

A detailed botanical illustration in black and white. On the left, a woody stem curves upwards, bearing several pinnately compound leaves with ovate leaflets. On the right, a long, slender, pendulous raceme hangs vertically, densely packed with numerous small, tubular flowers. The entire illustration is set against a plain white background.

**VASCULAR FLORA OF
MOUNT MAKILING AND VICINITY
(LUZON: PHILIPPINES), PART 2**

**Juan V. Pancho
and William Sm. Gruèzo**



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Jade vine (*Strongylodon macrobotrys* A. Gray), Papilionaceae.
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Vascular flora of Mount Makiling and vicinity (Luzon:Philippines), Part 2

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FOREWORD

The National Academy of Science and Technology (NAST) Philippines, in particular the Biological Sciences Division, takes pride in its involvement in the production of the final manuscripts in camera-ready form of Part 2 of the five-part treatise on the vascular flora of Mount Makiling and vicinity. The entire floristic work was a life-long preoccupation of the Late Professor Juan V. Pancho, but a few deterrent factors then became apparent when efforts to publish parts or the entire work were being undertaken, specifically during the latter part of Prof. Pancho's tenure in the University of the Philippines Los Baños.

A few years prior to the demise of Prof. Pancho (in May 20, 2000), NAST had provided him a substantial research grant to expedite the production of an electronic version of the manually-typed manuscripts of the remaining four volumes of his work. Unfortunately, this particular undertaking fell short of its expected outputs.

In November 2003, NAST appointed Dr. William Sm. Gruèzo to undertake the revision of Part 2 of the "Vascular Flora of Mount Makiling and vicinity" – a task involving largely nomenclatural updating, enhancement of taxonomic literature, modification of identification keys to genera and species for a number of families and taxonomic revision of a few taxa. However, this particular task could be done only after an entirely new electronic version of the old, badly xeroxed copy of the manuscripts was completed in a very tedious manner.

The present improved form and substance of the "Vascular Flora of Mount Makiling and Vicinity, Part 2" owe much to the unparallel perseverance and taxonomic expertise, as well as acute technical editing of Dr. Gruèzo. This sequel of the "Vascular flora of Mount Makiling and vicinity" would certainly be an indispensable primary reference book not only in Plant Systematics/Taxonomy, Agriculture, Botany, Forestry, Environmental Science, but also in Plant Breeding, Landscape Architecture, Veterinary Botany, Conservation Biology, Wildlife Studies, among others.

As Chair of the NAST Biological Sciences Division, I am extremely happy to see that the much-awaited Part 2 of the "Vascular Flora of Mount Makiling and Vicinity" has finally been published. With the constantly high commitment of NAST to assist in the publication of works with high scholarly value, it can be expected that the three other parts of this particular 'Vascular Flora' would also be published soon.

I, therefore, enjoin every one to expand the horizon of knowledge in tropical plants by exploring with enthusiasm every page of this particular book.

ACADEMICIAN EMIL Q. JAVIER, Ph.D.
President, National Academy of Science
and Technology (NAST) Philippines and
Chair, NAST Biological Sciences Division
DOST Complex, Bicutan, Taguig City

PREFACE

The current volume is the second of an intended 5-series floristic work entitled, "Vascular flora of Mount Makiling and vicinity (Luzon: Philippines)." The series when finally completed will serve as the *Magnum Opus* in the long-standing professional career of Professor Juan V. Pancho as a plant taxonomist of national and international acclaim and as an indefatigable mentor to only but a select group of Filipino and foreign plant taxonomists, many of which have similarly attained some respectable degree of prominence.

My direct involvement in this floristic work began some 32 years ago when as a newly hired Instructor in Agricultural Botany of the then Department of Agricultural Botany (College of Agriculture, UP Los Baños), I was assigned the task of proofreading the first set of manually typed manuscripts of this "Flora" during vacant hours. As a new apprentice to the discipline of Systematic Botany, I found the work not only intellectually challenging but also physically demanding as more often I had to do the proofreading from 7 am to 12 noon and 1 to 5 pm of each free day from teaching for almost one year. It was also in this sort of probationary period that I discovered one defining character of a true-blue systematist – that of being original, particularly when it comes to making taxonomic decision. In short, originality is a truly hallmark character of a practicing systematist.

After having gone through the long gauntlet, so to speak, I find myself facing one of the most exciting challenges in my professional life – that of having to polish to a near-perfect condition the remaining series of the "Vascular flora of Mount Makiling and vicinity" – a gargantuan task *vis-à-vis* a not only dwindling public financial resource for this kind of work, but rather a seemingly nonexistent one! Despite such a prognosis, I am still hopeful that sufficient financial support towards the publication of the entire "Flora" series will come right on time.

This Part 2 of the 'Flora' covers 553 species, 9 subspecies, 10 varieties and 3 forms, distributed in 269 genera and 57 families (*i.e.* Family numbers 68- Papilionaceae to 124- Cornaceae of the original Flora plan). One new combination is being proposed in this work, *i.e.* *Hibiscus glabrescens* (Warb. ex Perk.) Gruèzo, *comb. nov.* (Basionym: *Bombycidendron glabrescens* Warb. ex Perk., *Fragm. Fl. Philip.* 16, 1883), an endemic species belonging to the Family Malvaceae, and locally known as *Vidal's lanutan* (Tag.).

With the demise of Professor Pancho (last May 20, 2000) and the apparent unavailability of the original copy of the 'Flora Part 2' manuscripts during the final preparation stage of this book, I assume full responsibility for any shortcomings, technical or otherwise, that may become apparent in the present work. Any constructive comments that would lead to further improve the present version would therefore be appreciated.

WILLIAM SM. GRUÈZO, Ph.D.
Professor & Curator of Botany
UP Los Baños

INTRODUCTION

Some 23 years ago (in 1983), the '*Vascular Flora of Mount Makiling and Vicinity (Luzon: Philippines), Part 1*' was published as Supplement Number 1 of *Kalikasan*, The Philippine Journal of Biology (ISSN 0115-0553). This was made possible through the superb editing of Dr. Irineo J. Dogma, Jr. (then Chairman, *Kalikasan* Board of Editors), coupled with his unrelenting supervision of the work while in press.

The plan of this 'Flora' is composed of 5 parts, viz. Parts 1 to 4 treated conifer and angiosperm families according to Engler's *Syllabus der Pflanzenfamilien* (1964) with some modifications while Part 5 is devoted to the pteridophytes as worked out by Michael G. Price (1974) following Holttum (1959), with few changes.

The pernicious absence of public funds for publication caused the delay in the issuance of the sequels to Part 1; the delay was long enough that some taxonomic, nomenclatural and technical problems cropped up making the remaining original manuscript versions of the 'Flora' only partly useful for publication.

With the exception of a few recent treatises on the plants and animals of Mount Makiling following a landscape approach (Gruèzo 1997, Gonzalez 1997, Gruèzo & Gonzalez 1997, Gonzalez & Dans 1997), much of the information on the Mount Makiling environment as discussed in the introductory section of the 'Flora Part 1' (Pancho 1983) are still relevant, hence the readers are requested to refer to this, with special emphasis on the geographic coverage of the "Flora" as delimited by the first author (JVP).

For purpose of expediency, the abbreviations for the various dialects or languages as adopted from Merrill's *An Enumeration of Philippine Flowering Plants*, Volume 4, pp. 28-29 (1926) are reproduced here (regardless of whether actually used or not in this volume), together with the standard acronym for each of the 14 world herbaria where representative collections of Mount Makiling plants are permanently deposited and three series of collections. These are as follows:

A. Philippine dialects and languages.

Ap. = Apayao	Dum. = Dumagat
Bag. = Bagobo	Engl. = English
Bik. = Bikol	Gad. = Gaddang
Bil. = Bila-an	Ibn. = Ibanag
Bis. = Bisaya	If. = Ifugao
P. Bis. = Panay Bisaya	Ilk. = Iloko
C. Bis. = Cebu Bisaya	Ig. = Igorot
S.-L. Bis. = Samar-Leyte Bisaya	Ilg. = Ilongot
Ak. Bis. = Aklan Bisaya	Is. = Isinai
Bon. = Bontok	Ism. = Isamal
Buk. = Bukidnon	Iv. = Ivatan
Chab. = Chabacano	Kul. = Kulaman

Klg. = Kalinga	Sbl. = Sambali
Kuy. = Kuyonon	Sml. = Samal
Lan. = Lanao	Sp. = Spanish
Mag. = Magindanao	Sul. = Sulu
Mand. = Mandaya	Sub. = Subanun
Mang. = Mangyan	Tag. = Tagalog
Mbo. = Manobo	Tagb. = Tagbanua
Mng. = Mangguangan	Tagk. = Tagaka-olo
Neg. = Negrito	Ting. = Tinggian
Pamp. = Pampangan	Tir. = Tirurai
Pang. = Pangasinan	Yak. = Yakan

B. World herbaria where authentic herbarium materials of Mt. Makiling plants and collection series are deposited (Pancho 1983, p.13):

- A – Arnold Arboretum, Harvard University, Cambridge, Massachusetts, U.S.A.
- BO – Herbarium Bogoriense, Bogor, Indonesia
- BM – British Museum of Natural History, Cromwell Road, London, U.K.
- BS – Bureau of Science, Manila, Philippines (as to series; the herbarium defunct and replaced by the Philippine National Herbarium, see below)
- CA – College of Agriculture, University of the Philippines Los Baños, College, Laguna, Philippines (series)
- CAHP – College of Agriculture Herbarium, Museum of Natural History, University of the Philippines Los Baños, College, Laguna, Philippines
- FB – Forestry Bureau, Manila (series)
- GH – Gray Herbarium, Harvard University, Cambridge, Massachusetts, U.S.A.
- K – Kew, The Herbarium, Royal Botanic Gardens, Richmond, Surrey, U.K.
- L – Rijksherbarium, Leiden, The Netherlands
- LBC – Herbarium, College of Forestry and Natural Resources, University of the Philippines Los Baños, College, Laguna, Philippines
- NY – New York Botanical Garden, Bronx, New York, U.S.A.
- PNH – Philippine National Herbarium, P. Burgos St., Manila, Philippines (also as series)
- SB – Species Blancoanae of E.D. Merrill (series)
- SING – Herbarium of the Botanic Gardens, Singapore
- UC – Herbarium, University of California, Berkeley, California, U.S.A.
- US – U.S. National Museum (Department of Botany), Smithsonian Institution, Washington D.C., U.S.A.

ACKNOWLEDGMENTS

On behalf of Late Professor J.V. Pancho, I would like to extend our sincerest gratitude to Academician Emil Q. Javier, President and Chair of the Biological Sciences Division, National Academy of Science and Technology (NAST) Philippines for his genuine concern and the generous financial assistance that made possible the completion of an improved version of the 'Makiling Flora Part 2' manuscripts. I am also grateful to Dr. Asuncion K. Raymundo, Academician, NAST and former Director, Institute of Biological Sciences (IBS), College of Arts and Sciences (CAS), University of the Philippines Los Baños (UPLB), for her kind encouragement and support in various ways. The entire 626 pages of the camera ready manuscripts of this book were critically evaluated by Dr. Clare R. Baltazar, Professor Emeritus, UP Los Baños and National Scientist of the Philippines, to whom I am, indeed, very grateful for her insightful comments and corrections. I am also thankful to Ms. Rowena V. Briones (NAST) for her expert encoding of additional corrections and preparation of the final, clean manuscript copy of this book.

The kind permission to use a number of illustrations obtained from various authors and publishers is whole-heartedly acknowledged and the corresponding credit for each of these is provided where appropriate.

For permission to examine some critical herbarium specimens now deposited at the Botanical Herbarium (CAHP), UPLB Museum of Natural History (MNH), I am grateful to Dr. Lourdes B. Cardenas, former MNH Director. The assistance of Forester Danilo Tandang (formerly with the Plant Biology Division, IBS-CAS, UPLB) in locating and cataloging some herbarium specimens that form the Exsiccatae part of this book is also acknowledged with appreciation.

Finally, I thank Mrs. Aida BG. Gruèzo for her assistance in proofreading the final version of the manuscripts and Mr. Ydred Harriss G. Gruèzo for his expert assistance in the production of the electronic version of this book as well as for the use of all computer hardwares, *e.g.* personal desk top and lap top computers, scanning and printing machines, *etc.*

THE FLORA

KEY TO MAJOR TAXA AND FAMILIES³

(Taxa marked by an asterisk are treated in separate volumes).

1. Plants without seeds or flowers; reproducing by spores borne in sporangia (DIVISION I)..... PTERIDOPHYTA*
1. Plants with seeds borne in cones or produced by flowers (DIVISION II)..... SPERMATOPHYTA (1⁴, p. 37)
 2. Flowers absent; seeds not enclosed in an ovary, naked, usually borne on surface of imbricated scales which form a cone, strobilus or modified equivalent (SUBDIVISION 1).....GYMNOSPERMAE (1, p. 37)
 2. Flowers present; seeds enclosed in an ovary which becomes a fruit at maturity (SUBDIVISION 2)..... ANGIOSPERMAE (1, p. 54; 2, p. 27)
 3. Leaves mostly net-veined; taproots usually present; flower parts in whorls of 2 or 5, rarely 3; vascular bundles of stem arranged in a single cylinder; vascular cambium present; cotyledons 2, rarely 3 or more (CLASS 1)..... DICOTYLEDONEAE (1, p. 54; 2, p. 27)
 3. Leaves mostly parallel-veined; taproots absent; flower parts in whorls of 3, rarely 2, 4 or more; vascular bundles of stem scattered; vascular cambium usually absent; cotyledon 1 (CLASS 2)..... MONOCOTYLEDONEAE*

DIVISION II. SPERMATOPHYTA (Seed Plants)

SUBDIVISION 1: GYMNOSPERMAE (Cone-bearing Plants)

1. Staminate inflorescence a compound cone; vessel present in secondary wood; perianth present..... 6. Gnetaceae (1, p. 51)
1. Staminate inflorescence not a compound cone; vessel absent in secondary wood; perianth absent
 2. Leaves pinnately divided, crowded at apex of woody stem..... 1. Cycadaceae (1, p. 37)
 2. Leaves not divided or crowded at apex of woody stem
 3. Ovules 1 or more; fruit a berry or drupe-like; seed borne on fleshy aril..... 2. Podocarpaceae (1, p. 41)
 3. Ovules many to several, in cones without fleshy aril
 4. Leaves and cone-scales spirally arranged; ovuliferous scales free or adnate to bracts
 5. Ovuliferous scales and bracts completely fused; seeds never winged (except in *Agathis*)..... 3. Araucariaceae (1, p. 44)
 5. Ovuliferous scales separate or adnate to bracts; seeds winged... 4. Pinaceae (1, p. 47)

³Reprinted with permission from Pancho (1983), pp.16-36, with modifications.

⁴Treated in Part 1 of this Flora (Pancho 1983).

- 4. Leaves and cone-scales opposite, decussate or in whorls of 3-8; ovuliferous scales completely adnate to bracts.....
- 5. Cupressaceae (1, p. 49)

SUBDIVISION 2: ANGIOSPERMAE (Flowering Plants)

CLASS 1: DICOTYLEDONEAE

- 1. Corolla absent; calyx present or absent, sometimes petaloid and simulating a corolla (SUBCLASS 1)..... APETALAE (1, p. 17)
- 1. Corolla and calyx present; petals free from each other, joined at base only or more or less united
 - 2. Petals free from each other or joined at base only (SUBCLASS 2).....POLYPETALAE (1, p. 20)
 - 2. Petals more or less united (SUBCLASS 3)... SYMPETALAE (1, p. 30)

SUBCLASS 1: APETALAE

- 1. Plants with jointed, rush-like branchlets; leaves represented by minute scales 7. Casuarinaceae (1, p. 54)
- 1. Plants without jointed, rush-like branchlets; leaves ordinary, not represented by minute scales
 - 2. Flowers minute (mostly 1 mm long or less), cymosely branched, capitate, spicate or subumbellate
 - 3. Trees or scramblers, inflorescence enveloped by a caducous spathe 12. Cecropiaceae (1, p. 120)
 - 3. Succulent, suffrutescent herbs or subherbaceous vines
 - 4. Succulent herbs or climbing subherbaceous vines; leaves entire, alternate, rarely opposite; stamens 2-6 . 43.Piperaceae(1,p. 291)
 - 4. Suffrutescent herbs; leaves toothed, opposite; stamens 1 or 3 44. Chloranthaceae (1, p. 306)
 - 2. Flowers larger than 1 mm long, in catkins or catkin-like spikes, or on inner wall of a closed, ovoid, fleshy receptacle
 - 5. Flowers in catkins or catkin-like spikes, or on inner wall of a closed, ovoid or globose, fleshy receptacle
 - 6. Flowers on inner wall of a closed, ovoid or globose, fleshy receptacle 11. Moraceae (1, p. 67)
 - 6. Flowers in catkins or catkin-like spikes
 - 7. Catkins dense, racemose; plants mostly or strictly dioecious
 - 8. Plants strictly dioecious; inflorescence enveloped by a caducous spathe 12. Cecropiaceae (1, p. 120)
 - 8. Plants mostly dioecious; inflorescence otherwise 11. Moraceae (1, p. 67)
 - 7. Catkins slender and elongate; plants mostly monoecious

- 9. Leaves imparipinnate, glandular beneath, estipulate.....
..... 8. Juglandaceae (1, p. 56)
- 9. Leaves simple, eglandular beneath, stipulate ... 9. Fagaceae (1,p. 58)
- 5. Flowers not in catkins or inside a globose, fleshy receptacle
- 10. Cells or ovary (if simple) with 1 or 2 ovules
- 11. Pistils or distinct carpels more than 1, often numerous
- 12. Sepals colored, white or green, petal-like
 - 13. Suffrutescent herbs or climbers; placentation basal or parietal; fruit an achene or follicle
.....38. Ranunculaceae (1, p. 271)
 - 13. Large trees; placentation axile or parietal; fruit a 2-valved, loculicidal capsule 12.Crypteroniaceae (2,p.494)
- 12. Sepals not prominently colored or petaloid
- 14. Stamens monadelphous..... 97. Sterculiaceae (2, p. 415)
- 14. Stamens usually free, at least not monadelphous
- 15. Sepals imbricate; fruit an achene
..... 64. Rosaceae (1, p. 382)
- 15. Sepals valvate (at least the outer ones); fruit not long an achene
- 16. Inflorescence cymose or paniced, sometimes cauliflorous 97. Sterculiaceae(2, p. 415)
- 16. Inflorescence racemose orspicate, never cauliflorous 22. Phytolaccaceae (1, p. 169)
- 11. Pistils solitary , simple or compound
- 17. Ovary inferior (half inferior to superior in Nyctaginaceae) or at least completely and permanently immersed in calyx tube or hypanthium
- 18. Plants herbaceous
- 19. Plants parasitic on roots of other plants; leaves scale-like46. Rafflesiaceae (1, p. 312)
- 19. Plants not parasitic; leaves not scale-like
- 20. Flowers subtended by united calyx-like bracts
.....23. Nyctaginaceae (*Mirabilis*) (1, p. 170)
- 20. Flowers not so subtended
..... 64. Rosaceae (1, p. 382)
- 18. Plants vines; shrubs or trees, suffrutescent or woody
- 21. Leaves and young shoots covered with scurfy, peltate or stellate scales (upper surfaces of leaves sometimes nearly glabrous)
.....100. Elaeagnaceae (2, p. 438)
- 21. Leaves and shoots not scurfy

- 22. Flowers subtended by united, calyx-like bracts
 - 23. Bracts prominent, showy..... 23. Nyctaginaceae (*Bougainvillea*) (1, p. 170)
 - 23. Bracts otherwise..... 23. Nyctaginaceae (*Pisonia*) (1, p.170)
- 22. Flowers not so subtended
 - 24. Fruit a dehiscent capsule; calyx tubular; suffrutescent, climbing vine..... 45. Aristolochiaceae (1, p. 310)
 - 24. Fruit a drupe, berry or achene; calyx not tubular; shrub or tree
 - 25. Plants parasitic on branches of other plants; fruit a 1-seeded berry19. Loranthaceae (1, p. 155)
 - 25. Plants parasitic on roots of other plants; fruit a drupe or achene18. Santalaceae (1, p. 154)
- 17. Ovary superior
 - 26. Plants slender, submersed, aquatic; leaves whorled, cleft into slender, toothed lobes ...42. Ceratophyllaceae (1, p. 291)
 - 26. Plants robust, terrestrial, if aquatic, not submersed; leaves whorled or not, if the former, not cleft into slender, toothed lobes
 - 27. Nodes sheathed by stipules (ochrea); suffrutescent herbs, vines or trees..... 21. Polygonaceae (1, p.164)
 - 27. Nodes not sheathed by stipules; herbs, shrubs or trees
 - 28. Plants parasitic on roots of host plants; leaves scale-like
 - 29. Flowers perfect, solitary; stems with opposite scales 46. Rafflesiaceae (1, p. 312)
 - 29. Flowers imperfect, numerous; stems with alternate scales 20. Balanophoraceae (1, p. 162)
 - 28. Plants not parasitic on roots
 - 30. Plants herbs, often twiners or vines with tendrils
 - 31. Stigmas and styles if present, solitary
 - 32. Branches grooved, with tendrils; fruit a membranaceous, inflated capsule82. Sapindaceae (*Cardiospermum*)(2, p. 306)
 - 32. Branches not grooved, without tendrils; fruit otherwise
 - 33. Flowers bisexual
 - 34. Sepals 4 or 5; stamens 3-10 or more; shrub, herb or small tree 22. Phytolaccaceae (1, p. 169)
 - 34. Sepals or sepal-like bracts 2; petaloid sepals 5, often colored; stamens 5; herbaceous vine 27. Basellaceae (1, p. 186)
 - 33. Flowers unisexual13. Urticaceae (1, p. 125)

- 31. Stigmas (or styles) 2 or more
 - 35. Pistils 1-celled, one-ovuled
 - 36. Flowers subtended by scarious bracts; leaves alternate or opposite 30. Amaranthaceae (1, p. 191)
 - 36. Flowers not subtended by scarious bracts; leaves alternate 29. Chenopodiaceae (1, p. 190)
 - 35. Pistils of two or more carpels
 - 37. Flowers perfect; pistil of 2 to many united carpels ripening into a horned, dry, indehiscent fruit 24. Aizoaceae (1, p. 176)
 - 37. Flowers imperfect, pistil of 3 united carpels, splitting at maturity through partitions (septicidal) 73. Euphorbiaceae (2, p. 129)
- 30. Plants shrubs or trees
 - 38. Leaves opposite
 - 39. Stamens in 2 series 99. Thymelaeaceae (2, p. 434)
 - 39. Stamens not so
 - 40. Stamens 4-10, usually 8, inserted on summit or inside of disc; petioles not jointed 81. Aceraceae (2, p. 304)
 - 40. Stamens 2, sometimes 3-5, epipetalous; petioles usually jointed..... 136. Oleaceae*
 - 38. Leaves alternate, rarely verticillate
 - 41. Ovary 1- to 2-celled
 - 42. Calyx a long-cylindrical tube, often swollen at base
 - 43. Stamens 2-30, monadelphous 34. Myristicaceae (1, p. 245)
 - 43. Stamens 4, free 14. Proteaceae (1, p. 144)
 - 42. Calyx not tubular
 - 44. Stamens opposite calyx lobes 17. Opiliaceae (*Champereia*) (1, p. 152)
 - 44. Stamens otherwise
 - 45. Stamens on outer edge of disc .. 101. Flacourtiaceae (2, p. 440)
 - 45. Stamens not so inserted
 - 46. Styles and stigmas 2 10. Ulmaceae (1, p. 62)
 - 46. Style and stigma 1
 - 47. Anthers opening by lids at one end 36. Lauraceae (1, p. 252)
 - 47. Anthers opening lengthwise
 - 48. Plants lactiferous...11. Moraceae (1, p. 67)
 - 48. Plants not lactiferous
 - 49. Stamens 2, as many or twice as many as lobes... 22. Phytolacaceae (1, p. 169)
 - 49. Stamens 3 or more but not as many as lobes....99. Thymelaeaceae (2, p. 44)

- 41. Ovary often more than 2-celled 90. Rhamnaceae (2, p. 348)
- 10. Cells or ovary (if simple) with 3 or more ovules
 - 50. Ovary inferior
 - 51. Ovary 1-celled 120. Combretaceae (2, p. 556)
 - 51. Ovary 4- to 6-celled 45. Aristolochiaceae (1, p. 310)
 - 50. Ovary superior
 - 52. Pistils (or ovaries) 2 or more, separate 38. Ranunculaceae (1, p. 271)
 - 52. Pistil single
 - 53. Ovary 1-celled
 - 54. Leaves simple, not lobed nor divided 101. Flacourtiaceae (440)
 - 54. Leaves compound or deeply lobed 38. Ranunculaceae (1, p. 271)
 - 53. Ovary 2- to 6-celled
 - 55. Leaves bearing "pitchers"; ovary 4-celled..... 53. Nepenthaceae (1, p. 350)
 - 55. Leaves ordinary; ovary 2- to 6-celled..... 111. Lythraceae (2, p. 486)

SUBCLASS 2. POLYPETALAE

- 1. Stamens more than 10, usually numerous, or more than twice as many as petals (2 to many, often 6, in Menispermaceae)
- 2. Ovary inferior
 - 3. Aquatic herbs from submersed rootstocks; leaves round, floating..... 40. Nymphaeaceae (1, p. 288)
 - 3. Terrestrial herbs, vines, shrubs or trees; leaves various
 - 4. Plants with thick, fleshy stems, mostly spiny and without foliage leaves 31. Cactaceae (1, p. 208)
 - 4. Plants with foliage leaves, not cactaceous
 - 5. Flowers unisexual; succulent herbs (tall buttressed trees in Datisceae (*Octomeles*))
 - 6. Stigmas papillose on all sides, twisted; ovary 2- to 4-celled 109. Begoniaceae (2, p.468)
 - 6. Stigmas otherwise; ovary 1-celled 108. Datisceae (2, p. 466)
 - 5. Flowers bisexual; herbs, suffrutescent vines, shrubs or trees
 - 7. Suffrutescent vines; spines binnate or fasciculate 31. Cactaceae (*Pereskia*) (1, p. 208)
 - 7. Succulent herbs, shrubs or trees; spineless (except in some Rosaceae)

- 8. Plants herbaceous
 - 9. Sepals 2; ovary with central and basal placentae 26. Portulacaceae (1, p. 182)
 - 9. Sepals 4 or 5; ovary with parietal or apparently basal placentae
 - 10. Stamens distinctly perigynous; capsules circumscissile 24. Aizoaceae (1, p. 176)
 - 10. Stamens hypogynous or slightly perigynous; fruit a valvular capsule, not circumscissile 25. Molluginaceae (1, p. 180)
- 8. Plants shrubs or trees
 - 11. Stipules present
 - 12. Leaves opposite; nodes swollen; calyx limbs 3- to 16-lobed 119. Rhizophoraceae (2, p. 553)
 - 12. Leaves alternate; nodes not swollen; calyx limbs usually 5-lobed 64. Rosaceae (1, p. 382)
 - 11. Stipules absent, if present, minute and caducous
 - 13. Inflorescences in axillary cymes or jointed pedicels 123. Alangiaceae (2, p. 571)
 - 13. Inflorescences terminal or axillary, not on jointed pedicels
 - 14. Leaves glandular-punctate 113. Myrtaceae (2, p. 496)
 - 14. Leaves not glandular-punctate
 - 15. Leaves alternate; fruits dry and woody, dehiscent by a lid or crowned by persistent sepals
 - 16. Stamens free or connate at base, not in 1 or 2 bundles; endosperm absent or subruminate 117. Barringtoniaceae (2, p. 527)
 - 16. Stamens numerous, mona- or diadelphous, if the latter, one bundle ligulate and either bearing anthers or barren and arched over gynoecium; seeds without endosperm 116. Lecythydaceae (2, p. 525)
 - 15. Leaves opposite; fruits leathery, indehiscent 115. Punicaceae (2, p. 523)
- 2. Ovary superior
 - 17. Aquatic herbs from submersed rootstocks, leaves or upper part of petiole above water surface 41. Nelumbonaceae (1, p. 288)
 - 17. Terrestrial herbs, vines, shrubs or trees; leaves otherwise
 - 18. Pistils few to many, distinct or united at base, or connate near apex
 - 19. Plants climbers
 - 20. Leaves alternate, palmately-veined 39. Menispermaceae (1, p. 274)
 - 20. Leaves opposite, pinnately-veined 38. Ranunculaceae (1, p. 271)

- 19. Plants herbs, shrubs or trees
 - 21. Stamens monadelphous or 3- to 8-adelphous
 - 22. Stamens monadelphous 95. Malvaceae (2, p. 384)
 - 22. Stamens 1- or 3- 8-adelphous 51. Hypericaceae (1, p. 343)
 - 21. Stamens free
 - 23. Leaves opposite; stamens 4-6 or 7 to many
 - 24. Sepals and petals in 2 series; stamens 4-6; fruits indehiscent 35. Monimiaceae (1, p. 251)
 - 24. Sepals not as above; stamens 7 to many; fruits dehiscent 51. Hypericaceae (1, p. 343)
 - 23. Leaves alternate; stamens 10 or more
 - 25. Fruits follicles or samara-like
 - 26. Stamens 10, usually in 2 series 65. Connaraceae (1, p. 391)
 - 26. Stamens more than 10, arranged spirally or not
 - 27. Stamens spirally arranged; sepals 3, petaloid 32. Magnoliaceae (1, p. 212)
 - 27. Stamens arranged otherwise; sepals 5, not petaloid 93. Elaeocarpaceae (2, p. 364)
 - 25. Fruits baccates or berries
 - 28. Sepals 3, rarely 2, valvate; anthers 4-celled at anthesis 33. Annonaceae (1, p. 218)
 - 28. Sepals 3-6, often 5, imbricate; anthers 2-celled at anthesis 48. Saurauiceae (1, p. 319)
18. Pistils single but of 2 or more united carpels and sometimes more than 1 style
 - 29. Foliage glandular-dotted or with resin-canals; stamens united basally into 3 or more bundles
 - 30. Leaves glandular-dotted, alternate, estipulate; stamens on highly developed disc 74. Rutaceae (2, p. 222)
 - 30. Leaves with resin-canals, opposite or whorled, stipulate; stamens not on disc 52. Clusiaceae (1, p. 344)
 - 29. Foliage and stamens otherwise
 - 31. Ovary 2- or more-celled
 - 32. Leaves opposite or whorled
 - 33. Leaves with glands on lower surface or on petioles 78. Malpighiaceae (2, p. 277)
 - 33. Leaves otherwise
 - 34. Sepals and petals 3-5; fruits capsules 62. Cunoniaceae (1, p. 377)
 - 34. Sepals and petals 4-8; fruits berries 114. Sonneratiaceae (2, p. 521)
 - 32. Leaves alternate

- 35. Sepals and usually petals imbricate
 - 36. Stamens pentadelphous96. Bombacaceae (2, p. 409)
 - 36. Stamens otherwise
 - 37. Ovary unilocular, with 2-10 carpels, placentation parietal 101. Flacourtiaceae (2, p. 440)
 - 37. Ovary 2- or more-loculed; placentation axile (free-central if ovary is unilocular)
 - 38. Ovary 2-loculed, 2-carpelled 83. Sabiaceae (2, p. 327)
 - 38. Ovary 3- or more-loculed; carpels 2 to many, if single, septation incomplete
 - 39. Flowers solitary or few in clusters.....
 - 50. Theaceae (1, p. 337)
 - 39. Flowers cymose or racemose
 -15. Olacaceae (1, p. 146)
- 35. Sepals and usually petals valvate
 - 40. Anthers 1-celled
 - 41. Stamens markedly monadelphous; pollen grains spiny, large 95. Malvaceae (2, p. 384)
 - 41. Stamens not so; pollen grains smooth
 - 96. Bombacaceae (2, p. 409)
 - 40. Anthers 2-celled
 - 42. Stamens usually connate into a tube
 - 97. Sterculiaceae (2, p. 415)
 - 42. Stamens nearly free and distinct
 - 43. Sepals 3-5; petals 3-5; fruits drupes, berries or capsules, not winged
 - 44. Stipules present, fugacious; stamens 10 or more; fruits capsules or drupes 94. Tiliaceae (2, p. 371)
 - 44. Stipules present or absent; stamens 3-12; fruits drupes76. Burseraceae (2, p. 247)
 - 43. Sepals 5; petals 5; fruits drupes, winged by the enlarged sepals 49. Dipterocarpaceae (1, p. 323)
- 31. Ovary 1-celled (in Bixaceae, apparently more than 1-celled by intrusion of false partition)
 - 45. Sepals 2, exceptionally 3; herbs
 - 46. Placentae free- central 26. Portulacaceae (1, p. 182)
 - 46. Placentae parietal 54. Papaveraceae(1, p. 352)
 - 45. Sepals 3, 4 or 5 (to 20 in Dilleniaceae); herbs or woody plants
 - 47. Fruits (or ovaries) elevated on gynophores; plants spiny or sticky- viscid
 - 48. Fruits dehiscent, capsular; replum present; mostly herbs
 - 56. Cleomaceae (1, p. 359)
 - 48. Fruits indehiscent; replum absent; mostly trees and shrubs
 -55. Capparaceae (1, p. 354)

47. Fruits (or ovaries) not so elevated; plants not spiny (except in some flacourtiaceous genera) or sticky-viscid
49. Leaves compound or deeply fidd
50. Fruits numerous 1-seeded achenes, tailed or appendaged 38. Ranunculaceae (1, p. 271)
50. Fruits dehiscent or indehiscent pods
51. Petals valvate; flowers regular 66. Mimosaceae (1, p. 397)
51. Petals imbricate, flowers irregular
52. Flowers papilionaceous, upper petal (standard) exterior ... 68. Papilionaceae (2, p. 28)
52. Flowers caesalpinaceous, upper petal interior..... 67. Caesalpiniaceae (1, p. 418)
49. Leaves simple (or palmatilobed in Cochlospermaceae)
53. Plant-juice colored; fruits capsules
54. Capsules 2-valved, spiny or muricate; seeds densely studded with small, round, red, sessile glands 105. Bixaceae (2, p. 460)
54. Capsules 3- to 5-valved; seeds covered with woolly hairs..... 106. Cochlospermaceae (2, p. 462)
53. Plant-juice not colored; fruits capsules, pods or berries
55. Placentae axile; stamens united; scandent shrubs or trees... 47. Dilleniaceae (1, p. 314)
56. Fruits indehiscent or dehiscent by one or both sutures, sometimes winged, sometimes breaking into 1-seeded segments
57. Petals valvate in bud; flowers actinomorphic 66. Mimosaceae (1, p. 397)
57. Petals imbricate in bud; flowers zygomorphic or nearly so
58. Uppermost petal overlapped on each side by adjacent lateral petals 67. Caesalpiniaceae (1, p. 418)
58. Uppermost petal overlapped on each side by adjacent lateral petals (wings) but forming with keel petals a zygomorphic corolla 68. Papilionaceae (2, p. 28)
56. Fruits 2- to 5-valved capsules, fleshy drupes, or berry-like
59. Flowers unisexual; petals, if present, not spurred 101. Flacourtiaceae (2, p. 440)
59. Flowers bisexual; anterior petals spurred 102. Violaceae (2, p. 452)

1. Stamens usually 3-10; sometimes 2 or 4, not more than twice as many as petals
 60. Ovary inferior (calyx or its tube adherent, at least part way, to ovary)
 61. Cell or cells of ovary with only 1 ovule
 62. Stamens as many as petals and opposite the latter..... 90. Rhamnaceae (1, p. 348)
 62. Stamens not as many as petals, or, if as many, alternate with petals
 63. Stamens 5-10
 64. Leaves simple
 65. Leaves intrapetiolar, connate 125. Araliaceae*
 65. Leaves not intrapetiolar
 66. Flowers in umbels or dense heads; fruits schizocarps, splitting into 2 valves
 67. Mericarps with 5 longitudinal ribs..... 126. Apiaceae*
 67. Mericarps with 3 longitudinal ribs 127. Hydrocotylaceae*
 66. Flowers not as above; fruits capsules or achenes..... 64. Rosaceae (1, p. 382)
 64. Leaves compound
 68. Fruits berry-like 125. Araliaceae*
 68. Fruits dry, splitting into two halves 126. Apiaceae*
 63. Stamens 4 or 5, or 2-5 to twice as many as calyx lobes
 69. Stamens 4 or 5; stigmas and styles single; fruits drupes 124. Cornaceae (1, p. 573)
 69. Stamens 2-5 or twice as many as calyx lobes; stigmas (and often styles, more than 1 or else manifestly lobed; fruits capsular 121. Onagraceae (1, p. 563)
 61. Cell or cells of ovary with few or many ovules
 70. Ovary 1-celled
 71. Sepals 2; succulent herbs ... 26. Portulacaceae (1, p. 182)
 71. Sepals more than 2; trees, shrubs or vines..... 120. Combretaceae (2, p. 556)
 70. Ovary 2- or more-celled
 72. Aquatic, soft-glabrous herbs; flowers unisexual 122. Haloragaceae (*Myriophyllum*) (2, p. 570)
 72. Terrestrial, suffrutescent or woody herbs, shrubs or trees; flowers bisexual
 73. Anthers opening on top by pores..... 118. Melastomataceae (2, p. 533)
 73. Anthers opening by longitudinal slits

- 74. Stamens attached on a conspicuous disc sometimes covering and concealing ovary
 - 75. Ovary cells numerous, in 2 or 4 series, each with a single ovule 87. Siphonodontaceae (2, p. 339)
 - 75. Ovary cells 1-to 5-locular; ovules usually 2 86. Celastraceae (2, p. 334)
- 74. Stamens attached on calyx tubes or to petals
 - 76. Style single 121. Onagraceae (2, p. 563)
 - 76. Styles 2-5 60. Hydrangeaceae (1, p. 371)
- 60. Ovary superior
 - 77. Pistils (separate ovaries) 2 or more sometimes united at base and strongly lobed
 - 78. Stamens inserted on calyx, sometimes epipetalous
 - 79. Plants fleshy, herbaceous or nearly so 59. Crassulaceae (1, p. 367)
 - 79. Plants woody, not fleshy
 - 80. Stipules absent
 - 81. Stamens 10; carpels 5 ... 65. Connaraceae (1, p. 391)
 - 81. Stamens 6-14 or twice the number of petals; carpels 2, 3 or 5 60. Hydrangeaceae (1, p. 371)
 - 80. Stipules present (deciduous in Dichapetalaceae)
 - 82. Stamens 5; ovary pubescent 98. Dichapetalaceae (2, p. 432)
 - 82. Stamens variable, rarely 5 or 10; ovary otherwise 64. Rosaceae (1, p. 382)
 - 78. Stamens inserted on receptacles beneath ovaries or pistils
 - 83. Leaves punctate with pellucid dots (seen when leaf held against the light) 74. Rutaceae (2, p. 222)
 - 83. Leaves not as above
 - 84. Plants or leaves fleshy 59. Crassulaceae (1, p. 367)
 - 84. Plants or leaves not fleshy
 - 85. Plants herbaceous
 - 86. Ovaries with styles or stigmas separate 38. Ranunculaceae (1, p. 271)
 - 86. Ovaries separate or jointed into a lobed pistil, but with a common style 70. Geraniaceae (2, p. 123)
 - 85. Plants trees, woody shrubs or vines
 - 87. Leaves pinnate, usually alternate
 - 88. Leaflets not exceeding 5-7; vines or shrubs
 - 89. Shrubs; slender petioles and rachis winged; flowers bright red 75. Simaroubaceae (*Quassia*)(2, p. 244)

- 89. Vines; petioles and flowers not as above 38. Ranunculaceae (1, p. 271)
- 88. Leaflets 11 or more; trees..... 75. Simaroubaceae (2, p. 244)
- 87. Leaves simple, opposite or alternate
 - 90. Leaves opposite; petals clawed; carpels 2-4..... 78. Malpighiaceae (2, p. 277)
 - 90. Leaves alternate; petals not clawed; carpel single 37. Hernandiaceae (1, p. 269)
- 77. Pistils single (carpels may be more than 1 but joined into 1 body)
 - 91. Ovary 1-celled
 - 92. Placenta single
 - 93. Styles or stigmas 2 or more
 - 94. Stamens 5; styles 5 132. Plumbaginaceae*
 - 94. Stamens 6 or more; styles 1-3
 - 95. Plants herbaceous; stamens tetradynamous 57. Brassicaceae (1, p. 363)
 - 95. Plants woody; stamens otherwise..... 80. Anacardiaceae (2, p. 289)
 - 93. Styles and stigmas single
 - 96. Sepals 2; petals 5; stamens 5; fleshy, herbaceous twiners 27. Basellaceae (1, p. 186)
 - 96. Sepals and petals typically 5 (or 4-5 in Icacinaceae); stamens typically 10 (4-5 in Icacinaceae and alternate with petals); herbs shrubs, lianas or trees
 - 97. Stamens monadelphous or diadelphous..... 68. Papilionaceae (2, p. 28)
 - 97. Stamens free
 - 98. Fruits pods; leaves compound, leaflets usually 6 or more pairs 67. Caesalpiniaceae (1, p. 418)
 - 98. Fruits berries or capsules; leaves simple..... 89. Icacinaceae (2, p. 343)
 - 92. Placentae or stigmas, or both, or ovary cells more than 1 (ovary compound), or carpels more than 1 but 1-celled; ovules 2 or more
 - 99. Placentation axile or basal (*i.e.*, pendulous from the top, never on side walls)
 - 100. Plants climbing by tendrils or pad-like caps at ends of branched tendrils 91. Vitaceae (2, p. 353)
 - 100. Plants without tendrils
 - 101. Flowers in leaf-opposed spikes, racemes, panicles or cymes
 - 102. Ovule single in each locule of ovary; stamens united or adnate at base; shrubs or small trees 92. Leeaceae (2, p. 360)

102. Ovules 2 in each locule of ovary; stamens not united or adnate; climbing vines or shrubs 91. Vitaceae (2, p. 353)
101. Flowers not as above
103. Stamens attached to corolla, number same as, more than, or less than corolla lobes
104. Stamens in 2 whorls, occasionally 1 whorl missing 111. Lythraceae (2, p. 486)
104. Stamens 2 or 5 in 1 whorl
105. Stamens 2; style single 136. Oleaceae*
105. Stamens 5; styles 5 132. Plumbaginaceae*
103. Stamens not attached to corolla (occasionally so in Portulacaceae)
106. Stamens in 1 whorl, as many as and opposite petals or by splitting 2 or 4 times as many as petals..... 26. Portulacaceae (1, p. 182)
106. Stamens in 1-2 whorls, as many or twice as many as petals 28. Caryophyllaceae (1, p. 189)
99. Placentation parietal in 2 or more placentae
107. Leaves with resin-canals; stamens united basally into 3 or more bundles 52. Clusiaceae (1, p. 344)
107. Leaves and stamens not as above
108. Stamens 10; in 2 series (5 perfect and 5 staminodia in Moringaceae)
109. Fruits berries; plants with palm-like crown at apex of stem with milky juice 107. Caricaceae (2, p. 464)
109. Fruits 3-ridged capsules; plants not as above and without milky juice 58. Moringaceae (1, p. 366)
108. Stamens less than 10 and not arranged as above
110. Stamens tetradynamous; fruits siliques or silicles 57. Brassicaceae (1, p. 363)
110. Stamens otherwise, fruits capsules or berries
111. Fruits (or ovaries) elevated on gynophores
112. Plants erect or scandent, often viscid and sticky or spiny..... 55. Capparaceae (1, p. 354)
112. Plants climbing by tendrils, neither sticky nor spiny 104. Passifloraceae (2, p. 455)
111. Fruits (or ovaries) not as above
113. Stamens on outer edge of swollen disc 101. Flacourtiaceae (2, p. 440)
113. Stamens otherwise 61. Escalloniaceae (1, p. 373)

91. Ovary 2- or more-celled
114. Corolla irregular
115. Anthers opening by terminal pores..... 79. Polygalaceae (2, p.284)
115. Anthers splitting down the sides
116. Ovules usually 2 in each placenta 83. Sabiaceae (2, p. 327)
116. Ovules many in each placenta
117. Calyx tubular, saccate or oblique at base..... 111. Lythraceae (2, p. 486)
117. Calyx not tubular, 1 sepal long-spurred 84. Balsaminaceae (2, p. 330)
114. Corolla regular or essentially so
118. Stamens 4, didynamus, or only 2 150. Scrophulariaceae*
118. Stamens 5 or more, if 4, not didynamous
119. Fruits samaras; leaves opposite
120. Samaras double, 2-winged 81. Aceraceae (2, p. 304)
120. Samaras single, 1-winged 136. Oleaceae*
119. Fruits otherwise; leaves opposite or alternate
121. Petals 4; stamens tetradynamous..... 57. Brassicaceae (1, p. 363)
121. Petals and stamens otherwise
122. Flowers unisexual
123. Juice milky..... 73. Euphorbiaceae (2, p. 129)
123. Juice not milky
124. Sepals valvate; filaments connate into a tube; stipulate 97. Sterculiaceae (2, p. 415)
124. Sepals imbricate; filaments free; estipulate 63. Pittosporaceae (1, p. 379)
122. Flowers bisexual
125. Leaves compound
126. Leaves palmately compound
127. Plants herbaceous 69. Oxalidaceae (2, p. 118)
127. Plants woody 96. Bombacaceae (2, p. 409)

- 126. Leaves pinnately compound
 - 128. Annual or perennial herbs
 - 129. Stamens 10, 5 longer ones opposite petals, 5 shorter ones with gland at base 71. Zygophyllaceae (2, p. 125)
 - 129. Stamens equaling or double the number of petals (2-7), glands often in series 61. Escalloniaceae (1, p. 373)
 - 128. Trees or shrubs
 - 130. Leaves opposite, fruits inflated bladders or pods 88. Staphyleaceae (2, p. 341)
 - 130. Leaves alternate, if opposite, fruits not as above
 - 131. Stigmas toothed, lobed or cleft 82. Sapindaceae (2, p. 306)
 - 131. Stigmas otherwise
 - 132. Filaments with full length coalescent to form a tube..... 77. Meliaceae (2, p. 254)
 - 132. Filaments with half their length coalescent but not forming a tube ... 69. Oxalidaceae (2, p. 118)
- 125. Leaves simple, even if lobed or cleft
 - 133. Plants woody vines or with stems having aerial rootlets; seeds covered with orange to purple aril 86. Celastraceae (2, p. 334)
 - 133. Plants not as above; seeds without aril
 - 134. Fruits long-beaked, carpels 1- or 2-ovuled, dehiscent from below and joined by styles . 70. Geraniaceae (2, p. 123)
 - 134. Fruits not as above; carpels 1- to many-ovuled
 - 135. Leaves opposite or verticillate
 - 136. Sepals free or scarcely united at base
 - 137. Ovule single in each locule; plants woody..... 78. Malpighiaceae (2, p. 277)
 - 137. Ovules numerous, in 2 or more rows to a locule; plants herbaceous 103. Elatinaceae (2, p. 453)
 - 136. Sepals united into tubular or cup-like calyx
 - 138. Style single 111. Lythraceae (2, 486)
 - 138. Styles 3-5 . 28. Caryophyllaceae (1, p. 189)
 - 135. Leaves alternate
 - 139. Fruits small berries or drupes; flowers axillary, solitary or fascicled
 - 140. Petals 5, with bifid ligulate appendage on inner face; stamens 10 72. Erythroxylaceae*
 - 140. Petals 3-6, without ligulate appendage; stamens 3-12

- 141. Petals 3-6, valvate; stamens as many as and opposite petals
 - 142. Calyx enlarged, completely enclosing fruit 16. Erythropalaceae (1, p. 149)
 - 142. Calyx minute or wanting, incompletely enclosing fruit..... 15. Olacaceae (1, p. 146)
- 141. Petals 4 or 5, imbricate; stamens 4-5, alternate with petals 85. Aquifoliaceae (2, p. 332)
- 139. Fruits 3-valved, loculicidal capsules or baccate; flowers rarely axillary and fasciculate or solitary
 - 143. Fruits 3-valved, loculicidal capsules; stamens 10; local species at high altitudes 128. Clethraceae*
 - 143. Fruits capsular and baccate; fertile stamens 5, local species at low altitudes
 - 144. Stamens in two whorls, those of outer wanting or reduced to staminodes 97. Sterculiaceae (2, p. 415)
 - 144. Stamens in one whorl, alternate with the petals; staminodes absent 63. Pittosporaceae (1, p. 379)

SUBCLASS 3. SYMPETALAE

- 1. Flowers unisexual (plants usually dioecious), the staminate long-tubular and with 10 epipetalous stamens, sepals very small (pistillate flowers choripetalous) 107. Caricaceae (2, p. 464)
- 1. Flowers otherwise
 - 2. Ovary superior
 - 3. Stamens not attached to corolla
 - 4. Flowers irregular; ovary 1-loculed
 - 5. Stamens 10, exceptionally 12 or 8-9; anthers splitting longitudinally 68. Papilionaceae (2, p. 28)
 - 5. Stamens 4-8; anthers opening by terminal pore..... 79. Polygalaceae (2, p. 284)
 - 4. Flowers regular; ovary 4-loculed 129. Ericaceae*
 - 3. Stamens, at least some, borne on corolla
 - 6. Stamens (some or all) opposite corolla lobes, usually as many or twice as many as the latter
 - 7. Styles 2 or more
 - 8. Pistils several, free or united at base..... 59. Crassulaceae (1, p. 367)
 - 8. Pistil single; ovary 1-or more-celled or lobed
 - 9. Stamens as many as corolla lobes (5); fruits capsules, circumsciss near base 132. Plumbaginaceae*
 - 9. Stamens twice as many as corolla lobes (3-7) or more, sometimes same in number and in single series; fruits berries 134. Ebenaceae*

- 7. Style single
 - 10. Flowers zygomorphic; plants herbaceous; usually in wet places 156. Lentibulariaceae*
 - 10. Flowers actinomorphic; plants woody, usually in dry places
 - 11. Ovaries 1-celled; leaves and calyx punctate . 131. Myrsinaceae*
 - 11. Ovary 2- to 18-celled; leaves or calyx not punctate
 - 12. Corolla pubescent outside; ovary 3- to 10-celled; ovule 1 or ovules 1 or 2 to a cell 134. Ebenaceae*
 - 12. Corolla not pubescent outside, ovary 2- to 18-celled; ovule solitary to a cell 133. Sapotaceae*
- 6. Stamens alternate with corolla lobes, usually equal number or fewer than the latter
 - 13. Ovaries 2, each 1-celled
 - 14. Stamens free; styles united 139. Apocynaceae*
 - 14. Stamens united; styles free 140. Asclepiadaceae*
 - 13. Ovary single, 1- to many-celled
 - 15. Ovary deeply lobed around styles
 - 16. Leaves (at least the main ones) alternate; stems terete
 - 17. Styles twice-divided (4-lobed) 144. Cordiaceae*
 - 17. Styles undivided or divided once (2 lobed), or styles 2, free 145. Ehretiaceae*
 - 16. Leaves opposite; stems 4-sided, squarish..... 148. Lamiaceae*
 - 15. Ovary not deeply lobed around styles
 - 18. Ovary 1-celled
 - 19. Stamens as many as corolla lobes
 - 20. Flowers in dense, head-like spikes; corolla lobes 4 157. Plantaginaceae*
 - 20. Flowers in short, leafy racemes, terminal; corolla lobes 5 143. Hydrophyllaceae*
 - 19. Stamens fewer than corolla lobes, usually 2 or 4, rarely 5
 - 21. Plants parasitic on roots of other plants; leaves reduced to scales 155. Orobanchaceae*
 - 21. Plants not parasitic; leaves broad..... 154. Gesneriaceae*
 - 18. Ovary 2- or more-celled
 - 22. Fruits of 4 small nutlets
 - 23. Leaves alternate 146. Heliotropiaceae*
 - 23. Leaves opposite 147. Verbenaceae*
 - 22. Fruits not as above
 - 24. Stamens fewer than corolla lobes, usually 2, 4, or 5

25. Leaves alternate, the upper ones sometimes opposite
26. Stamens 2, if 4, didynamous; fruits capsules 150. Scrophulariaceae*
26. Stamens 4 or 5, if 4, not didynamous; fruits berries or capsules 149. Solanaceae*
25. Leaves opposite or in spurious whorls, upper ones alternate
27. Plants herbaceous or suffrutescent
28. Placentation axile; stamens 2, 4, or 5 150. Scrophulariaceae*
28. Placentation parietal; stamens 4, in 2 pairs
29. Flowers bracteate and bracteolate; fruits 1- or 2-celled, berry-like or capsular 154. Gesneriaceae*
29. Flowers not bracteate or bracteolate, if so, very small; fruits 2- or 4-celled capsules 153. Pedaliaceae*
27. Plants woody (herbaceous in some Acanthaceae)
30. Stamens 2 136. Oleaceae*
30. Stamens 4, didynamous or paired 152. Acanthaceae*
24. Stamens as many as corolla lobes
31. Plants herbaceous; leaves all in basal rosettes; flowers in dense spikes on naked scapes 157. Plantaginaceae*
31. Plants herbaceous or woody; leaves cauline; flowers various, not as above
32. Ovules not more than 2 to a cell; plants climbing, with milky sap, herbaceous or suffrutescent 142. Convolvulaceae*
32. Ovules 2 or numerous to a cell; plants not climbing, if so, without milky sap; herbs, shrubs, woody vines or trees
33. Placentation parietal; herbaceous or woody
34. Calyx divided nearly to base; corolla 8-10 mm in diameter; plants herbaceous 143. Hydrophyllaceae (*Hydrolea*)*
34. Calyx gamophyllous; corolla much larger; plants woody 151. Bignoniaceae*
33. Placentation axile (parietal with unilocular ovaries in Loganiaceae); herbs, shrubs or trees
35. Leaves opposite
36. Flowers corymbose or in globose heads; stamens 4 or 5, plants woody
37. Indumentum when present neither glandular, stellate nor lepidote; intraxylary phloem present 137. Loganiaceae*
37. Indumentum when present glandular-stellate or lepidote; intraxylary phloem absent 138. Buddlejaceae*

- 38. Flowers bracteate; capsules elastically dehiscent 152. Acanthaceae*
- 38. Flowers never bracteate; capsules not elastically dehiscent ..
..... 150. Scrophulariaceae*
- 35. Leaves alternate, sometimes densely imbricate
 - 39. Corolla lobes valvate or plicate in bud; stamens 5
..... 149. Solanaceae*
 - 39. Corolla lobes imbricate in bud; stamens 4, didynamous
..... 150. Scrophulariaceae*
- 2. Ovary inferior
 - 40 Herbs bearing tendrils, usually clambering on ground or climbing on
supports 110. Cucurbitaceae (2, p. 471)
 - 40. Herbs and woody plants without tendrils
 - 41. Stamens with either filaments or anthers distinctly connate,
forming tubes about the styles
 - 42. Filaments united in bundles..... 135. Symplocaceae*
 - 42. Filaments free; anthers
connate 161. Asteraceae*
 - 41. Stamens free, neither anthers nor filaments connate
 - 43. Stamens free from corolla or essentially so
 - 44. Stamens twice as many as corolla lobes; plants woody,
without milky juice 130. Vacciniaceae*
 - 44. Stamens as many as the corolla lobes; plants
herbaceous, usually with milky juice
..... 159. Campanulaceae*
 - 43. Stamens inserted on corolla, at the throat, within the tube, or
at base
 - 45. Leaves stipulate 141. Rubiaceae*
 - 45. Leaves estipulate
 - 46. Flowers subtended by a bract and two bracteoles;
annual, lactiferous herbs
 - 47. Flowers very small, in terminal, cylindric, dense
spikes 160. Sphenocleaceae*
 - 47. Flowers large, solitary , axillary; corolla tubes up
to 10 cm long 159. Campanulaceae (*Laurentia*)*
 - 46. Flowers not so subtended by bracts; perennial shrubs
or vines, not lactiferous 158. Caprifoliaceae*

CLASS 2. MONOCOTYLEDONEAE

- 1. Plants saprophytic; leaflets or leaves without chlorophyll
 - 2. Ovaries inferior; stamens 1 or 2, fused to styles; fruits
capsules..... 194. Orchidaceae (*Galeola*)*
 - 2. Ovaries superior or nearly so; stamens 2-6, not fused to styles; fruits
achenes..... 166. Triuridaceae*

1. Plants not saprophytic; leaves with chlorophyll, characteristically green
 3. Flowers bisexual
 4. Plants aquatic, usually submersed..... 164. Potamogetonaceae*
 4. Plants terrestrial or epiphytic, if aquatic, not submersed
 5. Ovaries 1-celled
 6. Ovules single per cell
 7. Perianths present
 8. Plants aquatic; ovaries superior; fruits achenes.....
..... 162. Alismataceae*
 8. Plants terrestrial; ovaries inferior; fruits capsules or
berries 193. Marantaceae*
 7. Perianths absent. if present, scale-like (flowers enclosed in
dry bracts except in Araceae)
 9. Inflorescences spadix, subtended by fleshy bracts
(spathes); leaves broad 184. Araceae*
 9. Inflorescences not spadix, subtended by chaffy bracts;
leaves narrow
 10. Flowers subtended by single bractlets; fruits
achenes; stems solid, triangular in cross section,
rarely circular 188. Cyperaceae*
 10. Flowers subtended by lemma (lower bracts)
enclosing both flowers and palea (upper bracts); fruits
caryopsis or grain; stems (culms) hollow in
internode, circular in cross section.... 181. Poaceae*
 6. Ovules many per cell
 11. Fertile stamens 6; plants terrestrial 173. Taccaceae*
 11. Fertile stamens 1-2, adnate to pistils; plants terrestrial or
epiphytic..... 194. Orchidaceae*
 5. Ovaries with more than 1 cell (fruits rarely 1-celled by abortion)
 12. Ovules 1-2 per cell
 13. Ovaries inferior
 14. Leaves all on top, or formed of fleshy, closely
imbricate leaf sheaths or distichous; fertile stamens 5
 15. Leaves all apical, formed from imbricate bases of
petioles; flowers mostly unisexual, staminate
within upper bracts, pistillate within lower bracts ...
..... 189. Musaceae*
 15. Leaves distichous; flowers bisexual, in cincinnus in
axils of spathes 190. Strelitziaceae*
 14. Leaves crowded on or near base of stem; fertile
stamens 6 170. Agavaceae*
 13. Ovaries superior
 16. Perianths absent 184. Araceae*
 16. Perianths present

17. Corolla thin and petal-like..... 167. Liliaceae*
17. Corolla firm and calyx-like
18. Leaves in a crown at apex of stem; plants trees.....
..... 182. Arecaceae*
18. Leaves scattered along stem; plants climbers
19. Fruits 1-seeded, covered by spirally set scales.....
..... 182. Arecaceae*
19. Fruits with 1-3 pyrenes, not covered by spirally set scales .
..... 180. Flagellariaceae*
12. Ovules more than 2 per cell
20. Plants aquatic..... 175 Pontederiaceae*
20. Plants terrestrial
21. Ovaries superior
22. Perianths absent 184. Araceae*
22. Perianths present
23. Epiphytic; stems thread-like.....
..... 177. Bromeliaceae (*Tillandsia*)*
23. Terrestrial; stems not as above
24. Rootstocks rhizomatous
25. Stems scandent or climbing; leaves reduced
to scarious, minute scales with flat, angular
or falcate modified branchlets (cladodes) in
their axis 169. Asparagaceae*
25. Stems erect; leaves not scarious,
crowded on or at base of stem
..... 170. Agavaceae*
24. Rootstocks bulbous or fleshy
26. Perianth parts green or purple, calyx-like
..... 178. Commelinaceae*
26. Perianth parts showy, not calyx-like.....
..... 167. Liliaceae*
21. Ovaries inferior
27. Fertile stamens 1-2, adnate to pistil; flowers irregular
28. Fruits fleshy, indehiscent or capsular; seeds small
to medium-sized
29. Anthers 2-celled; calyx tubular or spathe-like
..... 191. Zingiberaceae*
29. Anthers 1-celled, borne on margins of petal-like
filaments; calyx of free sepals.....
..... 192. Cannaceae*

- 28. Fruits capsular; seeds very minute, dust-like 194. Orchidaceae*
- 27. Fertile stamens 3 or more, not adnate to pistils; flowers regular or irregular
 - 30. Fertile stamens 5 189. Musaceae*
 - 30. Fertile stamens 3, 4, or 6
 - 31. Leaves not stiff or rigid
 - 32. Stamens 3, opposite outer segments... 176. Iridaceae*
 - 32. Stamens 6, if 3, opposite inner segments..... 172. Amaryllidaceae*
 - 31. Leaves stiff or rigid, often spiny
 - 33. Inflorescences single spikes 177. Bromeliaceae*
 - 33. Inflorescences branched spikes or panicles
 - 34. Fruits berry-like, with thin pericarps..... 171. Dracaenaceae (*Sansevieria*)*
 - 34. Fruits capsules 170. Agavaceae*
- 3. Flowers unisexual
 - 35. Flowers on simple or branched, spicate inflorescences or spadix
 - 36. Submersed or floating aquatics
 - 37. Floating, acaulescent plants
 - 38. Minute-thallus plants..... 185. Lemnaceae*
 - 38. Large leafy plants, several cm wide 184. Araceae (*Pistia*)*
 - 37. Submersed, caulescent plants
 - 39. Ovary superior 165. Najadaceae*
 - 39. Ovary inferior 163. Hydrocharitaceae*
 - 36. Not submersed or floating aquatics
 - 40. Monoecious herbs
 - 41. Flowers in dense, globose to ovoid, solitary heads; ovaries 3-celled; leaves crowded in rosette at base 179. Eriocaulaceae*
 - 41. Flowers otherwise; ovaries 1-celled; leaves not crowded in rosette at base
 - 42. Flowers in dense, cylindrical spikes; leaves linear..... 187. Typhaceae*
 - 42. Flowers in racemes or panicles, often in whorls at nodes; leaves sagittate..... 162. Alismataceae* (*Sagittaria*)
 - 40. Dioecious vines
 - 43. Ovaries inferior..... 174. Dioscoreaceae*
 - 43. Ovaries superior..... 168. Smilacaceae*
 - 35. Flowers not on simple or branched, spicate inflorescences or spadix

- 44. Flowers 4-sided or in conspicuous spirals on rachis 183. Cyclanthaceae*
- 44. Flowers not 4-sided
 - 45. Dioecious trees or woody vines
 - 46. Perianths present..... 182. Arecaceae*
 - 46. Perianths absent..... 186. Pandanaceae*
 - 45. Monoecious trees or herbs
 - 47. Perianths present; trees..... 182. Arecaceae*
 - 47. Perianths absent; herbs or canes
 - 48. Fruits caryopses or grains sometimes enclosed in hard sheath; flowers each between a pair of bracts; filaments attached to middle of the anther; stems terete 181. Poaceae*
 - 48. Fruits achenes; flowers each subtended by one bract; filaments attached to base of anther; stems 3-angled. rarely terete 188. Cyperaceae*

DESCRIPTIONS OF TAXA

DIVISION II - SPERMATOPHYTA (Seed Plants)

SUBDIVISION 2. ANGIOSPERMAE (Flowering Plants)

CLASS 1. DICOTYLEDONAE

68. PAPILIONACEAE

Trees, shrubs or herbs, sometimes climbing or decumbent. Leaves alternate or opposite, mostly compound, impari- or paripinnate, rarely simple or reduced as scales; stipules free or adnate to petioles; stipels present or absent. Flowers solitary to racemose, paniculate or capitate, rarely spicate, mostly irregular, bisexual. Calyx tubular, 5- or 4-lobed, imbricate or valvate. Petals 5, rarely absent, imbricate, free or connate. Adaxial petal (standard) outermost, two lateral ones (wings) parallel with each other and lower two innermost to form the keel. Stamens inserted with petals, 10, free, monadelphous; or diadelphous. Anthers 2-locular, opening by a slit lengthwise. Ovaries superior, 1 carpel, 1-locular, septate; ovules 1 or numerous. Pods dehiscent by 1 or both sutures or indehiscent, sometimes winged or jointed and breaking into 1-seeded segments.

Genera 480, species 12000, of world-wide distribution.

1. Stamens free; seeds vermilion-red..... 1. *Ormosia*
1. Stamens monadelphous or diadelphous; seeds otherwise
 2. Pods composed of 1-seeded joints, usually indehiscent
 3. Leaves pinnate
 4. Leaflets odd-pinnate, numerous, 5 mm long; stamens united into 2 bundles of 5 each..... 2. *Aeschynomene*
 4. Leaflets even-pinnate, few, 2-5 cm long; stamens united into a closed tube..... 3. *Arachis*
 3. Leaves trifoliolate or reduced to a single leaflet
 5. Pods exerted, as long as or longer than calyx
 6. Pods flattened..... 4. *Desmodium*
 6. Pods cylindrical 5. *Alysicarpus*
 5. Pods folded together within the calyx
 7. Calyx not enlarged in fruit; leaflets longer than broad; flowers in very dense, capitate racemes..... 6. *Uraria*
 7. Calyx enlarged in fruit; leaflets broader than length; flowers in few in large racemes..... 7. *Christia*
 2. Pods not jointed, dehiscent or indehiscent
 8. Leaves pinnate with 5 to many leaflets
 9. Leaves odd-pinnate
 10. Pods dehiscing by both sutures
 11. Herbs, shrubs or trees; inflorescences racemose
 12. Shrubs or trees

- 13. Racemes terminal or in upper leaf axils; branches with leaves when in bloom
 - 14. Branches erect; racemes axillary, as long as leaves; flowers pink to purple..... 8. *Milletia*
 - 14. Branches drooping; racemes terminal, longer than leaves; flowers whitish to bluish..... 9. *Clitoria*
- 13. Racemes along branches; branches leafless when in bloom..... 10. *Gliricidia*
- 12. Herbs with cylindric or 4-angled pods (flat in *Tephrosia*)
 - 15. Flowers in axillary racemes; pods cylindric or 4-angled 11. *Indigofera*
 - 15. Flowers in leaf-opposed racemes; pods flat..... 12. *Tephrosia*
- 11. Vines with axillary, solitary, white or blue flowers..... 9. *Clitoria*
- 10. Pods indehiscent
 - 16. Leaflets alternate or spirally arranged
 - 17. Erect undershrubs; pods ellipsoid, drupaceous 13. *Euchresta*
 - 17. Scandent shrubs or trees; pods otherwise
 - 18. Trees with yellow flowers; pods orbicular, winged. 14. *Pterocarpus*
 - 18. Woody vines with pink or white flowers; pods elongated-narrow, not winged..... 15. *Dalbergia*
 - 16. Leaflets opposite
 - 19. Trees with thick, wingless pods..... 16. *Pongamia*
 - 19. Woody vines with thin winged pods..... 17. *Derris*
- 9. Leaves even-pinnate
 - 20. Slender vines with pink to pink-purple, or salmon flowers; pods flat, short..... 18. *Abrus*
 - 20. Coarse shrubs with yellow flowers or trees with very large white or white tinged with pink flowers; pods very long, cylindric..... 19. *Sesbania*
- 8. Leaves simple or with 3 or more digitately arranged leaflets
 - 21. Leaves simple
 - 22. Stamens monadelphous; pods many-seeded..... 20. *Crotalaria*
 - 22. Stamens diadelphous; pods usually 2-seeded..... 21. *Moghania*
 - 21. Leaves with 3 or more digitately arranged leaflets

23. Flowers and fruits covered by broad bracts.....22. *Phylacium*
23. Flowers and fruits not covered by broad bracts
24. Pods 1-seeded
25. Pods oblong, rounded at both ends; seeds lenticular.....
..... 23. *Spatholobus*
25. Pods falcate, pointed at both ends; seeds lanceolate.....
.....24. *Monarthrocarpus*
24. Pods 2- or more seeded
26. Leaflets estipellate or the stipels replaced by large glands
27. Trees; stipels replaced by large glands 25. *Erythrina*
27. Herbs, shrubs or vines; estipellate
28. Leaves gland-dotted beneath
29. Herbaceous vines..... 26. *Atylosia*
29. Erect shrubs
30. Pods linear, straight, 3- to 5-seeded, torulose with
oblique depression..... 27. *Cajanus*
30. Pods oblong, turgid, usually 2-seeded, not torulose
and depressed..... 21. *Moghania*
28. Leaves not gland-dotted beneath..... 20. *Crotalaria*
26. Leaflets stipellate
31. Styles not bearded below stigmas
32. Stamens monadelphous, vexillary filament uniting with
others
33. Nodes of racemes not swollen
34. Calyx with 2 basal bracteoles; pods not curved or
hooked at apex, with dense brown, well-spread
hairs 28. *Calopogonium*
34. Calyx not as above; pods curved or hooked at
apex, slightly appressed, pubescent.....
.....29. *Teramnus*
33. Nodes of racemes swollen
35. Upper lip of calyx projecting, distinctly longer
than lower one; pods large, keeled along each
side of dorsal suture..... 30. *Canavalia*
35. Upper lip of calyx not exceeding lower one; pods
small, flattened along suture

- 36. Stems with blood-red sap; ovaries few-ovuled; pods oblong, turgid..... 31. *Dioclea*
- 36. Stamens not as above; ovaries many-ovuled; pods linear, compressed..... 32. *Pueraria*
- 32. Stamens diadelphous, vexillary one free from others
 - 37. Nodes of racemes not swollen; pods glabrous
 - 38. Inflorescences in long, drooping raceme; calyx bell-shaped, gibbous, lobes inconspicuous; seeds with hilum more than halfway round..... 33. *Strongylodon*
 - 38. Inflorescences, calices and seeds not as above
 - 39. Pods 9-15 cm long, longitudinally 2-ribbed along each valve, glabrescent to glabrous..... 34. *Centrosema*
 - 39. Pods 6 cm or less long, not longitudinally ribbed, brown-hairy..... 28. *Calopogonium*
 - 37. Nodes of raceme swollen; pods densely pubescent or covered with stinging hairs..... 35. *Mucuna*
- 31. Styles bearded below stigmas
 - 40. Stigmas oblique
 - 41. Keel spirally twisted..... 36. *Phaseolus*
 - 41. Keel not spirally twisted
 - 42. Styles flattened upward; leaflets toothed; roots fleshy, turnip-shaped..... 37. *Pachyrrhizus*
 - 42. Styles filiform; leaflets entire; roots ordinary..... 38. *Vigna*
 - 40. Stigmas not as above
 - 43. Pods flattened, not winged..... 39. *Dolichos*
 - 43. Pods square, 4-winged..... 40. *Psophocarpus*

1. ORMOSIA G. Jackson, *nom. cons.*

Trees. Leaves imparipinnate; leaflets opposite, coriaceous. Flowers usually in dense terminal racemes; calyx campanulate, deeply 5-cleft, upper lobe shortest; corolla not much exerted; petals with short claws, about equal in length, the standard round; keels and wings oblong, obtuse, the former not connate; stamens 10, free, much-incurved, exerted when flower expands, with oblong, versatile anthers; ovaries sessile or nearly so; styles long, filiform, circinnate, at end with oblique stigma. Pods rigid, bivalved, sutures not winged; seeds red.

Species 30, in the tropics of both hemispheres; 8 in the Philippines.

1. *Ormosia calavensis* Azaola ex Blco., Fl. Filip. ed. 2, 30, 1845; Merr., En. Philip. 2: 269, 1923.

Trees erect, medium-sized. Leaves clustered at ends of branches, 12-20 cm long; leaflets 7-9, oblong or subelliptic, 5-8 x 2-3 cm, apex acute, base obtuse; petiolules 5 mm long. Panicles terminal or in upper leaf axils, appressed, ferruginous; pedicels short, subtended by minute bracts; calyx thick, broader than long, unequally lobed; corolla nearly twice as long, white and purplish tinged or bluish purple. Pod 25 x 4 cm, compressed, vermilion-red.

Java, Moluccas and Palau islands. Northern Luzon to Mindanao, Philippines. In forests at low and medium altitudes.

Com. name – *Bahai* (Bik., C. Bis., S.-L. Bis., Tag.).

Exsicc. – *Gates CA 1406; Villamil CA 1407 (CAHP); Foxworthy 1091619; Elmer 17581, 1237185 (US).*

2. AESCHYNOMENE Linnaeus

Herbs erect, branched. Leaves with numerous, close, sensitive, odd-pinnate, small, linear leaflets. Flowers small, in few-flowered racemes; calyx with 2 basal bracteoles. Subequally 5-lobed or deeply 2-lipped, lips toothed; standard orbicular; keel not beaked; stamens in 2 bundles of 5 each. Pods linear, stalked, flat, 4- to 8-seeded, ultimately separating into 1-seeded joints.

Species 250, in the tropics and subtropics of both hemispheres; 1 in the Philippines.

1. *Aeschynomene indica* L., Sp. Pl. 2: 713, 1753; Rudd, Reinwardtia 5: 30, 1959. **Figure 1**

Annual herbs erect, branched, suffrutescent, 0.3-1.2 m high, glabrous; branches green, cylindric. Rachis 3-5 cm. long; leaflets small, linear or oblong, 5 mm long, numerous, obtuse 1-nerved, close; stipules lanceolate, 1 cm long, deciduous, produced below point of attachment. Racemes axillary, short, 1- to 4-flowered; flowers 8 mm long, yellow, often suffused with purple. Pod linear-oblong, straight or curved, 1-3 cm long, composed of 4-8 joints with group of confluent ridge-like tubercles.

Pantropic. Throughout the Philippines, in open, wet grasslands; introduced.

Com. name – *Makahiyang lalaki* (Tag.).

Exsicc. – *Bardenas & Pancho CA 10580*; Guantes CA 10722; Guantes & Pancho CA 1002; Velasco CA 1248 (CAHP).*

3. ARACHIS Linnaeus

Herbs low, usually prostrate. Leaves even-pinnate; leaflets 2 or 3 pairs, estipellate. Flowers yellow, crowded in short, axillary spikes or pedicelled in axils of leaves; calyx tubes slender, 4 upper wings oblong; keel incurved,

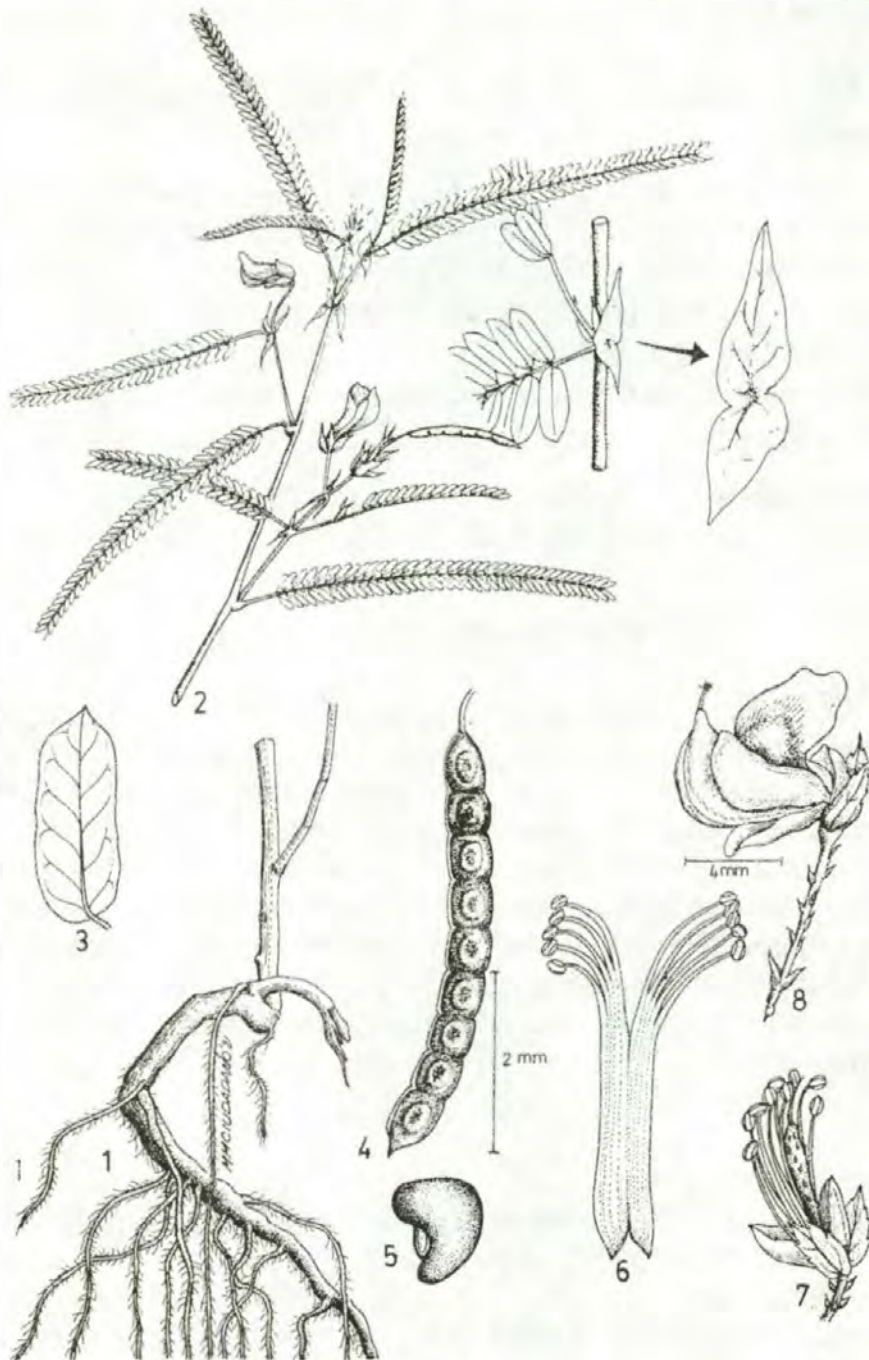


Figure 1. *Aeschynomene indica*: 1. portion of stem base with roots; 2. flowering branch; 3. leaflet; 4. pod; 5. seed; 6. stamens, opened; 7. calyx and stamens; 8. flower. (After Paqcho & Obien 1983, with permission)

beaked; filaments united in closed tube, some anthers versatile, alternating ones subbasifixed. Pods oblong-cylindric, reticulate, indehiscent, torulose but not jointed, maturing underground.

Species 19, in American tropics; 1 cultivated in all warm countries.

1. *Arachis hypogaea* L., Sp. Pl. 2: 741, 1753; Chuang & Ruang, Legum. Taiwan, Anim. Ind. Ser. 7: 14, f. 13, 1945. **Figure 2**

Annual, branched herbs, spreading, hairy. Stems 30-80 cm long. Leaves 8-12 cm long, clasping base of petiole; sheath produced in 2 linear-lanceolate stipules; leaflets oblong to obovate, 2-5 cm long. Flowers axillary, few, fascicled, yellow, 8 mm long. Pods ripening underground, oblong, 1-5 cm long, leathery, reticulate, containing 1-3 seeds.

Native of tropical America, now widely cultivated in most tropical and subtropical countries. Throughout the Philippines, in open areas at low altitude.

Com. names – *Mani* (Bis., Tag.); Peanut (Engl.).

Exsicc. – *Lugod* CA 8364*, 8765; *Dijamco* CA 1259 (CAHP).

4. DESMODIUM Desvaux, *nom. cons.*

Herbs, shrubs, or small trees. Leaves simple or trifoliolate, stipellate. Flowers small, white, pink, red or purplish, in few- to many-flowered axillary or terminal racemes or umbels, sometimes paniculate; calyx lobes as long as or shorter than tube, upper pair frequently subconnate; corolla exserted, standard broad, wings adhering to obtuse keel; upper stamens free or partially so, remaining 9 united; ovaries few- to many-ovuled; styles incurved; stigmas minutely capitate. Pods 1- to many-seeded, indehiscent, compressed joints disarticulating or not, smooth or covered with minutely hooked hairs.

Species 250, in all tropical countries, a few in temperate regions; 32 in the Philippines.

1. Leaves simple
 2. Petioles 2 cm long, glabrous 1. *D. gangeticum*
 2. Petioles 6 mm long, brown-pubescent 2. *D. velutinum*
1. Leaves trifoliolate
 3. Leaves silvery pubescent beneath 3. *D. capitatum*
 3. Leaves otherwise
 4. Bracts large, persistent, enclosing the flower 4. *D. pulchellum*
 4. Bracts small or wanting, not enclosing flower
 5. Erect herbs or undershrubs
 6. Erect undershrub; flowers several to a node, pods 6- to 10-jointed 5. *D. laxiflorum*

6. Erect herb; flowers scattered in pairs to a node; pods 4- to 6-jointed..... 6. *D. procumbens*
5. Prostrate or ascending herbs
7. Inflorescence terminal, distantly flowered; flowers pale purple 7. *D. scorpiurus*
7. Inflorescence opposite leaves in fascicles; flowers dark violet-red.....8. *D. triflorum*

1. *Desmodium gangeticum* (L.) DC., Prodr. 2: 327, 1825; van Meeuwen, Reinwardtia 6: 249, 1962; Liu & Chuang, Taiwania 8: 77, f.6, 1962. – *Hedysarum gangeticum* L., Sp. Pl. 2: 746, 1753. **Figure 3**

Shrubs low, widely spreading. Branches slender, twigs angular, grayish pubescent or glabrous. Leaves simple, ovate-oblong, 6-12 x 4-7 cm wide below middle, paler or subglaucous and silky pubescent beneath, apex acute, base rounded; petioles 1.5-2 cm long, glabrous. Spicate racemes terminal and sublateral, occasionally branched, slender, 30 cm long or shorter; flowers numerous, 4 mm long, pale yellow. Pods numerous, crowded, curved, 1.5-3 cm x 3 mm, pubescent, with 4-10 joints, segments rounded along ventral suture, straight along back.

Tropical Africa and Asia, extending to Australia and Polynesia. Throughout the Philippines, in open secondary forests and wastelands, at low and medium altitudes.

Com. name – *Mangkit* (Tag.).

Exsicc. – *Ayaso, Jr. CA 1347; Esteban CA 1346; Gates & dela Peña CA 1345; Novero CA 1343; Velasco CA 1348* (CAHP).

2. *Desmodium velutinum* (Willd.) DC., Prodr. 2: 328, 1825; van Meeuwen, Reinwardtia 6: 264, 1962. – *Hedysarum velutinum* Willd., Sp. Pl. 3: pt. 2, 117, 1802. – *D. lasiocarpum* (Beauv.) DC., Prodr. 2: 328, 1825; Liu & Chuang, Taiwania 8: 83, f. 11, 1962. – *Hedysarum lasiocarpum* Beauv., Fl. d' Oware et de Benin 1: 32, 1804. – *D. virgatum* Zoll., Nat. & Genesk. Arch. Neerl. Ind. 3: 58, 76, 1846, *nomen*; King, J. As. Soc. Beng. 66: 143, 1897. **Figure 4**

Undershrubs slender, erect, simple or few-branched, less than 1 m high, twigs pubescent. Leaves simple, ovate to ovate-oblong, 7-14 cm long, acute to acuminate, appressed-pubescent beneath; petioles 6 mm long, pubescent. Racemes terminal and axillary, erect, many-flowered, slender, 6-20 cm long; flowers white, usually tinged with pink, 4-5 mm long. Pods pubescent, slightly curved or falcate, 1-2 cm long, consisting of 3-7 joints.

Africa through southern Asia, Malaysia and New Guinea. Throughout the Philippines, in thickets at low and medium altitudes.

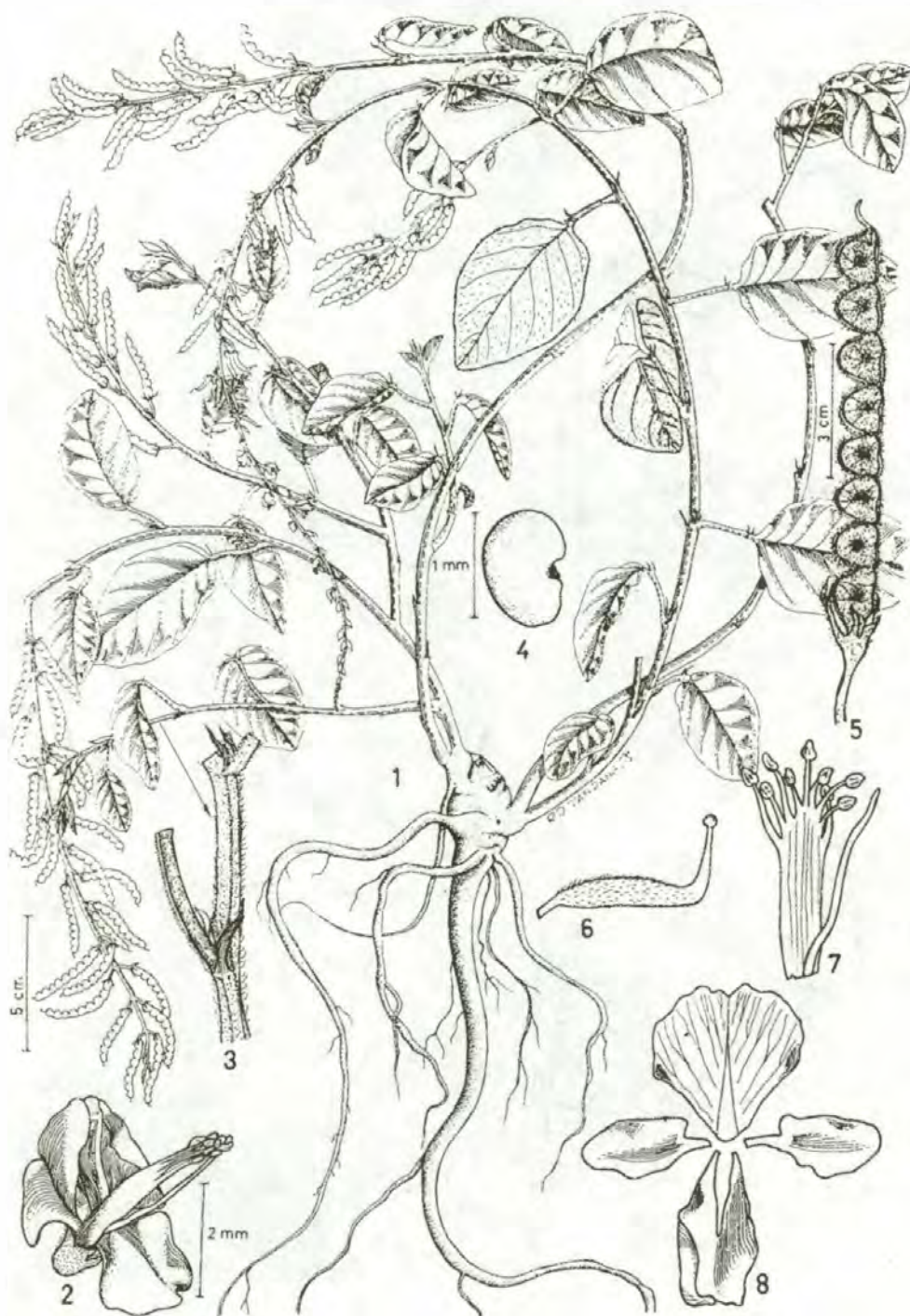


Figure 3. *Desmodium gangeticum*: 1. habit; 2. flower; 3. stem, enlarged, with stipules and leaf bases; 4. seed; 5. pod; 6. pistil; 7. stamens; 8. perianth, expanded.

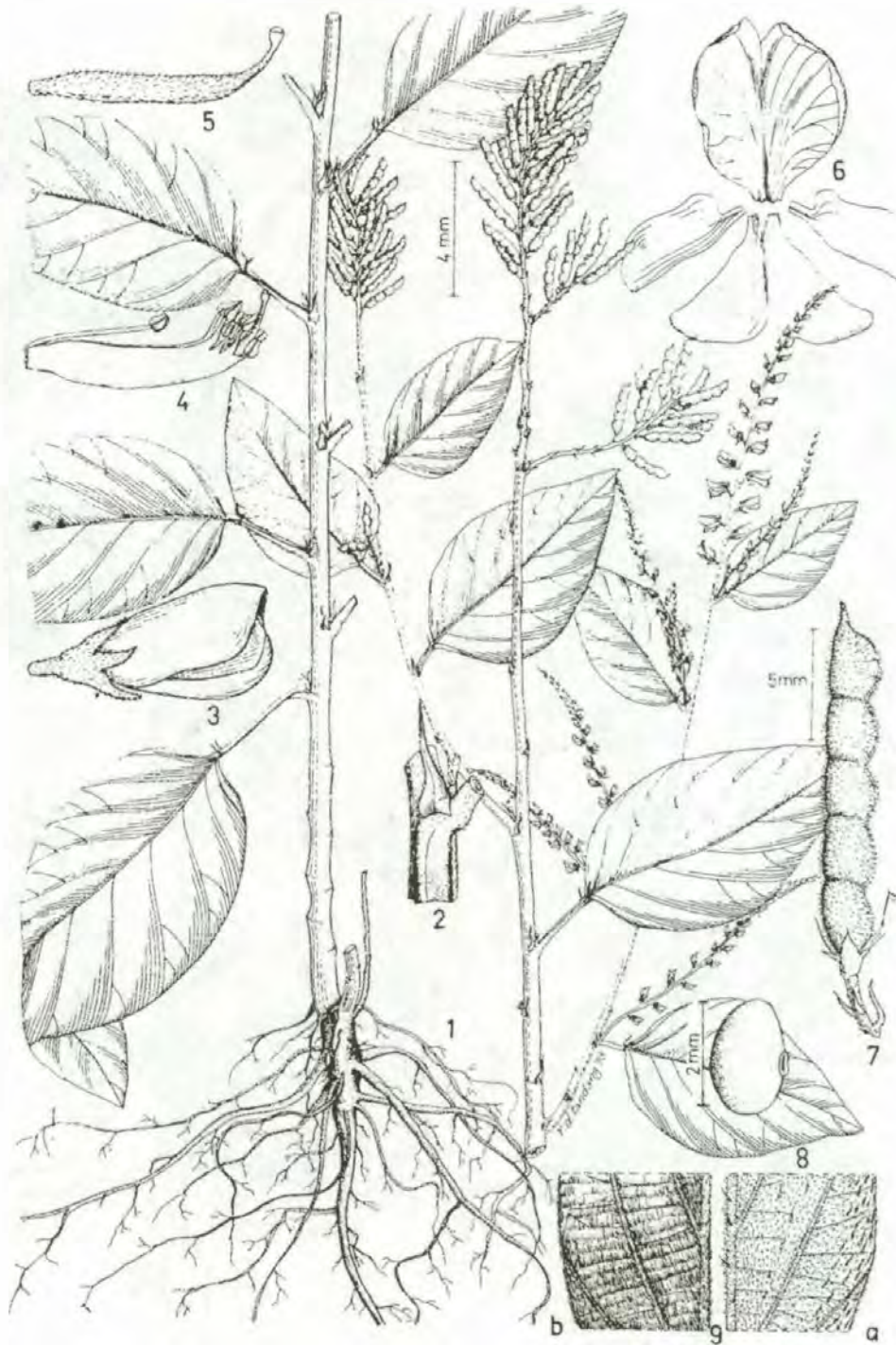


Figure 4. *Desmodium velutinum*: 1. habit; 2. portion of stem, enlarged to show stipule; 3. flower; 4. flower, petals excised to show stamens and pistil; 5. pistil; 6. perianth, expanded; 7. pod; 8. seed; 9. portion of leaf-ventral (a) and dorsal (b).

Exsicc. – Gates CA 1344, 1366, 1367; Lugod CA 4665*; Novero CA 1342 (CAHP); Steiner 513, 2376507; Sulit 34069, 2244125; Villamil BF 23462, 1290158 (US).

3. *Desmodium capitatum* (Burm. f.) DC., Prodr. 2: 336, 1825; Merr., En. Philip. 2:284, 1923. – *Hedysarum capitatum* Burm. f., Fl. Ind. 167, t. 64, f. 1, 1768. – *D. styracifolium* (Osbeck) Merr., Amer. Journ. Bot. 3: 580, 1916; Back. & Bakh. f., Fl. Jav. 3: 651, 1968. **Figure 5**

Creeping weeds, often more or less woody at base, stems 10-30 cm long. Leaves trifoliolate; leaflets obovate, rounded-truncate-emarginate, glabrous and often pale blotched on upper surface, densely appressed-white hairy beneath. Racemes numerous, axillary and terminal, dense, many-flowered, 2-5 cm long, flowers purple, 6 cm long. Pods numerous, 1-2 cm long, veined, somewhat pubescent, of 3-6 joints.

Old World tropics. Throughout the Philippines, in open grasslands, roadside, etc.; common.

Com. names – *Bilibig* (Bik.); *Kalapikid* (Bag.); *Mani-mani*, *Maning parang* (Tag.); *Mani-manian* (Pang., Tag.).

Exsicc. – Pancho CA 13401; Pancho & Guantes CA 10705; Hernaez CA 19628; Gates CA 1841 (CAHP).

4. *Desmodium pulchellum* (L.) Benth., Fl. Hongk. 83, 1861; van Meeuwen, Reinwardtia 6: 256, 1962; Liu & Chuang, Taiwania 8: 89, f. 16, 1962. – *Hedysarum pulchellum* L., Sp. Pl. 2: 747, 1753. **Figure 6**

Undershrubs erect, up to 1.5 m high. Branchlets terete, gray-pubescent. Leaves trifoliolate; leaflets finely pubescent beneath, terminal ones oblong, 8-13 cm long, longer than wide, as large as lateral pairs, rigid and subchartaceous, prominently nerved, apex obtuse or subacute, base rounded, sometimes obscurely repand. Racemes terminal and in upper axils, ascending or horizontal, 8-25 cm long; flowers white, 6 mm long, umbellately fascicled, hidden by distichous, orbicular, persistent bracts 1-1.5 cm in diameter. Pods small, oblong, soft-hairy, with 2, rarely 1 or 3 joints.

India through tropical Asia, Taiwan, Malaysia, and North Australia. Throughout the Philippines, in open, wastelands and settled areas at low and medium altitudes.

Com. name – *Gaan-gaan* (Sul.).

Exsicc. – Estioko, Jr. CA 1361*, 1363; Jarmin CA 1362; Velasco CA 1360; Fernandez CA 1359 (CAHP).

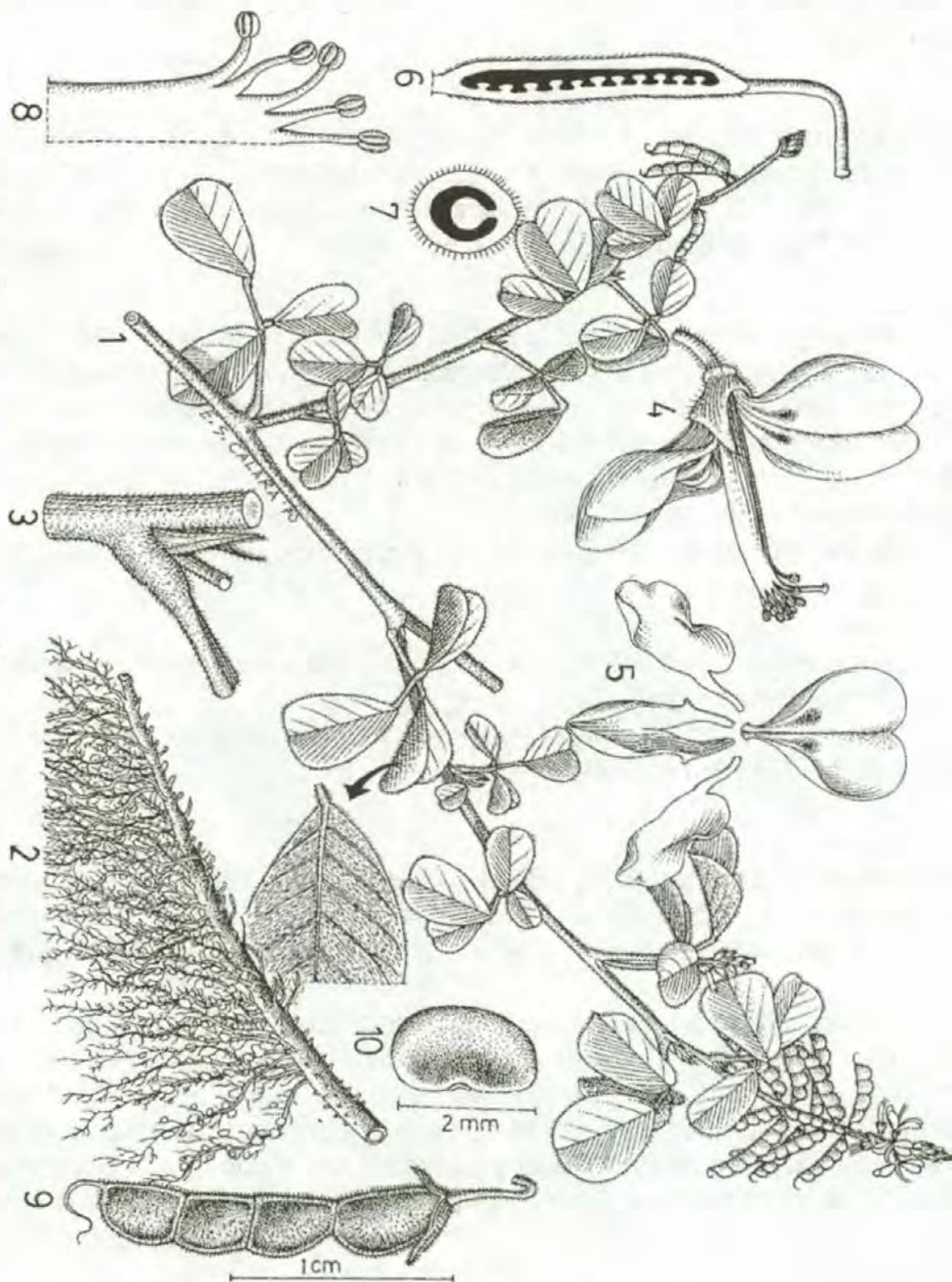


Figure 5. *Desmodium capitatum*: 1. flowering branch; 2. root system; 3. portion of stem with stipules; 4. flower; 5. perianth, expanded; 6. ovary, vertical section; 7. ovary, cross section; 8. stamens; 9. pod; 10. seed.

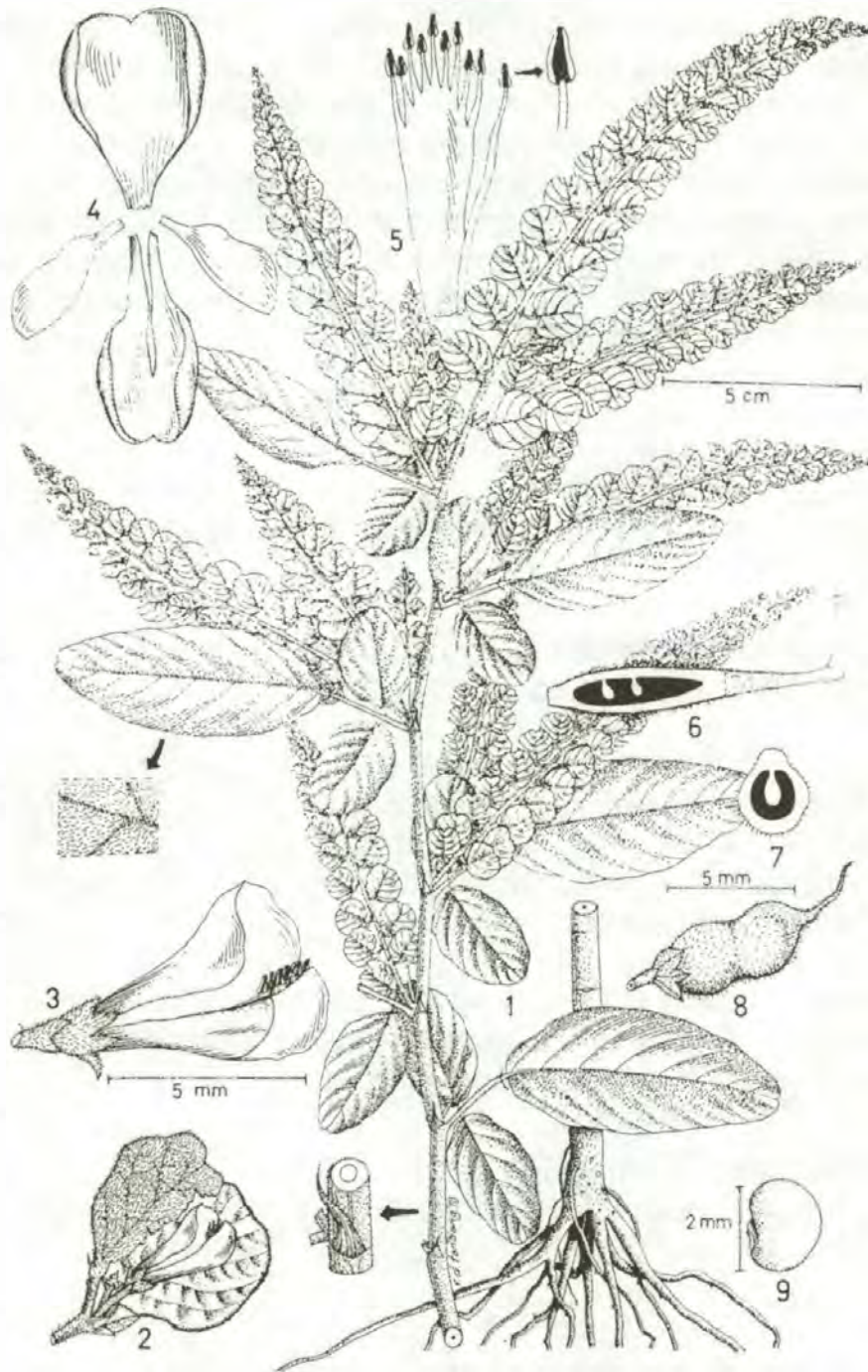


Figure 6. *Desmodium pulchellum*: 1. flowering branch; 2. bracts, opened to show flower; 3. flower, enlarged; 4. perianth, expanded; 5. stamens; 6. ovary, vertical section; 7. ovary, cross section; 8. pod; 9. seed.

5. *Desmodium laxiflorum* DC., Ann. Sc. Nat. Bot. 4: 100, 1825; van Meeuwen, Reinwardtia 6: 252, 1962; Liu & Chuang, Taiwania 8: 85, f. 13, 1962.

Undershrubs erect, 1-1.5 m high. Branches clothed with dense short hairs, obtusely angled. Leaves trifoliolate; petioles 2.5-5 cm long; leaflets membranous, glabrous except nether side, terminal ones ovate to broad oblong, sometimes obovate, acute, 10-15 cm long, larger than lateral ones. Racemes copious, terminal and axillary, the former short-branched toward base, 30 cm long; flowers several to a node; pedicels 4-6 cm long, with minute, subulate bracts; calyx 2 mm long, purplish, hairy, lobes lanceolate, longer than tube. Pods 2 cm or more long by 2 mm wide, 6- to 10-jointed, with minutely hooked hairs.

India, Taiwan, Malaysia and New Guinea. Throughout the Philippines, widely scattered in dry brushlands.

Com. name – *Mangkit-labuyo* (Tag.).

Exsicc. – *Cabrera CA 5035; Blancaver CA 4777; Casanova CA 1350; Agman CA 1349 (CAHP); Sulit 34070, 2244126, Mabesa 26321, 1290010 (US).*

6. *Desmodium procumbens* (Mill.) A.S. Hitch., Rept. Mo. Bot. Gard. 4: 76, 1893; Merr., Philip. J. Sc. 5 (Bot.): 82, 1910. **Figure 7**

Herbs erect, 0.5-1.5 m high, nearly glabrous. Leaves petioled, trifoliolate; leaflets ovate-oblong to lanceolate, obtuse, 4-6 cm long, terminal ones longer than lateral ones. Racemes axillary and terminal, lax, 8-20 cm long; flowers scattered in pairs, yellowish-green, 2.5 mm long, on long, slender pedicels. Pods slender, 4- to 6-jointed, 1 cm or less long, spirally twisted, joints as long as broad.

Native of tropical America, now widely distributed in most tropical countries. Throughout the Philippines, in thickets and open wastelands: in Mt. Makiling, Luzon, it is abundant in open areas in the hillsides.

Com. name – *Mangkit* (Tag.).

Exsicc. – *Pancho CA 17902*; Guantes & Pancho CA 10447; Cabrera CA 6019 (CAHP).*

7. *Desmodium scorpiurus* (Sw.) Desv., Jour. Bot. 1: 122, 1813; DC., Prodr. 2: 333, 1828; Merr., Philip. J. Sc. 1: Suppl. 65, 1906. **Figure 8**

Annual herbs slender, somewhat hirsute, prostrate or ascending. Leaves trifoliolate; leaflets elliptic to oblong-elliptic, terminal ones larger than lateral ones. Inflorescences terminal, slender, distantly flowered; flowers pale purplish,



Figure 7. *Desmodium procumbens*: 1 habit; 2. portion of stem, enlarged to show stipules; 3. flower; 4. flower, petals removed; 5. ovary, vertical section; 6. ovary, cross section; 7. perianth, expanded; 8. pod; 9. seed.



Figure 8. *Desmodium scorpiurus*: 1. habit; 2. pod; 3. flower; 4. stamens; 5. bracts; 6. perianth, expanded; 7. pistil.

4 mm long. Pods slender, 2-5 cm long, less than 2 mm wide, pubescent (hairs hooked), with 3-8 joints much longer than wide.

Native of tropical America, now widely distributed in many tropical countries. Throughout the Philippines, in open dry thickets, grasslands, etc., at low and medium altitudes.

Com. name – *Tagum-tagum* (Bik.).

Exsicc. – *Blancaver CA 4860**; *Valencia CA 1364* (CAHP).

8. *Desmodium triflorum* (L.) DC., Prodr. 2: 334, 1825; Merr., Philip. J. Sc. 3 (Bot.): 81, 1908; En. Philip. 2: 289, 1923. **Figure 9**

Herbs small, creeping, often densely leafy, much-branched. Leaflets 3, or 1 on lower leaves, obovate, 2.5-10 x 2-9 mm. Flowers opposite leaves, in 2- to 5-flowered fascicles, not in racemes, pedicels slender, 1 cm long; corolla dark violet-red, standard obovate, 4-5 cm long including narrowly cuneate, 2-2.5 mm long claw. Pods 10-17 x 2.25-2.5 mm, joints 7 or fewer, reticulate-veined, indehiscent.

Pantropic. Throughout the Philippines; common, in open grassy places at low altitudes.

Com. name – *Pakpak-langau* (Tag.).

Exsicc. – *Moog CA 16571**; *Gates CA 1353*; *Gutierrez CA 1352* (CAHP).

5. **ALYSICARPUS** Desvaux, *nom. cons.*

Annual herbs erect or spreading, branched. Leaves simple, suborbicular to linear, stipellate. Flowers small, in axillary or terminal racemes; calyx deeply toothed, upper 2 teeth often connate; corolla not exerted; standard broad; keel obtuse, adhering to wings; stamens diadelphous; ovaries sessile or subsessile, many-ovuled. Pods cylindrical or turgid, composed of several indehiscent, 1-seeded joints.

Species 30, in Old World tropics; 3 in the Philippines.

1. Leaves linear to lanceolate-linear; pods smooth; calyx equaling several joints of pod..... 1. *A. bupleurifolius*
 1. Leaves suborbicular to oblong or oblong-lanceolate; calyx as long as first 1-2 joints of pod

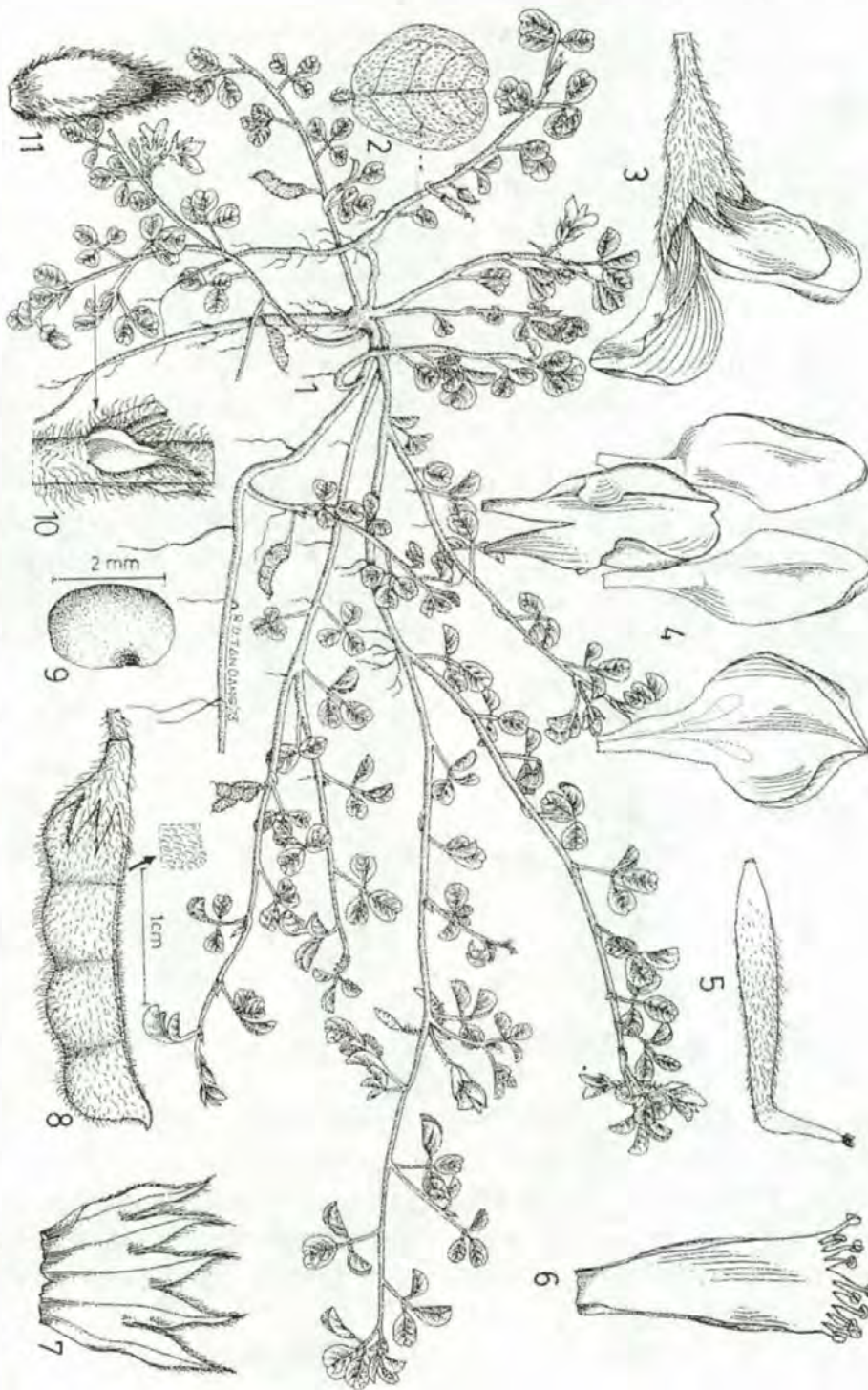


Figure 9. *Desmodium triflorum*: 1. habit; 2. leaf, enlarged; 3. flower; 4. perianth, expanded; 5. pistil; 6. stamens; 7. bracts; 8. pod; 9. seed; 10. enlarged portion of stem with stipule; 11. flower bud.

2. Erect or suberect, 1 m high; pods glabrescent..... 2. *A. vaginalis*
 2. Prostrate or spreading, 0.5-1 m high; pods pubescent
 3. *A. nummularifolius*

1. ***Alysicarpus bupleurifolius*** (L.) DC., Prodr. 2: 352, 1825; Chuang & Huang, Legum. Taiwan, Anim. Ind. Ser. 7: 129, 1965. – *Hedysarum bupleurifolium* L., Sp. Pl. 2: 745, 1753.

Herbs erect, slender, branched, wiry, 25-30 cm high. Leaves linear to linear-lanceolate, 2-5 cm long; stipules lanceolate-acuminate, brown, 8 mm long or less. Racemes terminal, slender, interrupted, 10-15 cm long; flowers in pairs, 6 mm long; pedicels very short; calyx lobes twice as long as tube. Pods 1 cm long or less, composed of 4-6, glabrous, smooth joints.

India to southern China, Malaysia and Polynesia. In open grasslands throughout the Philippines.

Com. name – *Banig-usa* (Tag.).

Exsicc. – *Pancho* CA 20208, 20240 (CAHP).

2. ***Alysicarpus vaginalis*** (L.) DC., Prodr. 2: 353, 1825; Chuang & Huang, Legum. Taiwan, Anim. Ind. Ser. 7: 13, f. 11, 1965. – *Hedysarum vaginalis* L., Sp. Pl. 2: 746, 1753. – *Alysicarpus nummularifolius* Auct. non DC.

Figure 10

Herbs erect, ascending. Stems glabrous or laxly patently long-hairy; stipules 0.5-2 cm long. Leaves broad-oval to narrow-lanceolate, 1-8 x 0.75-2.5 cm, glabrous on upper side, appressed-hairy beneath; petioles 0.3-1.2 cm long. Standard exceeding calyx, 6-7 mm long, usually red with 2 basal yellow stripes, wings dark red, rarely entirely white, segments of fruiting calyx at hardy overlapping base, entire calyx shorter than 2 lowermost joints of pods. Pods 1.2-2.5 cm long, at first black, later yellowish, hairy or not, with 4-9 joints.

Throughout the Philippines, in open grasslands.

Com. name – *Maramani* (Ilk.).

Exsicc. – *Sanchez* CA 1256; *Hernaez* CA 12458* (CAHP).

3. ***Alysicarpus nummularifolius*** (L.) DC., Prodr. 2: 352, 1825; Merr., En. Philip. 2: 292, 1923. – *Hedysarum nummularifolium* L., Sp. Pl. 2: 746, 1753.

Figure 11

Herbs spreading or prostrate, rarely ascending, branched, nearly glabrous. Stems up to 1 m long, often much shorter, branchlets pubescent. Leaves

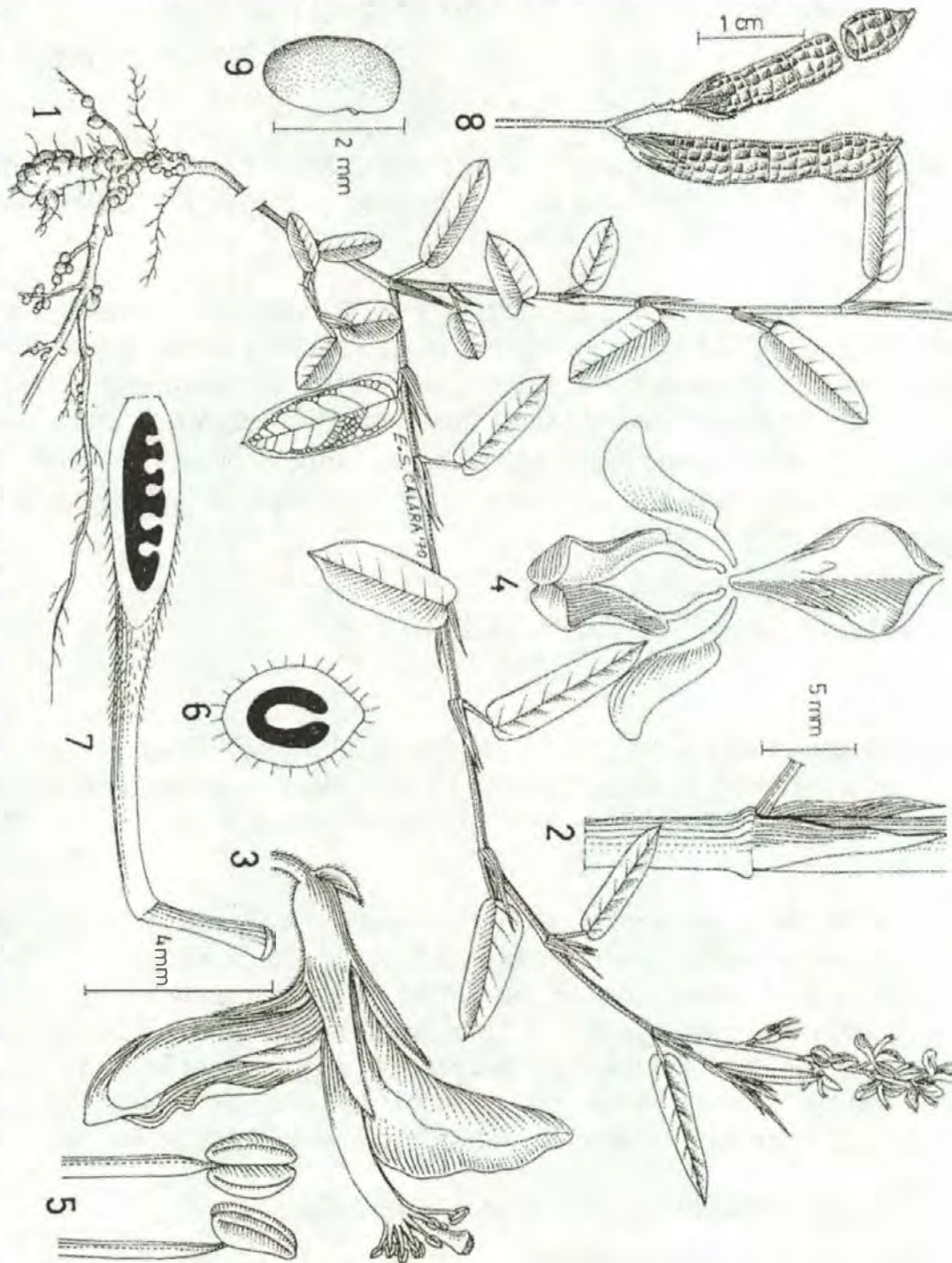


Figure 10. *Alysicarpus vaginalis*: 1. habit; 2. portion of stem with stipules; 3. flower; 4. perianth, expanded; 5. stamen, 2 views; 6. ovary, cross section; 7. ovary, vertical section; 8. pods; 9. seed.

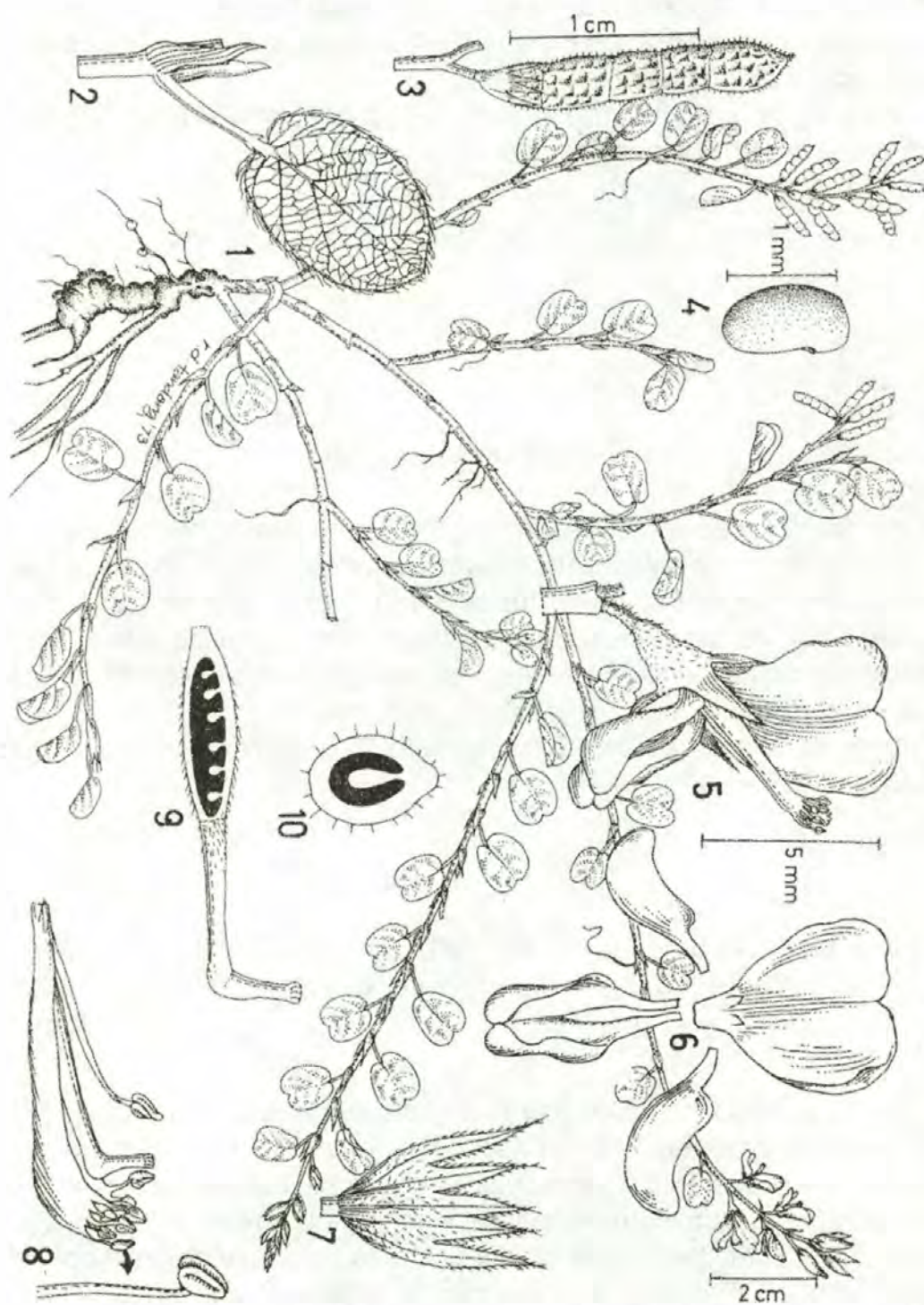


Figure 11. *Alysicarpus nummularifolius*: 1.habit; 2. portion of stem with stipules and leaf; 3. pod; 4. seed; 5. flower; 6. perianth, expanded; 7. bracts; 8. flower, perianth excised to show stamens and pistil; 9. ovary, vertical section; 10. ovary, cross section.

exceedingly variable, elliptic to oblong or lanceolate, 1-4 x 0.5-1.5 cm, obtuse, rounded or acute. Racemes terminal, 2-3 cm long; flowers pink-purple, 6 mm long, densely arranged. Pods crowded, 1-2 cm long, 2-5 mm thick, composed of 3-6, rugose, pubescent joints.

India, Ceylon, southern China and Taiwan through Malaysia to Polynesia. Throughout the Philippines, in open, wastelands.

Com. name – *Banig-usa* (Tag).

Exsicc. – *Hechanova CA 1254, 2842; Trinidad CA 1255** (CAHP).

6. URARIA Desvaux

Perennial herbs erect or spreading, herbaceous or suffrutescent. Leaves 1- to 9-foliolate; leaflets stipellate. Flowers numerous, small, in dense cylindrical or spike-like racemes; calyx tubes short, upper 2 lobes short, lower 3 usually elongate, setaceous; standard broad; wings adhering to keel; stamens diadelphous; anthers uniform; ovaries few-ovuled; styles slender, inflexed. Pods small, indehiscent, joints 2-6 swollen, 1-seeded.

Species 35, in tropical Africa, India to China, Malaysia, southward to Australia; 2 in the Philippines.

1. *Uraria lagopodioides* (L.) Desv. ex DC., Prodr. 2: 324, 1825; Merr., En. Philip. 2: 293, 1923. – *Hedysarum lagopodioides* L., Sp. Pl. 2: 1198, 1753.

Figure 12

Herbs pubescent, spreading or trailing; stems branched, up to 160 cm long, flowering branches erect or ascending. Leaves 1- to 3-foliolate; stipules linear or setaceous; leaflets orbicular to elliptic or elliptic-lanceolate, 1-6 cm long, rounded or subacute, apiculate. Racemes terminal, cylindrical, ovoid to oblong, 3-8 x 2 cm, pubescent, bracts ciliate, ovate to lanceolate; flowers pale purple; corolla 6 mm long; pedicels densely ciliate. Pods with 1-2 joints, the latter ellipsoid, 3 mm long, swollen, shiny.

India to southern China, Malay Peninsula, Malaysia, Java, Celebes, southward to Australia and Polynesia. Throughout the Philippines, in open, dry grasslands.

Exsicc. – *Orlido CA 5072**; *Velasco CA 1454; Guantes CA 10706; Cabrera CA 4846; Blancaver CA 4861* (CAHP); *McGregor BS 22991, 1238980* (US).



Figure 12. *Uria lagopodioides*: 1. habit; 2. flowers with bracts; 3. flower, side view; 4. perianth, expanded; 5. bracts; 6. stamens; 7. ovary, cross section; 8. ovary, vertical section; 9. enlarged portion of stem with stipules; 10. pod; 11. seed, 2 views.

7. CHRISTIA Moench

Herbs erect or spreading. Leaves 1- to 3-foliolate; stipels thin. Flowers in terminal, simple or paniced racemes; calyx thin, campanulate, enlarged in fruit, lobes lanceolate, as long as tube; corollas equaling or longer than calyx; standard broad; keel obtuse; stamens diadelphous; ovaries few-ovuled; styles inflexed, slender. Pods with few joints, small, the latter 1-seeded, smooth-veined.

Species 4, India to China, Malaysia and Australia; 2 in the Philippines.

1. *Christia vespertilionis* (L.f.) Bakh. f. ex van Meeuwen, Reinwardtia 6: 90, 1961. – *Lourea vespertilionis* (L.) Desv., J. Bot. 1: 122. t. 5, f.18, 1813. – *Hedysarum vespertilionis* L. f., Suppl. 331, 1537.

Herbs, slender, erect, 60 cm high, upper parts finely pubescent. Leaves with 1, rarely 3 leaflets, green, mottled with white, terminal leaflets several times broader than long, often 4-7 cm wide by less than 1 cm long, halves linear to lanceolate, spreading, apex broadly emarginate. Racemes slender, 3-21 cm long. Flowers small; calyx in fruit 1 cm long. Pods with 4-5 joints.

Native of India, now widely distributed in the tropics; occasionally cultivated for ornamental purposes. Luzon, Philippines

Exsicc. – Pancho CA 20033 (CAHP).

8. MILLETTIA Wight & Arnott

Trees, lianas or shrubs. Leaves odd-pinnate. Flowers in axillary, simple, often fascicled racemes or terminal panicles; calyx campanulate, truncate or with short lobes; corolla exserted, petals long-clawed; standard broad; keel not beaked; stamens monadelphous; filaments thread-like; ovaries sessile, linear, few-ovuled; styles incurved; stigmas capitate. Pods linear to oblong, usually flat, tardily dehiscent.

Species 150, in the tropics and subtropics of the Old World; 11 in the Philippines.

1. Leaf nerves prominent; pods 5 cm long, rhomboid-oblong, turgid..... 1. *M. brachycarpa*
 1. Leaf nerves faint; pods 8-12 cm long, linear, flat..... 2. *M. merrillii*

1. *Millettia brachycarpa* Merr., Philip. J. Sc. 10 (Bot.):17, 1915; En. Philip. 2: 278, 1923.

Shrubs or small trees. Leaves alternate, 9-12 cm long; leaflets usually 7, broad-oblong to subelliptic, 4-10 cm long, rounded at both ends, apex with a short point, midrib raised, with 5-8 prominent lateral nerves on each side; petiolules 5 mm long. Infrutescences axillary, 7-12 cm long with few turgid pods at ends; pods rhomboid-oblong, 5 x 3 cm, obtuse at base and abruptly terminated by a short, sharp point.

Endemic. Philippines: Luzon (Laguna & Batangas). In clearings at low altitudes.

Com. name – *Balok-balok* (Tag.).

Exsicc. – *Pancho CA 20034, 20119* (CAHP).

2. *Millettia merrillii* Perk., Fragm. Fl. Philip. 81, 1904; Merr., En. Philip. 2: 279, 1923.

Shrubs or small trees. Leaves alternate, 15-72 cm long; leaflets 9, ovate to ovate-oblong, 3-7 cm long, apex short-acute to acuminate, base rounded; petioles 4 mm long. Racemes spicate, axillary, as long as leaves or shorter; flowers purplish white, 12 mm long; calyx truncate, cup-shaped. Pods linear to oblanceolate, flat, 8-12 x 2 cm, narrowed toward base, pointed, dehiscing from apex to base, valves rigid and twisting.

Endemic. Northern to Central Luzon, Mindoro and Negros, Philippines.

Com. name – *Balok* (Tag.).

Exsicc. – *Pancho CA 20127, 20226* (CAHP).

9. CLITORIA Linnaeus

Trees, shrubs or woody vines. Leaves pinnately 3- to 9-foliolate, stipulate and stipellate. Flowers solitary or in 1-2 pairs on axillary peduncles, resupinate; peduncles with 2 small bracts and 2 large bracteoles, calyx thin, tubular, 5-lobed; standard much longer than other petals, broad-ovate, orbicular, without basal auricles; keel adhering to wings; stamens monadelphous or diadelphous; anthers uniform. Ovaries stalked, many-ovuled. Pods linear, flattened, with membranous septa between seeds.

Species 30, mostly in the tropics of the New World; 2 in the Philippines

1. Tree; leaves trifoliolate; flowers in drooping racemes, standard violet with red-purple throat..... 1. *C. fairchildiana*
 1. Vine; leaves 5- to 7-foliolate; flowers solitary, standard deep, pale blue, or nearly white..... 2. *C. ternatea*

1. *Clitoria fairchildiana* Howard, *Baileya* 15: 16, f. 1, 1967. – *C. racemosa* Benth., *Ann. Mus. Vind.* 2: 115, 1832. – *Vigna racemosa* (G. Don) Hutch. & Dalz., *Fl. West Trop. Afr.* 1: 409, 1928. **Figure 13**

Trees, up to 8 m or higher. Leaflets 3, oblong-elliptic, 2.5-6 x 10-18 cm long, acute; stipels acicular, 1.5 cm long. Flowers racemose, raceme terminal or axillary, drooping; bracts lanceolate, 1 cm long, green; bracteoles oblong-ovate, 1.5-2 cm long; calyx 1.75 cm long, green; corolla 3.5-4 cm long, standard violet with purple throat. Pods 15-20 cm long, flat, 3- to 6-seeded.

Probably native of Brazil. Recently introduced in the Mt. Makiling area, on the University campus, Laguna, Luzon, Philippines.

Com. name – *Pukingan kahoy* (Tag.).

Exsicc. – *Pancho CA 20120, 20179, 20311** (CAHP).

2. *Clitoria ternatea* L., *Sp. P1.* 2: 753, 1753; Merr., *En. Philip.* 2: 303, 1923.

Vines. Stems 1 cm in diameter. Leaflets 5-7, elliptic to oblong, 3-7 cm long, obtuse; stipels small, acicular. Flowers solitary; bracts oblong, 2 mm long; bracteoles green, roundish, 5-8 mm long; calyx green, 1.5 cm long; corolla 3.5-4 cm long, standard deep blue with a white or yellowish center, sometimes pale blue or nearly white. Pods 5-10 cm long, flat, 6- to 10-seeded.

Pantropical. Throughout the Philippines; in thickets, often cultivated.

Com. name – *Pukingan* (Tag.).

Exsicc. – *Gates & Quisumbing CA 1301; Hernandez CA 40087; Lugod CA 4701* (CAHP).

10. *GLIRICIDIA* Humboldt, Bonpland & Kunth

Trees or erect shrubs. Leaves odd-pinnate; stipules minute; leaflets often mottled when dry, estipellate. Flowers in axillary racemes, frequently on branches below foliage; calyx lobes short, upper pair subconnate; standard broad, reflexed; wings falcate-oblong, free; keel incurved, obtuse; vexillary stamens free, others united in a sheath; ovaries with numerous ovules. Pods stipitate, flat, 2-valved, valves coriaceous.

Species 6-9, in tropical America; 1 in the Philippines.

1. *Gliricidia sepium* (Jacq.) Kunth ex Walp., *Nomencl.* 688, 1821; Merr., *En. Philip.* 2: 280, 1923. – *Robinia sepium* Jacq., *Enum.* 28, 1760.

Small trees, up to 8 m high. Leaves 15-25 cm long; leaflets 13 on average, opposite, oblong or ovate-oblong, 4-6 cm long, pale beneath, shiny above; apex acuminate, blunt, base rounded. Racemes 4-8 cm long, numerous



Figure 13. *Clitoria fairchildiana*: 1. flowering twig; 2. flower, front view; 3. flower, expanded to show staminal tube; 4. stamens and pistil; 5. pod.

on leafless branchlets, many-flowered, solitary or few-fascicled in axils of fallen leaves; flowers 2 cm long, pink; calyx glabrate, shiny green; standard reflexed, retuse, pale yellow in median portions. Pods narrow-oblong to oblanceolate, 10-14 x 2 cm, flat, 6- to 8-seeded, tardily dehiscent.

Introduced from Mexico, now naturalized and growing wild in dry, wastelands throughout the Philippines.

Com. name – *Kakauate* (Tag.).

Exsicc. – *Pancho CA 10983; Champhaka CA 8081; Gates CA 1372* (CAHP)

11. INDIGOFERA Linnaeus

Herbs or shrubs erect, branched. Leaves imparipinnate, paripinnate or trifoliolate, sometimes simple, densely appressed-pubescent or canescent, stipulate; stipels minute or absent. Flowers small, in dense axillary racemes; calyx small, campanulate, 5-lobed, lobes subequal; corolla caducous; standard obovate; keels straight, spurred on each side near base; stamens diadelphous with uniform, apiculate anthers; ovaries sessile, 1- to many-ovuled; styles short; stigmas capitate, usually penicillate. Pods linear, subcylindric, often curved, 1- to many-seeded, septate between seeds.

Species 800, in all tropical and subtropical regions; 10 in the Philippines.

1. Pod straight or curved only toward apex, 2-3 cm long 1. *I. tinctoria*
 1. Pod entirely curved, 1-1.5 cm long..... 2. *I. suffruticosa*

1. *Indigofera tinctoria* L., Sp. Pl. 2: 751, 1753; Merr., En. Philip. 2: 276, 1923.

Shrubs erect, spreading, laxly branched, 1-1.5 m high. Leaves 6-10 cm long; leaflets 9-13 pairs, oblong to obovate, 1.5-2.5 cm long, membranous, blackish when dry. Racemes lax, sessile, 2-6 cm long; calyx short, gray-strigose, lobes as long as tube; corolla yellowish to red, 3-4 times as long as calyx. Pods spreading or reflexed, straight or nearly so, 2-3 cm long, 8- to 12-seeded.

Tropical. Introduced; cultivated for indigo and now spontaneous in wastelands throughout the Philippines.

Com. name – *Indigo* (Tag.).

Exsicc. – *Mabesa BF 26918, 1294012* (US).

2. *Indigofera suffruticosa* Mill., Gard. Dict. ed. 8. no. 2, 1768; Merr., En. Philip. 2: 275, 1923. – *I. anil* L., Mant. 2: 272, 1771. **Figure 14**

Herbs erect, branched, suffrutescent, 1 m high; branchlets lax, slightly pubescent with appressed hairs. Leaves 5-8 cm long; leaflets in 9-11 opposite pairs, oblong to subelliptic, apiculate, 1-2 cm long, pale green and appressed-pubescent beneath; calyx short, canescent, lobes as long as tube; corolla 3 times as long, red. Racemes axillary, solitary, 2-3 cm long. Pods numerous, reflexed, crowded, strongly curved on entire length, 1-1.5 cm long, 6- to 8-seeded, very short- appressed pubescence.

Native of tropical America. Introduced; cultivated for indigo. Throughout the Philippines, spontaneous in wastelands.

Com. name – *Tayum* (C. Bis., Ilk., P. Bis., Tag.).

Exsicc. – *Pancho CA 3358** (CAHP); *Serviñas BS 16874, 900642* (US).

12. TEPHROSIA Persoon, *nom. cons.*

Herbs or undershrubs. Leaves odd-pinnate; leaflets opposite, at least appressed-pubescent beneath. Racemes leaf-opposed or subterminal, flowers sometimes solitary or in pairs in leaf axils; calyx tubes campanulate with subequal lobes; petals clawed, standard suborbicular, keel incurved; stamens diadelphous with obtuse, uniform anthers; ovaries linear, many-ovuled, sessile; styles strongly incurved, filiform or flattened; stigmas capitate, often penicillate. Pod linear, compressed, 2- to many-seeded, 2-valved, continuous or obscurely septate between seeds.

Species 400, in the tropics of both hemispheres; 6 in the Philippines.

1. Leaves 15-25 cm long; flowers 2 cm long, white 1. *T. candida*
 1. Leaves 5-10 cm long; flowers 7 mm long, pink purple
 2. *T. dichotoma*

1. *Tephrosia candida* (Roxb.) DC., Prodr. 2: 249, 1825; Merr., En. Philip. 2: 278, 1923.

Shrubs, 2-3 m high, branchlets slender, cinereous at apex. Leaves 15-25 cm long, short-petioled; stipules setaceous; leaflets 18-25 pairs, oblong to subelliptic, 2-4 cm long, darker green on upper surface, gray and thinly silky beneath, apex acute. Racemes copious, terminal or subterminal, 10-30 cm long; flowers scattered, solitary or in small clusters; calyx upon pubescent pedicel, 2-5 cm long, densely silky, lobes much shorter than tube; corolla 2 cm long, white or reddish tinged. Pods 6-12 cm long, compressed with hairs, short-appressed and brown-canescant, 10- to 15-seeded.

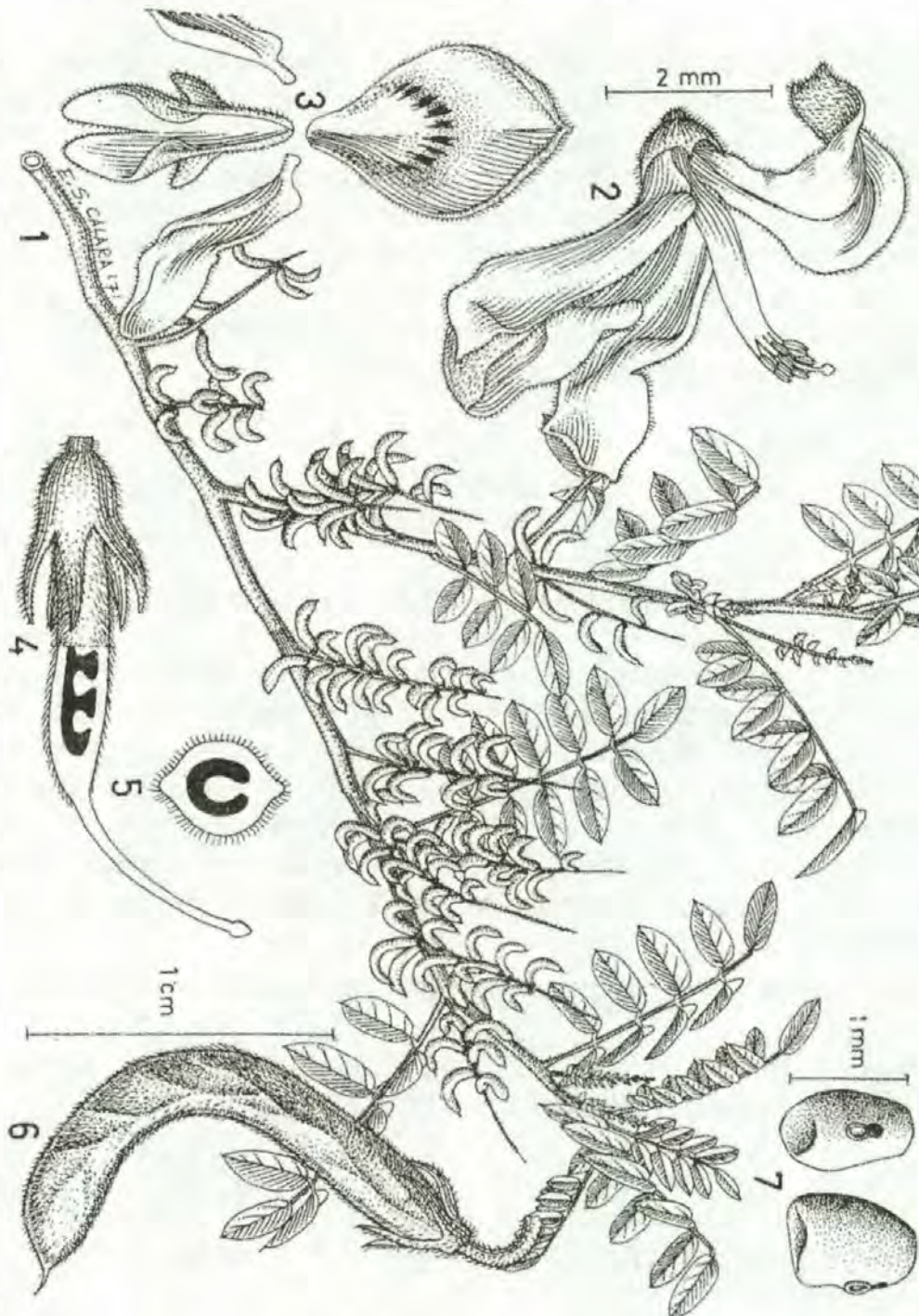


Figure 14. *Indigofera suffruticosa*: 1. fruiting branch; 2. flower; 3. perianth, expanded; 4. immature pod, partly excised; 5. ovary, cross section; 6. pod; 7. seed, 2 views.

Southeastern Asia. Recently introduced into the Philippines as green manure crop.

Com. name – *Balabalatungan* (Tag.).

Exsicc. – *Aspiras CA 1448*; *Jarmin CA 1449*; *Lugod CA 6058*; *Pancho CA 10149* (CAHP).

2. *Tephrosia dichotoma* Desv., Ann. Sc. Nat. Bot. I, 9: 415, 1826; Merr., En. Philip. 2: 277, 1923. – *T. luzonensis* Vogel, Nov. Act. Acad. Nat. Cur. 19, Suppl. 1: 15, 1843.

Shrubs erect or ascending, suffrutescent, 1 m high. Twigs pubescent, terete. Leaves 5-10 cm long; leaflets 5-20, narrow-oblong to oblanceolate, 1-2.5 cm long, lower side canescent, apex mucronate, base cuneate. Racemes short, dense, axillary, many-flowered; flowers pink to purple, 7 mm long. Pods many, straight or slightly curved, narrow-oblong, 2.5-3.5 x 0.4 cm, pubescent, containing 7-12 seeds.

Java. Throughout the Philippines, in open, dry places at low and medium altitudes.

Com. name – *Balabalatungan* (Tag.).

Exsicc. – *Gamboa CA 3923* (CAHP); *Loher 2397, 389496*; *Robinson BS 17361, 901777* (US).

13. EUCHRESTA Bennett

Shrubs erect. Leaves spirally arranged, odd-pinnate; stipules small, erect; leaflets opposite, estipellate. Flowers solitary on rachis of terminal racemes; calyx deeply campanulate, oblique, 5 short lobes deltoid, back crooked; corolla much-exserted, scarcely cohering; standard elongate but narrow, curved; keel obtuse; stamens diadelphous, vexillary stamens free, filaments cohering more or less; anthers versatile; ovaries long-stalked, 1- or 2-ovuled; styles slender, bent; stigmas capitate. Pods pedicellate, ovate-ellipsoid, 1-seeded, indehiscent.

Species 4, India to Ryukyu Islands, and Taiwan, southward to Java; 1 in the Philippines.

1. *Euchresta horsfieldii* (Lesch.) Benn., Pl. Jav. Rar. 148, 1840; Merr., En. Philip. 2: 302, 1923. – *Andira horsfieldii* Lesch., Ann. Mus. Paris 16: 481, t. 12, 1810.

Shrubs sparingly branched, unarmed. Leaves long-petioled; leaflets 3-5, opposite, oblong, 10-15 cm long, acute subsessile. Flowers in simple, peduncled, axillary racemes; pedicels geminate, minutely bracteate, shorter

than calyx; corolla white, 1.25 cm long, twice as long as calyx. Pods oblong, 1-2 cm long, turgid, purplish black at maturity.

Indo-Malaysia, Taiwan to Java. Throughout the Philippines, on high mountains.

Com. name – *Laguan* (Tag.).

Exsicc. – *Ramos BS 1011, 1311830* (US).

14. PTEROCARPUS Linnaeus

Trees. Leaves odd-pinnate; stipules narrow; leaflets alternate, ovate, entire, coriaceous, glabrous, estipellate. Flowers yellow, in axillary, paniced racemes; pedicels jointed at apex; calyx trubinate, curved in the bud, short toothed; petals exserted, long-clawed; standard and wings crisped; staminal sheath slit above, below or both; upper stamens nearly free; anthers versatile; ovaries stipitate, 2- to 6-ovuled; styles incurved; stigmas terminal. Pods orbicular, usually 1-seeded, indehiscent, surrounded by broad wing.

Species 20, subspecies 2, pantropical; 1 in the Philippines.

1. *Pterocarpus indicus* Willd., Sp. Pl. 3: 904, 1800; Rojo, Phan. Monog. 5: 41, f. 7a-f, i-j, 1972. – *P. santalianus* (non L. f.) Blco., Fl. Filip. 561, 1837.

forma *indicus*

Figure 15

Large trees. Leaves 15-30 cm long, glabrous; leaflets ovate to oblong, 5-10 cm long, apex acute, base rounded or deltoid, petiolules short. Flowers copious, in terminal or subterminal panicles, clothed with brown pubescence when young, yellow, falling off early, 1.5 cm long. Pods puberulent, glabrous when old, orbicular to subobovate with a very short beak, undulate, reticulate, winged edge 1.25 cm wide, 1-seeded, indehiscent.

Southern Burma, Central and Peninsular Thailand, Indochina (Phu Quoc), throughout Malesia and the Pacific Islands. In the Philippines, widely distributed in low, forested regions.

Com. name – *Narra* (Tag.).

Exsicc. – *Peña CA 8168**; *Lopez & Orlido CA 10651*; *Ballesteros CA 8022*; *Novero CA 7074*; *Champhaka CA 8082*; *Espiritu CA 8205*; *Palis CA 3456*; *Barile CA 2775, 2776* (CAHP).

forma *echinatus* (Pers.) Rojo, Phan. Monog. 5: 46, f. 7g-h, 1972. – *P. echinatus* Pers., Syn. Pl. 2: 277, 1807.

Distinguished by its spinescent pods.



Figure 15. *Pterocarpus indicus* forma *indicus*: 1. flowering branch; 2. flower; 3. flower, with petals removed; 4. perianth, expanded; 5. ovary, cross section; 6. ovary, vertical section; 7. pod; 8. seed; 9. portion of twig, enlarged to show stipule.

Celebes, Ambon, Adonara, Wetar and Kisar Islands (south of Celebes); Philippines (Luzon), in low, forested region.

Com. name – Prickly narra (Engl.).

Exsicc. – Cruz CA 2831 (CAHP).

15. DALBERGIA Linnaeus *f.*, *nom. cons.*

Trees or shrubs, often tall or climbing, sometimes spiny. Leaves odd-pinnate with alternate, coriaceous leaflets. Flowers small, numerous, in terminal or axillary panicles; calyx campanulate, with 5 short lobes; corolla exserted, standard broad; keel obtuse, jointed at tip; stamens 9 or 10, monadelphous or sheath slit down on one side; anthers minute, basifixed; ovaries stipitate, few-ovuled; styles short, incurved, glabrous; stigmas capitate. Pods oblong to strap-shaped, thin, flat, 1- to 4-seeded, indehiscent, not winged.

Species 200, in the tropics and subtropics of both hemispheres; 10 in the Philippines.

- 1. Leaflets 3-7
 - 2. Erect tree; pods not reticulate 1. *D. sisso*
 - 2. Scandent shrubs; pods prominently reticulate 2. *D. reticulata*
- 1. Leaflets numerous
 - 3. Erect tree 3. *D. mimosella*
 - 3. Scandent shrubs
 - 4. Flowers 3.5 mm long; seed portion of pods pitted 4. *D. cumingiana*
 - 4. Flowers twice as long as 3.5 mm; seed portion of pods reticulate
 - 5. Leaflets 1.5 - 4 cm long; bracts spatulate 5. *D. ferruginea*
 - 5. Leaflets, 0.75 - 2 cm long; bracts not spatulate 6. *D. pinnata*

- 1. *Dalbergia sisso* Roxb. ex DC., Prodr. 2: 416, 1825, Fl. Ind. ed. 2, 3: 223, 1832.

Trees erect. Branches with fine gray-puberulence. Leaflets scattered along zigzag rachis. 3-5, accrescent toward apex of leaf, broad oval to rhomboid-ovate, 3-7 x 2-6 cm, apex abruptly acuminate. Panicles much shorter than leaves. axillary, suberect, branches pubescent; calyx downy, lobes short except lowest one (longer and lanceolate); corolla yellowish, twice length of calyx; standard with long claw and round blade; stamens 9, in bundle, slit along top. Pod 1- to 4-seeded, opposite seeds not veined, stalked, obtuse, thin, oblong, 4-8 x 1 cm long.

Afghanistan, Baluchistan, northern India and Java. Recently introduced in the Philippines.

Com. name – Zigzag rosewood (Engl.).

Exsicc. – Lugod CA 4640, 4677, 4696 (CAHP).

2. *Dalbergia reticulata* Merr., Philip. J. Sc. 10(Bot): 14, 1915; En. Philip. 2: 296, 1923.

Shrubs scandent. Leaves 10 cm long; leaflets 5-7, with 8 pairs of obscure nerves, broadly elliptic to ovate, rounded at both ends; petiolules short. Racemes axillary, 2.5-4 cm long, puberulent; calyx sparsely pubescent, 3.5 mm long; wings twice as long as calyx, obtuse or rounded, clawed; stamens united into a sheath split down on one side up to base. Pods narrow-oblong, 7 x 1.75 cm, membranaceous, rounded, minutely apiculate, prominently and laxly reticulate; base decurrent with slender, 8 mm long stalk; seeds 1 or 2, central.

Luzon, Mt. Makiling, Philippines. Endemic.

Exsicc. – *Elmer 18340, 1237729* (US).

3. *Dalbergia mimosella* (Blco.) Prain, Ann. Bot. Gard. Calc. 10: 42, 1904; Merr., En. Philip. 2: 295, 1923. – *Amerimnon davaoensis* Elm., Leaflet. Philip. Bot. 2: 700, 1910.

Trees. Leaves 15-25 cm long, glabrous or rachis puberulent; leaflets 12-18, elliptic or oblong-elliptic, 5 x 2.5 cm, rounded at both ends, emarginate at apex; petiolules 3-5 mm long, brown-strigose. Panicles terminal or subterminal, shorter than foliage, with short-ferruginous pubescence; branchlets and pedicels subtended by small, linear to lanceolate bracts; calyx hairy, suboblique, unequally toothed; corolla 3 times as long as calyx, whitish, bluish tinged. Pods variable, 3-7 x 1.25 cm, flat, 1- to 3-seeded, obscurely reticulate, slenderly stipitate, acute to rounded at apex.

Throughout the Philippines, in woody areas in valleys.

Com. name – *Malasampalok* (Tag.).

Exsicc. – *Pancho CA 20161, 20216* (CAHP).

4. *Dalbergia cumingiana* Benth. in Miq., Pl. Jungh. 255, 1852; Merr., En. Philip. 2: 294, 1923.

Shrubs suberect or scandent. Leaflets 5- to 9-foliolate, elliptic, 3-5 x 2-3 cm, with pale and short-soft pubescence beneath, obtusely rounded at both ends, apex blunt, emarginate; petiolules short. Inflorescences elongate, corymbosely paniculate, terminal or in upper leaf axils, puberulent; flowers clustered at ends of ultimate branches; pedicels short, subtended by minute bracts, 3 mm long, margins of bracts and calyx segments ciliate; corolla whitish, exserted. Pods cushion-like, elliptic or oblongish, 2-3 x 1 cm, apex rounded, base abruptly constricted, 1- or 2-seeded, seedy portion pitted.

Throughout the Philippines, abundant in dry woods.

Com. name – *Kauilan* (Tag.).

Exsicc. – *Elmer 17931, 1237442* (US).

5. *Dalbergia ferruginea* Roxb., Hort. Beng. 58, 1814, *nom. nud.*; Fl. Ind. ed. 2, 3: 288, 1832; Merr., En. Philip. 2: 295, 1923. – *D. luzonensis* Vogel, Nov. Act. Acad. Nat. Cur. 19: Suppl. 1, 33, 1843.

Shrubs scandent. Leaves 10-20 cm long; leaflets 15-20, elliptic to oblong, 1.5-4 cm long, ferruginous-pubescent or glabrous beneath, rounded to retuse at tip, base a trifle oblique. Panicles terminal and lateral, forming a leafy inflorescence; flowers pink or whitish to yellowish tinged, 5-7 mm long; pedicels subtended by persistent spatulate bracts. Pods 3-7 x 1.5 cm, oblong to strap-shaped. 1- to 3-seeded, stalked, side covering seeds thickened, otherwise, thin.

Borneo to Papua New Guinea and the Caroline islands. Luzon to Palawan and Mindanao, Philippines. In forests and thickets at low and medium altitudes.

Com. name – *Kulik-manok* (Pamp.).

Exsicc. – *Valencia* CA 1324, 1327; *Gates & Villamil* CA 1325; *Gates* CA 1326 (CAHP); *McGregor* BS 22810, 89260; *Villamil* BF 20663, 901695 (US).

6. *Dalbergia pinnata* (Lour.) Prain, Ann. Bot. Gard. Calc. 10: 48, 1904; Merr., En. Philip. 2: 296, 1923. – *Derris pinnata* Lour., Fl. Cochinch. 432, 1790.

Shrubs scandent. Branches clothed with fine brown-pubescence. Leaves 7-15 cm long; leaflets 25-40, rhomboid-oblong, thinly pubescent, nearly sessile, subglaucous beneath, deciduous. Panicles axillary, 3-5 cm long, branches densely brown-pubescent; pedicels shorter than calyx; bracts and bracteoles minute, downy, subpersistent; calyx 3 mm long, pubescent, with short, obtuse lobes; corolla white, 2-3 times as long as calyx; standard orbicular; stamens 10. Pods 4-8 x 1.8 cm, thin, glabrous, long-stalked, brown.

India to southern China, southward to Borneo, Sumatra and Java. Throughout the Philippines, in dry brushlands.

Com. name – *Tikos-maiadon* (Mbo.).

Exsicc. – *Villamil* BF 21395, 903102 (US).

16. PONGAMIA Ventenat, *nom. cons.*

Trees. Leaves odd-pinnate; stipule fugacious; leaflets opposite, estipellate. Flowers white, in axillary racemes; standard broad, wings cohering to obtuse keel; stamens monadelphous, upper filaments free nearly to base; anthers oblong, versatile; ovaries subsessile, 2-ovuled; styles incurved, glabrous, stigmas capitate. Pods woody, flattened, oblong, indehiscent, not winged nor thickened along margins.

Monotypic. Tropical Asia, Mascarene Islands, Malaysia, Australia and Polynesia. Throughout the Philippines, along seashores; in some areas extending in and near borders of lakes.

1. *Pongamia pinnata* (L.) Pierre, Fl. For. Cochinch. 5, t.384, 1907; Merr., En. Philip. 2: 298, 1923. – *Cytisus pinnatus* L., Sp. Pl. 2: 741, 1753. – *Pongamia mitis* Merr., Philip. J. Sc. 5 (Bot): 101, 1910.

Characteristics. (Refer to genus description).

Com. name – *Bani* (Tag., Ilk., Sul., Pamp.).

Exsicc. – *Foxworthy & Catalan CA 1427* (CAHP).

17. DERRIS Loureiro *nom. cons.*

Shrubs scandent, rarely erect, or trees. Leaves odd-pinnate, stipulate; leaflets 3 to many, opposite. Inflorescences in axillary and terminal racemes or panicles; flowers numerous, usually fascicled; calyx truncate, cup-shaped; corolla several times longer than calyx; standard broad; keel adhering to and as long as or somewhat shorter than wings; stamens monadelphous or upper one free; anthers versatile; ovaries sessile or shortly stalked, densely hairy, 2- to many-ovuled; styles incurved, filiform; stigmas capitate. Pods flat, indehiscent, strap-like or oblong, winged along upper or both sutures.

Species 70, in most tropical countries; 14 in the Philippines.

- 1. Leaflets 6 x 1 cm
 - 2. Leaflets 9-13, coriaceous, glabrate 1. *D. scandens*
 - 2. Leaflets 13-21, membranous, ferruginous-pubescent 2. *D. cumingii*
- 1. Leaflets at least 15 x 2 cm
 - 3. Leaflets trifoliolate, occasionally up to 7..... 3. *D. trifoliata*
- 3. Leaves pinnate
 - 4. Inflorescences subglabrous..... 4. *D. lianoides*
 - 4. Inflorescences pubescent
 - 5. Leaflets acute to acuminate, glabrous.....5. *D. philippinensis*
 - 5. Leaflets obtuse to rounded, pubescent beneath when young
 - 6. Standard tomentose 6. *D. elliptica*
 - 6. Standard glabrous 7. *D. polyantha*

1. *Derris scandens* (Roxb.) Benth., J. Linn. Soc. Bot. 4: Suppl. 103, 1868; Merr., En. Philip. 2: 301, 1923. – *Dalbergia scandens* Roxb., Pl. Corom. 2, t. 192, 1798.

Shrubs low, spreading, scandent, height 3-6 m or more. Leaves 15 cm long; leaflets 9-13, ovate-oblong to elliptic or lanceolate, 2-6 x 1-2.5 cm; petiolules 3-5 mm long. Racemes axillary, few- to many-flowered, longer than leaves; flowers fasciculate on short, lateral branches; calyx dull purple, a trifle

oblique, 3 mm. long; corolla white, 1 cm long. Pods flattened, lanceolate to oblong, 4-6 x 1 cm, narrowed at both ends, 1- to 3-seeded, with a narrow wing along dorsal suture

India to southern China through Malesia to tropical Australia. Throughout the Philippines, scattered in thickets and jungle woods.

Com. name – *Tubli* (Bik.).

Exsicc. – *Sulit* CA 3388 (CAHP), *Elmer* 18310, 1237714 (US).

2. *Derris cumingii* Benth., J. Linn. Soc. Bot. 4: Suppl. 104, 1860; Merr., En. Philip. 2: 299, 1923.

Shrubs scandent or tree-like. Leaves 10-15 cm long, leaflets 13-21, elliptic to broad-oblong, 2.5 x 1.25 cm, acute to obtuse or rounded at both ends, apex terminated by small mucronate point, subsessile or upon short petiolules. Flowers numerous on slender, spicate racemes, terminal or in upper leaf axils, ferruginous-pubescent; pedicels short, bract-subtended; calyx campanulate, bluntly toothed; corolla twice as long as calyx, subolivaceous, glabrous. Pods ligulate, 4-6 x 1 cm, flat, tapered toward both ends, narrowly winged along 1 suture, brown-canescens at maturity.

Endemic. Luzon (Ilocos Norte to Rizal), Philippines. In thickets, at low and medium altitudes.

Com. name – *Tubling kahoi* (Tag.).

Exsicc. – *Pancho* CA 20158, 20231 (CAHP).

3. *Derris trifoliata* Lour., F1. Cochinch. 433, 1790; Merr., En. Philip. 2: 301, 1923.

Shrubs scandent. Leaves 10-20 cm long, leaflets 3-7, oblong to ovate-oblong, 4-13 cm long. Inflorescences in simple, axillary racemes or narrow panicles 5-10 cm long; flowers white, often tinged with violet, 8-10 mm long; Pods subrhomboid to broadly oblong, 2.5-5 x 3 cm, glabrous, 1- or 2-seeded, prominently veined with narrow wing along suture.

Tropical East Africa, Asia through Malaysia to Australia and Polynesia. Throughout the Philippines, in thickets along tidal streams, seas or lakes.

Com. name – *Mangasin* (Tag.).

Exsicc. – *Velasco* CA 3500; *Hernaez* CA 19838; *Festín* CA 10343 (CAHP).

4. *Derris lianoides* Elm., Leaf. Philip. Bot. 1: 228, 1907.

Lianas or woody vines. Leaves 20 cm long; leaflets 3-5 pairs, oblong to elliptic 7 x 4 cm, 7- to 9-nerved, apex acute to acuminate, base rounded. Inflorescences chiefly below foliage, 7-14 cm long, usually branched from near base into few spicate

racemes, subglabrous; pedicels 1 cm long, subtended by small bracts; calyx glabrous, cupular, 4 mm long; standard white or tinged with red, 18 mm long, clawed; wings a trifle shorter than standard; keel equaling wings. Pods. 5-8 x 2 cm, glabrous, flat, few-seeded, tapered at both ends with raised, submarginal vein along both sutures; wings 3 mm or less, broad.

Endemic. Philippines: Northern Luzon, Palawan and Mindanao. In forests, at low and medium altitudes.

Exsicc. – *Pancho CA 20225, 20274 (CAHP).*

5. *Derris philippinensis* Merr., Philip. J. Sc. 5(Bot.): 104, 1910; En. Philip. 2: 300, 1923. – *D. multiflora* Vidal, Rev. Pl. Vasc. Filip. 112, 1886; Merr., Philip. J. Sc. 1 (Suppl.): 66, 1906 *non* Benth.

Shrubs scandent. Leaflets 5-7, narrow-ovate to broad-lanceolate or oblong, 7-13 x 2.5-4.5 cm, apex strongly subcaudate or acuminate, base rounded or acute. Racemes axillary or terminal, slender, shorter than or equaling leaves, spicate, occasionally few-branched, dark brown-pubescent or strigose, many-flowered; flowers white, 1 cm long, fascicled, slenderly pedicelled. Pods thin, narrowly oblong to lanceolate, 4-8 x 1-1.5 cm, slightly falcate, few-seeded, reticulate at seedy portion; wing 1.5-2 mm long.

Endemic. Philippines: Northern to southern Luzon. In thickets, at low and medium altitudes.

Com. name – *Ollabak puti* (Tag.).

Exsicc. – *Gates & Villamil CA 1338; Gates CA 1336, 1337 (CAHP); Catalan BF 26463, 1292914 (US).*

6. *Derris elliptica* (Roxb.) Benth., J. Linn. Soc. Bot. 4: Suppl. III, 1860; Merr., En. Philip. 2: 299, 1923. – *Galedupa elliptica* Roxb., Hort. Beng. 53, 1814. *nom. nud.*, Fl. Ind. ed. 2, 3: 242, 1832. **Figure 16**

Shrubs scandent, branches brown-pubescent. Leaves 30 cm long, long-petioled; leaflets 9-13, obtuse or pointed, 10-15 x 5-7 cm, subglaucous and silky beneath. Racemes 15-30 cm long, lax, nodes produced into branchlets, axils and pedicels densely brown-pubescent; pedicels 4-6 mm; calyx broad, densely silky; corolla red, 2 cm long, canescent outside; standard round, 12-15 mm broad. Pods 5-8 x 1.8 cm, 1- to 3-seeded, thin, with raised sutures.

Chittagong (Bangladesh) through Malesia and the Bismarck Archipelago. Philippines: Northern Luzon to Mindanao. In secondary forests, at low and medium altitudes.

Com. name – *Tibanglan* (Tag.).

Exsicc. – *Gates CA 1329, 1335; Villamil CA 1330**; *Jose CA 1331, 1334; Dycoco CA 2830; Aquino CA 1332; Valencia CA 1330; Baliguas CA 2781 (CAHP); Elmer 17708, 1237274; Villamil BF 20662, 901594 (US).*



Figure 16. *Derris elliptica*: 1. fructing twig; 2. flowering twig; 3. flower, closed; 4. flower, opened; 5. seed, 2 views.

7. *Derris polyantha* Perk., Fragm. Fl. Philip. 83, 1904; Merr., En. Philip. 2: 301, 1923.

Shrubs scandent. Leaflets 7-9, oblong, 5-8 x 2-3 cm, pale green and pubescent beneath, glabrous when old, midrib with 5-7 pairs of ascending, curved nerves, obtuse and emarginate at blunt apex, base obtusely rounded; petioles 3-5 mm long. Spicate racemes long, terminal or axillary, rufous-pubescent; pedicels slender, brown, villous, subtended by minute bracts; calyx similarly hairy, subtruncate; corolla glabrous, 2-3 times longer than calyx.

Endemic. Luzon (Pampanga to Batangas), Philippines. In thickets and secondary forests at low altitudes.

Com. name – *Tinalang* (Tag.).

Exsicc. – *Pancho CA 20259, 20317* (CAHP).

18. ABRUS Adanson

Vines slender, climbing, suffrutescent. Leaves distichous, paripinnate; leaflets small, numerous; stipels reduced to minute protuberances of rachis. Racemes dense, peduncled, axillary, many-flowered, flowers small, pink or purplish; calyx campanulate, with short teeth; corolla much-exserted; standard ovate, adhering to staminal tube; wings narrow; keel arched; stamens 9, monadelphous; ovaries sessile, 4- to many-ovuled; styles short, incurved. Pods oblong, flat or turgid; seeds black and red.

Species 4, pantropical; 2 in the Philippines.

1. Pods 2.5-5 cm long; seeds vermilion-red with black spot around hilum..... 1. *A. precatorius*
 1. Pods 3-9 cm long; seeds brown-black 2. *A. fruticulatus*

1. *Abrus precatorius* L., Syst. ed. 2, 472, 1767; Breteler, Blumea 10: 617, 1960. **Figure 17**

Vines suffrutescent, climbing or sprawling. Leaves 5-10 cm long, glabrous or thinly silky beneath; leaflets 20-40 pairs, oblong, 1-3 cm long, mucronate, paler beneath. Racemes axillary, shorter than leaves; flowers crowded, pinkish white to pale purple or salmon-red, 1 cm long; calyx short, strigose; corolla 3-4 times as long as calyx. Pods oblong, turgid, 2.5-5 x 1.5 cm; seeds 3-5, shiny, vermilion-red with black spot around hilum.

Circumtropical. Throughout the Philippines, in dry thickets.

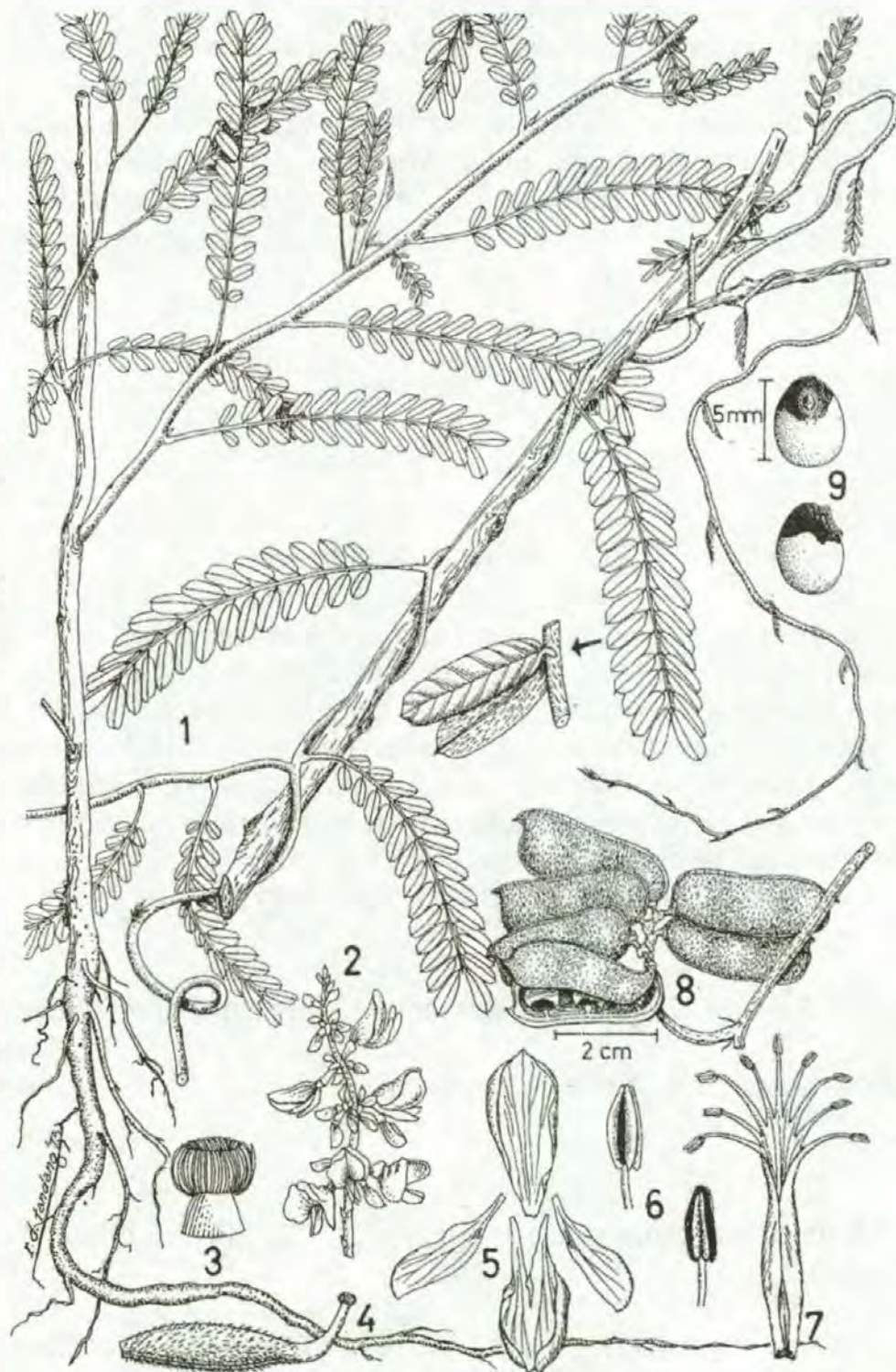


Figure 17. *Abrus precatorius*: 1. habit; 2. inflorescence; 3. stigma; 4. pistil; 5. perianth, expanded; 6. stamen, 2 views; 7. united stamens; 8. pods; 9. seed, 2 views. (After Pancho 1983, with permission).

Com. names – *Kansasaga*, *Saga-saga* (Bik., Pamp., Tag.); Precatory bean (Engl.).

Exsicc. – *Gates & Castro CA 1231** (CAHP).

2. *Abrus fruticulosus* Wall ex Wight & Arn., Prodr. 1: 236, 1834; Breteler, Blumea 10: 612, 1960. – *A. laevigatus* Mey., Comm. 1: 126, 1836.

Vines slender, twining, suffrutescent, 1.5-3 m long. Leaves 5-10 cm long, rachis subvillous; leaflets 9-16 pairs, subsessile, oblong, 1-2.5 cm long, minutely apiculate, strigose especially beneath. Flowers fasciculately crowded, pink or purplish, 7-8 mm long; stalk and calyx woolly-pubescent; calyx short, apiculate toothed; corolla at least 3 times as long as calyx. Pods oblong to linear, 3-9 cm long, flattened, glabrescent; seeds brown-black.

Circumtropical. In the Philippines, in thickets and jungle woods.

Com. name – *Saga* (Tag.).

Exsicc. – *Pancho CA 20220, 20298* (CAHP).

19. **SESBANIA** Scopoli, *nom. cons.*

Herbs, shrubs, or trees erect, branched, suffrutescent. Leaves long, narrow, even-pinnate; leaflets numerous, oblong to linear-oblong, obtuse, mucronate. Flowers in axillary racemes, small to large; calyx campanulate, shallowly 2-lipped or 5-toothed; corolla much-exserted, white, reddish or yellow; petals long clawed; standard broad; keel straight or recurved; stamens diadelphous; ovaries linear, stipitate, many-ovuled; styles glabrous, incurved, filiform; stigmas capitate. Pods long, narrow, septate, dehiscent.

Species 70, in the tropics and subtropics of both hemispheres; 4 in the Philippines.

1. Tree; flowers large, white, tinged with red..... 1. *S. grandiflora*
 1. Shrub; flowers small, yellow..... 2. *S. sesban*

1. *Sesbania grandiflora* (L.) Pers., Syn. 2: 316, 1807; Merr., En. Philip. 2: 281, 1923. – *Robinia grandiflora* L., Sp. Pl. 2: 722, 1753

Trees glabrous, height 15 m or more. Leaves 20-30 cm long; leaflets 20-40 pairs, oblong, 2.5-3.5 cm long, obtuse, pale or subglaucous-green, subsessile. Racemes short, axillary, few-flowered; flowers pendulous, 7-9 cm long, succulent, white, often reddish tinged; calyx green, subtruncate or shallowly bi-lipped. Pods pendent, linear, 20-60 cm long, 7-8 mm wide, slightly curved, many-seeded.

India, Malaysia to tropical Australia and Mascarene Islands. Throughout the Philippines, often planted in settled areas at low and medium altitudes.

Com. name – *Katurai, Gaway-gaway* (Ibn., Pang., P. Bis., Tag.).

Exsicc. – *Gates CA 1441* (CAHP).

2. *Sesbania sesban* (L.) Merr., Philip. J. Sc. 7(Bot.): 235, 1912, En. Philip. 2: 282, 1923. – *Aeschynomene sesban* L., Sp. Pl. 2: 714, 1753.

Figure 18

Shrubs erect, 2-3 m high. Twigs slightly appressed-pubescent. Leaves 10-20 cm long, sparsely pubescent beneath; leaflets 10-20 pairs, oblong, 2-3 cm long, rounded, apiculate or mucronate. Racemes 10 cm long, few-flowered above middle; flowers 1.5 cm long, uniformly yellow, slenderly pedicelled. Pods linear, subcylindric or flattened, slightly twisted, pendulous, nearly 20 cm long x 3 mm wide, depressed between seeds.

In the tropics of both hemispheres. Throughout the Philippines, in open, poorly drained fields; introduced.

Com. name – *Sesbania* (Engl.).

Exsicc. – *Pancho & Guantes CA 16009; Corpuz CA 17893*, 17894** (CAHP).

20. CROTALARIA Linnaeus

Herbs or shrubs. Leaves simple or digitately compound. Flowers in terminal or leaf-opposed racemes; calyx 5-lobed; corolla equaling or exceeding calyx, standard with a short claw, otherwise round; wing obovate-oblong, shorter; keel broad, equaling wings; stamens 10, monadelphous; anthers dimorphous; ovaries sessile or stipitate, 1- to many-ovuled; styles abruptly incurved at base, bearded upwards. Pods sessile or stipitate, turgid; seeds 1 to many, kidney-shaped.

Species 300, throughout the tropics and subtropics; 17 in the Philippines.

1. Leaves simple
 2. Pods 7 mm long, ovoid-oblong, subsessile, glabrous..... 1. *C. linifolia*
 2. Pods 3 cm long, oblong, pedicelled, brown-pubescent..... 2. *C. juncea*
1. Leaves trifoliolate or 5- to 7-foliolate
 3. Leaves trifoliolate
 4. Stems with slender, longitudinal grooves; racemes 20-40 cm long; corolla yellow with red stripes..... 3. *C. saltiana*
 4. Stems otherwise; racemes 5-20 cm long; corolla yellow, usually with purple blotches..... 4. *C. incana*
 3. Leaves 5- to 7-foliolate..... 5. *C. quinquefolia*

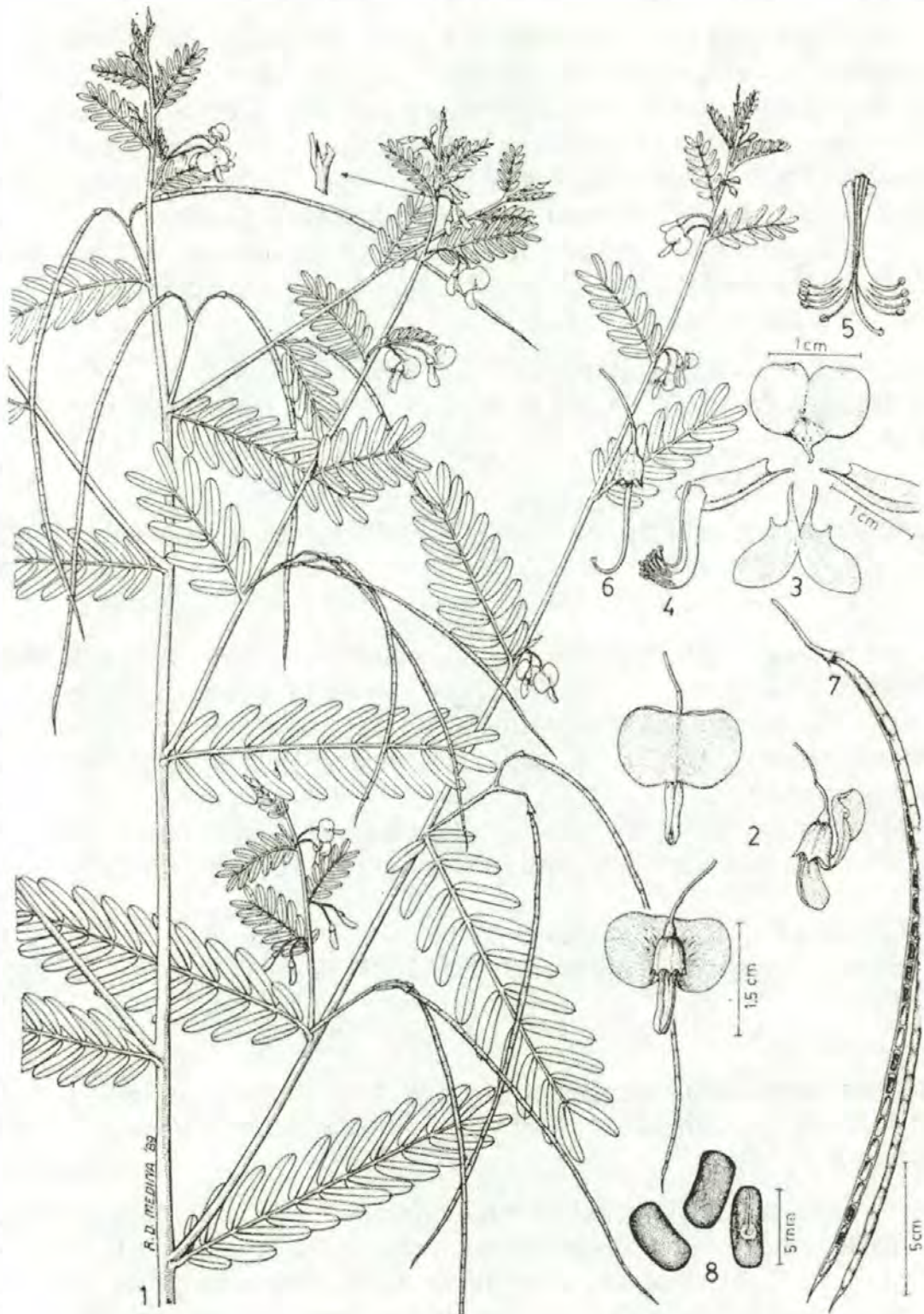


Figure 18. *Sesbania sesban*: 1. habit; 2. flower; 3. stamens; 4. pistil; 5. perianth, expanded; 6. fruit; 7. seed.

1. *Crotalaria linifolia* L. f., Suppl. 322, 1781; Munk, Reinwardtia 6: 207, 1962; Chuang, Taiwania 9: 81, f. 9, 1963. **Figure 19**

Annual herbs slender, erect, simple or branched, 10-18 cm high, pubescent. Leaves linear to narrowly oblong-lanceolate, 1-5 cm long, 2-5 cm wide. Racemes terminal, elongate; flowers less than 1 cm long, scattered, yellow; calyx green, tinged with brown, 2-lipped, upper lip with 2 short lobes, lower with 3 linear ones; corolla yellow, standard 6-7 mm wide. Pods glabrous, ovoid-oblong obtuse, 7 x 4-5 mm, inflated, containing 8-10 seeds.

India to southern China and Taiwan through Malaysia to Australia, New Guinea and Caroline Islands. Throughout the Philippines, in open abandoned areas at low and medium altitudes.

Com. name – Flax leaf (Engl.).

Exsicc. – *Corpuz CA 1318; Estioko, Jr. 1319**; *Jimenez CA 10025* (CAHP).

2. *Crotalaria juncea* L., Sp. Pl. 2: 714, 1753; Munk, Reinwardtia 6: 206, 1962. **Figure 20**

Herbs erect, stiff, branched, suffrutescent, 1 m high, all parts finely pubescent. Leaves simple, linear-oblong to oblong, sessile or shortly petioled, obtuse, 4-10 cm long. Racemes terminal, 8-20 cm long; calyx densely brown-pubescent, lobes long. Corolla yellow, 2.5 cm long. Pods oblong, 3 cm long, brown-pubescent.

Madagascar, India, Malay Peninsula, Java and New Guinea. Introduced from India as a fiber plant, cultivated and naturalized throughout the Philippines.

Com. name – Sun hemp (Engl.).

Exsicc. – *Pancho CA 4565, 9086**, 9087; *Guico & Paysan CA 2872* (CAHP).

3. *Crotalaria saltiana* Andr., Bot. Rep. t. 648, 1811; Chuang, Taiwania 9: 81. f. 10, 1963. – *C. striata* DC., Prodr. 2: 131, 1825; Baker in Hook. f., Fl. Brit. Ind. 2: 84, 1876. **Figure 21**

Herbs erect, few-branched, suffrutescent, 50-70 cm tall. Stems puberulent, with slender, longitudinal grooves. Leaves trifoliolate; leaflets obovate to obovate-oblong, 3-5 x 2-4 cm, obtuse or acute at base, apex emarginate with fine mucro; stipules minute, setaceous, deciduous. Racemes terminal, 20-40 cm long, 15- to 30-flowered; calyx 7 mm long, sparsely pubescent, lobes lanceolate; corolla 1.2 cm long, yellow with red stripes. Pods oblong, 4 cm long, 20- to 30-seeded.

Tropical Asia, Africa and America. Introduced in Mt. Makiling area, Luzon, Philippines as a cover crop.



Figure 19. *Crotalaria linifolia*: 1. habit; 2. flower; 3. perianth, expanded; 4. leaf, enlarged; 5. portion of stem, enlarged; 6. flower, petals excised to show stamens and pistil; 7. pod; 8. seed; 9. ovary, cross section; 10. ovary, vertical section.

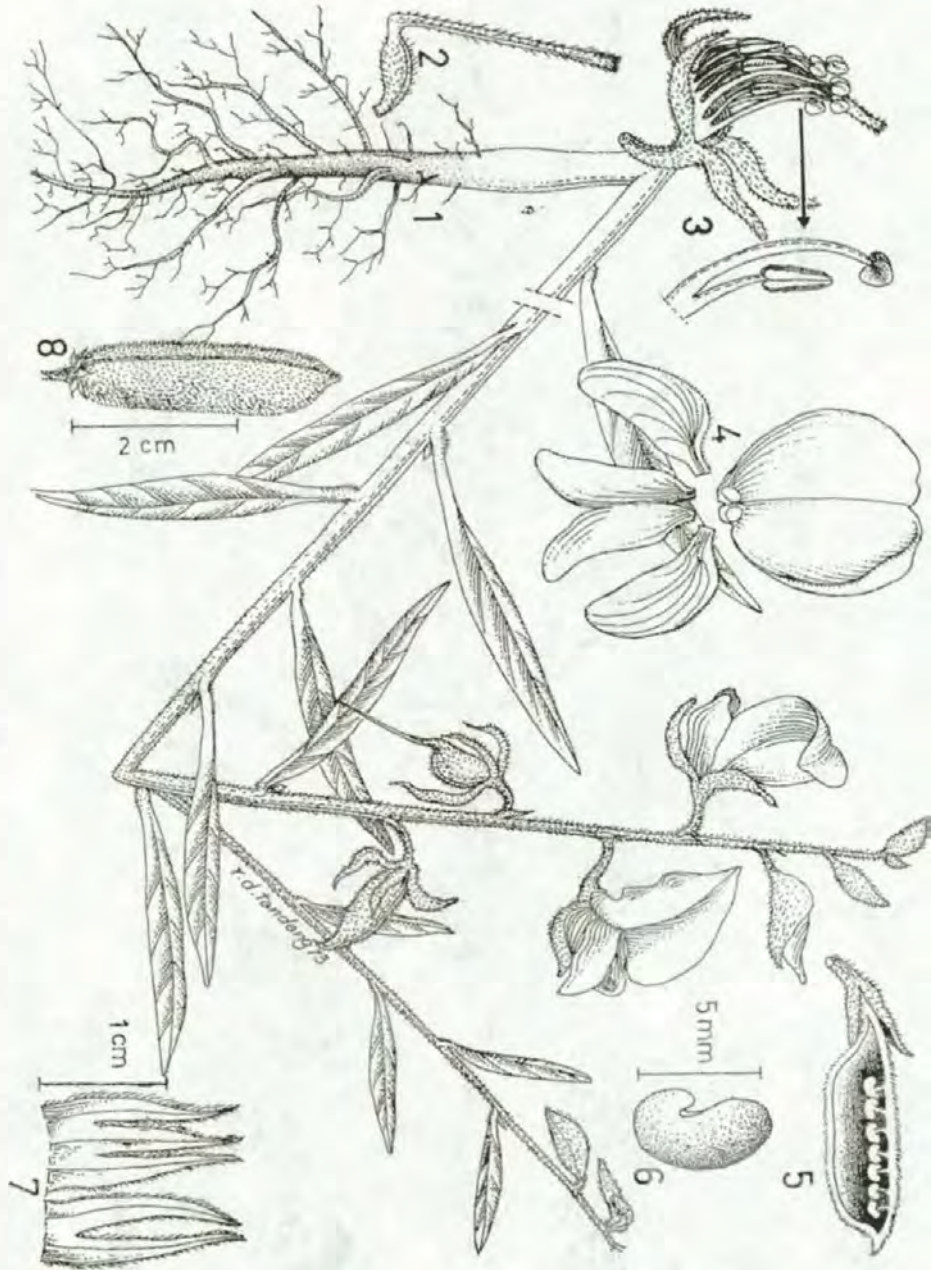


Figure 20. *Crotalaria juncea*: 1. habit; 2. pistil; 3. flower, petals excised to show stamens and pistil; 4. perianth, expanded; 5. pod, opened; 6. seed; 7. bracts; 8. pod.



Figure 21. *Crotalaria saltiana*: 1. habit; 2. flower; 3. perianth, expanded; 4. flower, petals removed; 4a. stamens; 5. flower, petals and stamens removed; 6. ovary, vertical section; 7. ovary, cross section; 8. leaf; 9. pods; 10. seed.

Com. name – *Tambarisa* (P. Bis.).

Exsicc. – *Orido* CA 4915; *Balesteros* CA 1321*, *Lugod* CA 4638; *Guantes & Pancho* CA 10442 (CAHP); *Sulit* PNH 24071, 2244127; *Mabesa* BF 26919, 129401 (US).

4. *Crotalaria incana* L., Sp. Pl. 2: 716, 1753; Munk, Reinwardtia 6: 205, 1962; Chuang, Taiwania 9: 79, f.8, 1963. **Figure 22**

Herbs erect, branched, suffrutescent, 1 m high, softly gray-pubescent; stems and branches cylindrical. Leaflets 3, elliptic to obovate, 2-5 x 1.5-3 cm, obtuse or slightly acuminate. Racemes terminal, 5-20 cm long; calyx 1 cm long, lobes lanceolate, acuminate, much longer than tube; corolla yellow, blotched (not veined) with purple, standard 10-13 mm wide. Pods 3-4 x 1 cm, deflexed, inflated, hirsute.

A native of tropical America, now pantropic; common throughout the Philippines mostly in wastelands and cultivated areas.

Com. name – *Latok-latokan* (Tag.).

Exsicc. – *Guantes* CA 10693*; *Gates* CA 1314 (CAHP).

5. *Crotalaria quinquefolia* L., Sp. Pl. 2: 716, 1753; Munk, Reinwardtia 6: 212, 1962. **Figure 23**

Annual herbs erect, branched, coarse, 1-1.5 m high; stems green, striate. Leaflets 5, rarely 7, linear to linear-lanceolate. Racemes terminal, bracteoles narrow-lanceolate, acuminate, 1-1.5 cm long; calyx glabrous, 1 cm long, lobes ovate to ovate-lanceolate; petals yellow, standard more or less brownish purple on back, 2.5 cm wide. Pods inflated, boat-shaped, 5-6 x 2 cm, stalked, containing 30-40 seeds.

India through Malaysia, Java to Australia. Throughout the Philippines, in open fields at low and medium altitudes.

Com. name – *Potokan* (Tag.).

Exsicc. – *Guantes & Pancho* CA 10441*; *Vergara* CA 2966; *Sulit* CA 2013; *Cabrera* CA 4847 (CAHP).

21. MOGHANIA J. St. Hilaire

Shrubs erect. Leaves simple or trifoliolate, gland-dotted below. Inflorescences various; pedicels short, ebracteolate; calyx tubes short, tooth narrow, acuminate, lowest often longest; corolla little or not at all exerted, petals equal; keel obtuse or slightly prostrate; stamens diadelphous; anthers uniform; ovaries sessile, 2-ovuled; styles filiform, beardless; stigma capitate. Pods oblong, turgid, small, usually 2-seeded.

Species 40, chiefly in tropical Asia, few in Africa, Malaysia and Australia; 6 in the Philippines.



Figure 22. *Crotalaria incana*: 1. habit; 2. flower; 3. stamens; 4. leaf, dorsal view; 5. bracts, opened; 6. ovary, cross section; 7. ovary, vertical section; 8. seed; 9. portion of stem, enlarged; 10. perianth, expanded.

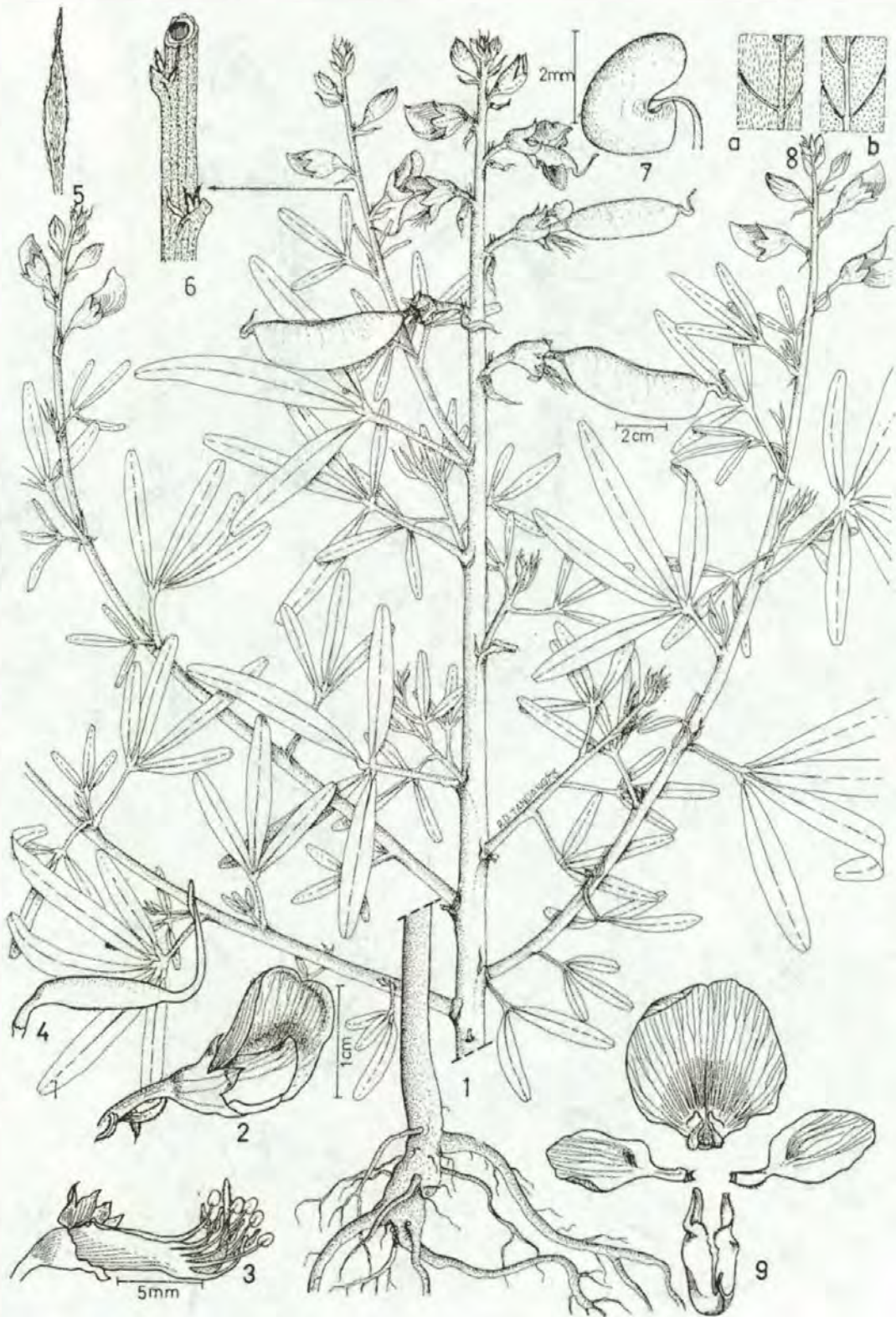


Figure. 23. *Crotalaria quinquefolia*: 1. habit; 2. flower; 3. flower, perianth removed to show stamens; 4. pistil; 5. stipule; 6. portion of stem, enlarged; 7. immature seed; 8. portion of leaf, (a) dorsal and (b) ventral views; 9. perianth, expanded. (After Pancho 1983, with permission).

1. Leaves simple; cymes in simple or branched racemes hidden by large, folded, persistent, distichous bracts..... 1. *M. strobilifera*
 1. Leaves trifoliolate; flowers in dense, solitary racemes..... 2. *M. macrophylla*

1. ***Moghania strobilifera*** (L.) J. St. Hill. ex Jacks., Ind. Kew 2: 252, 1894; Li, Woody Fl. Taiwan 352, f. 125, 1963. **Figure 24**

Shrubs erect, up to 2 m high. Leaves simple, ovate-oblong, 6-14 cm long, with 5-7 ascending nerves, apex acute, base broadly rounded or subcordate; petioles 2 cm long. Racemes terminal or axillary, 5-15 cm long, finely pubescent, rachis zigzag; flowers in small fascicles or cymes, yellowish green, tinged with purple, 8 mm long, folded over by large persistent bracts. Pods oblong, 1 cm long, 2-seeded, swollen.

India to southern China and Malaysia. Throughout the Philippines, in the settled areas and open, wastelands.

Com. name – *Payang-payang* (Tag.).

Exsicc. – *Rosacia* & *Orlido* CA 10528, 10529, 10530*; *Blancaver* CA 5052; *Velasco* CA 1396; *Novero* CA 1398, 8125; *Ballesteros* CA 8026; *Gates* CA 1397; *Prieto* CA 1399; *Orlido* CA 4874 (CAHP); *Gabot* 33453, 2212488 (US).

2. ***Moghania macrophylla*** (Willd.) O. Kuntze, Rev. Gen. Fl. 1: 199, 1891; Nooteboom, Reinwardtia 5: 434, 1961. – *Crotalaria macrophylla* Willd., Sp. Pl. 3: 982, 1800. – *Flemingia cumingiana* Benth. in Miq., Pl. Jungh. 245, 1852. – *F. philippinensis* Merr. & Rolfe, Philip. J. Sc. 3 (Bot.): 103, 1908. **Figure 25**

Shrubs erect or spreading, slightly branched, pubescent or suffrutescent, 1-2 m high or shorter. Stems 3-angled, densely pubescent. Leaves trifoliolate; leaflets ovate to rhomboid-ovate, acute, 5-12 cm long, densely pubescent beneath lateral ones inequilateral. Racemes in upper axils, densely pubescent, 2-5 cm long; flowers 8 mm long; calyx densely silky-pubescent, as long as corolla; standard dark purple, wings and keel greenish. Pods 1 cm long, inflated.

Africa, Himalaya to Sri Lanka and China, throughout Malaysia. Throughout the Philippines, at low and medium altitudes.

Com. name – *Malabalatong* (Pamp.).

Exsicc. – *Escobin* CA 3464; *Lantican* CA 3294; *Gates & Feria* CA 1373; *Lugod* CA 8357, 8356* (CAHP).



Figure 24. *Moghania strobilifera*: 1. flowering branch; 2. flower, bracts closed; 3. flower, bracts opened; 4. flower, enlarged, bract removed; 5. flower, corolla removed; 6. perianth, expanded; 7. ovary, vertical section; 8. ovary, cross section; 9. seed, 2 views; 10. pod.



Figure 25. *Moghania macrophylla*: 1. portion of fructing and flowering branch; 2. root system; 3. perianth, expanded; 4. pod; 5. flower, petals removed to show stamens; 6. ovary, cross section; 7. seed, 2 views.

22. **PHYLACIUM** Bennett

Herbs twining. Leaves alternately scattered, trifoliolate; petioles 2-3 cm long, slender, strigose; leaflets oblong, 3-6 x 1-3 cm, obtusely rounded; base truncately rounded, often emarginate, membranous, paler green and canescent beneath. Inflorescences clustered in axils of leaves, 3-5 cm long; stalks cinerous, slender, curved toward apex; flowers 1-3, bluish white, enclosed by strongly folded bracts, slenderly pedicellate; bracts green, soft-membranous, elongate-ovate in side view, 2-3 cm long, finely veiny, ciliate along back; calyx strigose, acutely toothed. Pods much-compressed, rotund, sharply pointed when young, glabrate when old, 1-seeded.

Species 2, India, Malesia (excluding Borneo) and Australia (North Queensland); 1 in the Philippines.

1. *Phylacium bracteosum* Benn., Jav. Rar. 159, t. 33, 1840; Merr., En. Philip. 2: 294, 1923; Bresser, Blumea 24: 488, f. 1, 3a-f, 1978. **Figure 26**

Herbs. Stems hollow, glabrescent. Stipules ovate-lanceolate to triangular, 2-3 x 0.5-1 mm. Stipel ovate-lanceolate, 1.5-2 x 0.3-0 mm. Terminal leaflets mostly elliptic, often ovate-lanceolate, rarely obovate, 3-9.5 x 1.2-4.5 cm, lateral leaflets slightly smaller. Flowers 6-8 mm long; standard obovate, 0.5 x 3-3.5 mm, base cordate, auricles 0.3-0.5 mm; wing 4.5 x 0.8-1.2 mm; keel 0.4 x 1-1.5 mm. Pods indehiscent, obliquely elliptic, 7-11 x 4-6 mm; seed 4 x 3 mm, with small appendage perpendicular to and on the curvature directed to base of pod.

Malesia (excluding Borneo) and Australia (North Queensland). In the Philippines, in dry thickets from sea level to 1400 m.

Com. name – *Takilis* (P. Bis.).

Exsicc. – *Ballesteros CA 1415**; *Gates & Bucago CA 1414* (CAHP).

23. **SPATHOLOBUS** Hasskarl

Woody climbers. Stems sometimes with red sap. Leaves trifoliolate, stipellate. Flowers small or medium-sized, in terminal panicles extending from axils of upper leaves; pedicels densely fascicled at tumid nodes; calyx campanulate, lobes lanceolate or oblong to deltoid, upper 2 connate; corolla distinctly exerted, petals subequal; keel obtuse, rarely straight; stamens diadelphous; anthers uniform; ovaries sessile or stipitate, 2-ovuled; style incurved, beardless; stigmas capitate. Pods coriaceous, 1-seeded at end, lower portion indehiscent.

Species 20, mostly in India, Malaysia and tropical Africa; 3 in the Philippines.



Figure 26. *Phylacium bracteosum*: 1. flowering branch; 2. basal portion of leaf, (a) dorsal and (b) ventral views; 3. perianth, expanded; 4. pod; 5. seed, 2 views; 6. stamens; 7. pistil with stamen; 8. floral bract, opened to show flowers.

1. Leaves glabrous; flowers white; pods glabrous..... 1. *S. palawanensis*
 1. Leaves pubescent; flowers blood-red; pods pubescent..... 2. *S. gyrocarpus*

1. *Spatholobus palawanensis* (Elm.) Merr., En. Philip. 2: 310, 1923. – *Derris palawanensis* Elm., Leafl. Philip. Bot. 5: 1800, 1913. – *Spatholobus philippinensis* Merr., Philip. J. Sc. 13 (Bot.): 17, 1918.

Forest climbers sprawling. Leaves alternate; petioles 3-5 cm long; leaflets ovate-oblong, 8 x 4 cm, inequilateral, midrib prominent, with 5-7 pairs of ascending curved nerves, apex obtuse to subacute, base rounded; petiolules 5-8 mm long. Inflorescences fragrant, terminal, 10-20 cm long, paniculate, puberulent or ferruginous-pubescent; flowers fascicled, upon short, canescent stalks, bract-subtended; calyx broadly cupular, glabrescent when old; corolla twice as long as calyx, white or reddish tinged. Pods 12 x 3 cm, glabrous, shiny, oblong, slightly falcate, both ends rounded, concave or dorsal edge thickened, flat, slightly thickened at terminal or bean-breaking portion, reticulate.

Endemic. Philippines: Luzon, Palawan to the Visayan Islands. In forest at low and medium altitudes.

Com. name – *Palawan ipal* (Tag.).

Exsicc. – *Pancho CA 20163, 20195* (CAHP).

2. *Spatholobus gyrocarpus* (Wall.) Benth. in Miq., Fl. Jungh. 238, 1852; Merr., En. Philip. 2: 310, 1923. – *Butea gyrocarpa* Wall., Cat. No. 5442, 1832. *nom. nud.* – *Spatholobus sanguinea* Elm., Leafl. Philip. Bot. 8: 3087, 1919.

Tree climbers. Stems yellowish brown-pubescent. Leaves upon 10-cm long petioles, with oblong, entire, pubescent stipules; leaflets 16 x 8 cm long, apex abruptly or short-obtuse to acute, base rounded, terminal ones elliptic, laterals unequally sided and ovate-elliptic, midrib and 5-8 lateral nerves prominent. Inflorescences terminal, profusely paniculate, olivaceous-tomentose, ultimate branches racemosely floriferous; flowers upon very short pedicel, 5 mm long; calyx tomentulose, turbinate, lobed; corolla nearly twice as long, glabrous, blood-red. Pods finely tomentulose, flat, papyraceous, terminally 1-seeded, 3-5 cm long, broader or winged portion 1-1.5 cm wide.

Malay Peninsula. Central Luzon to Leyte, Philippines. In forests at low and medium altitudes.

Com. name – *Ipal* (Tag.).

Exsicc. – *Pancho CA 20165, 20218* (CAHP).

24. **MONARTHROCARPUS** Merrill

Shrubs small or low, suberect. Leaves trifoliolate, occasionally simple, alternate, glabrous; petioles 3-7 cm long; stipules acuminate; leaflets ovate-oblong, 15 x 3-9 cm, terminal much larger, triplinerved, with 3-5 lateral, ascending curved nerves, finely reticulate, apex acute to acuminate, base truncately obtuse or subcuneate. Racemes suberect, terminal, slender, long, occasionally branched; flowers mainly toward top, few-fascicled, short-pedicelled; calyx salver-shaped, unequally and acutely toothed, sparsely puberulent; corolla 2-3 times as long, white. Pods falcately ascending, 4 x 3 cm, tapered at both ends, compressed, longitudinally reticulate, with short, crisped, hispid hairs; seeds lanceolate, solitary, blackish brown.

Species 2, Indo-Malaysia and the Moluccas; 1 in the Philippines.

1. *Monarthrocarpus securiformis* (Benth.) Merr., Philip. J. Sc. 5 (Bot.): 89, 1910; En. Philip. 2: 291, 1923. – *Desmodium securiforme* Benth. in Miq., Pl. Jungh. 226, 1852.

Undershrubs erect or slightly scandent, 10-70 cm high. Stems grayish or brownish, 3-5 mm in diameter, glabrous, younger parts densely puberulent. Leaves trifoliolate; leaflets subrhomboid, oblong to elliptic-ovate, glabrous on upper surface, the lower puberulent on veins, apex subcaudate-acuminate, base triangular-acute; petiolules puberulent, 2-4 mm long. Inflorescence a terminal raceme, rarely forming a 2- or 3-branched panicle, 8-20 cm long, puberulent. Flowers 5-7 mm long, in pairs; pedicels 2 mm long; calyx 3 mm long, puberulent. 2-cleft. Pods compressed, not articulated, narrowed at both ends; seeds solitary, brown, narrowly oblong, 2 cm long, 3 mm wide.

Philippines: Luzon to Mindoro and Basilan. In forests at low and medium altitudes.

Exsicc. - Pancho CA 20197, 20212 (CAHP).

25. **ERYTHRINA** Linnaeus

Trees or erect shrubs, aculeate. Leaves trifoliolate; petiolules tipped with prominent glands. Flowers large, bright or dull red, in dense racemes, frequently produced before foliage; calyx oblique, spathe-like, finally splitting to base or campanulate, 2-lipped; petals unequal, standard longer than keel and wing; upper filaments of anthers free nearly to base or connate with others; stamens 10, monadelphous; anthers uniform; ovaries many-ovuled; styles incurved, beardless, bearing capitate stigmas. Pods linear, swollen, contracted between seeds or flattened at one end.

Species 108, in the tropics of both hemispheres; 5 in the Philippines.

- 1. Inflorescences terminal, elongate, glabrous..... 1. *E. crista-galli*
- 1. Inflorescences subterminal or axillary, not elongate, at least scurfy-pubescent
 - 2. Basal portion of pods flat and seedless; alpine..... 2. *E. subumbrans*
 - 2. Pods turgid and seed-bearing throughout; low country
 - 3. Foliage with or without variegation; petals bright red; standard 7-9 cm long..... 3. *E. variegata*
 - 3. Foliage without variegation; petals dull purplish red; standard 4 cm long..... 4. *E. fusca*

1. *Erythrina crista-galli* L., Mant. 99, 1767; Backer & Bakh. f., Fl. Java. 1.: 628, 1963.

Trees. Branches glabrous. Leaves alternate, 20 cm long; petioles slender, with recurved hooks; petiolules 8 mm long, gland-subtended; leaflets elliptic, 7 x 4 cm, roundly obtuse at both ends, with faint lateral nerves, subchartaceous, curing grayish green. Inflorescences spicate racemes, 20-30 cm long, rachis subterete, glabrous, drying brown; pedicels slender, 1.5-3 cm long, glabrous except nodulose base; calyx 1 cm long and broad, bifid in bud, truncate when old, basal portion apiculate, thick and glabrate; standard 4 cm long, clawed; wings and keel shorter.

Recently introduced from Argentina; now used as avenue plants in Baguio City, La Trinidad and vicinity, Benguet Province; few plants are growing in Los Baños, Laguna Province.

Com. name – Cock's spur (Engl.).

Exsicc. – *Pancho* CA 29023, 29024 (CAHP).

2. *Erythrina subumbrans* Merr., Philip. J. Sc. 5(Bot.): 113, 1910; En. Philip. 2: 305, 1923. – *Hypaphorus subumbrans* Hassk., Retzia 198, 1855.

Forest trees tall, young tips scurfy-pubescent. Leaves alternate; petioles 10 cm long; leaflets glabrous, 10 x 7 cm, apex gradually acuminate, base truncately rounded; petiolules short, subtended by conspicuous glands. Spikes stout, scurfy, equaling petioles, terete; flowers flame-red, clustered towards ends; scurfy calyx short-pedicelled, turbinate, oblique, obscurely toothed; standard straight, narrow at base, 3 cm long; wings half as long, equaling broad keel; stamens subequal; free vexillary stamens shorter and united with others toward base. Pods flat below middle, seedless.

Burma to Indochina, Malaysia, Java. In the Philippines, in subalpine forest.

Com. name – *Rarang* (Bik.).

Exsicc. – *Pancho* CA 20266, 20315 (CAHP).

3. *Erythrina variegata* L., Herb. Amboin. 10, 1754; Amoen. Acad. 4: 122, 1759; based on *Gelala alba* Rumph., Herb. Amboin. 2: 234, t. 77, 1750; Krukoff & Barneby, Lloydia 37: 431, 1974. – *E. corallodendrum* L. var. *orientalis* L., Sp. Pl. 706, 1753. – *E. orientalis* (L.) Murr., Comm. Gotting. 8: 35. t. 1, 1787. – *E. indica* Lam., Encyl. 2: 391, 1788. – *E. variegata* L. var. *orientalis* Merr., Int. Rumph. 216, 1917. **Figure 27**

Deciduous trees, up to 15 m high, branches spreading, crookedly rebranched with sharp, black prickles. Leaflets broad-ovate, 8-18 cm long, apex acuminate, base broad or subrhomboid. Racemes subterminal, pubescent, dense, suberect, 5 cm long; flowers large, numerous, descending; calyx 4 cm long, minutely 5-toothed at tip, spathaceous, oblique, splitting towards base; petals bright red, standard 7-9 cm long, wings and keel subequal, shorter than calyx. Pods 10-25 x 1.5-2 cm, distinctly torulose.

Form with mottled or light yellow blotches along nerves occurs only in cultivation.

Old World tropics, extending from Madagascar and Zanzibar westward through India, Indochina, Malesia into Polynesia; only cultivated inland and in the neotropics. Throughout the Philippines, along seashores; frequently planted in plantations as a soil enricher.

Com. name - *Dapdap* (Tag.).

Exsicc. – *Pancho CA 20168, 20224** (CAHP).

4. *Erythrina fusca* Lour., Fl. Cochinch. 427, 1790; Merr., En. Philip. 2: 305, 1923.

Trees low, spreading. Stems 10 m high, grayish brown, with large conical protruberances; branches crookedly rebranched, with small, scattered prickles; leaflets oblong to subelliptic, 8-15 cm long, apex acute or obtuse, base acute to round. Racemes 10-20 cm long; calyx campanulate, 2-lipped, not splitting to base along back, pubescent, 1 cm long; petals dull purplish, standard 4 cm long, wings a little shorter than keel; pods seeded throughout, subcylindric, 10-25 x 1.5 cm, apiculate, 6- to 10-seeded.

Indo-Malaysia and Polynesia. Throughout the Philippines, in open wet lands.

Com. name – *Anii* (Tag.).

Exsicc. – *Gates CA 1369* (CAHP).



Figure 27. *Erythrina variegata*: 1. flowering branch; 2. flower; 3. calyx; 4. flower bud; 5. stamens and pistil; 6. standard; 7. (a-b) keel and (c-d) wing petals. (After Pancho 1983, with permission).

26. **ATYLOSIA** Wight & Arnott

Herbs slender, twining with 3-foliolate leaves which are gland-dotted beneath. Flowers axillary, solitary or racemed. Calyx-teeth distinct, larger or shorter than tube. Corolla exserted, keel not beaked; stamens diadelphous. Ovary sessile, with 3 or more ovules; styles glabrous. Pod oblong, somewhat turgid, marked with transverse lines or depressions between seeds.

Species about 25, India to Mauritius and Australia, 2 in the Philippines.

1. Petals deciduous; leaflets 1.5-3 cm long; pods less than 3 cm long 1. *A. scarabaeoides*
 1. Petals marcescent; leaflets 3-9 cm long; pods 5-7 cm long 2. *A. volubilis*

1. ***Atylosia scarabaeoides*** Benth. in Miq., Pl. Jungh. 245, 1852; Vidal, Phan. Cuming. Philip. 109, 1885; Perk., Fragm. Fl. Philip. 88, 1904. – *Dolichos scarabaeoides* L., Sp. Pl. 726, 1753. – *Cantharospermium scarabaeoides* (L.) Baill., Bull. Soc. Linn. Paris 1: 384, 1883 (*scarabaeoideum*); Merr., Philip. J. Sc. 5(Bot.): 128, 1910; Fl. Manila 128, 1912, En. Philip. 2: 315, 1923 Figure 28

Vines slender, herbaceous, trailing or twining, more or less pubescent reaching a length of 2 m or less. Leaflets obovate-oblong to oblong, obtuse, 1-4 cm long, gray pubescent on both surfaces. Racemes or corymbs short, few-flowered; flowers yellow, about 1 cm long, calyx pubescent. Pod oblong, straight, 2 cm long or less, covered with spreading, brown hairs, containing 3-5 seeds, distinctly depressed between seeds.

India to the Mascarene Islands, southern China, Malaya and the Marianne Islands. Philippines: Northern Luzon to Mindanao. In open grasslands and thickets at low and medium altitudes.

Exsicc. – Aguilar CA 50879; Regalado CA 39449 (CAHP).

2. ***Atylosia volubilis*** (Blco.) – *Cytisus volubilis* Blco., Fl. Filip. 599, 1837. – *Cajanus volubilis* Blco., Fl. Filip. ed. 2, 417, 1845; Fl. Filip. ed. 3, 2: 398, 1879. – *Cantharospermium volubile* (Blco.) Merr., Philip. J. Sc. 5(Bot.): 127, 1910; Fl. Manila 127, 1912; Sp. Blancoanae 190, 1918; En. Philip. 2: 315, 1923. – *Dunbaria horsfieldii* Miq., Fl. Ind. Bat. 1: 179, 1855. – *Atylosia mollis* F.-Vill., Novis. App. 66, 1880. – *Dolichos crassus* Grah. in Wall., Cat. No. 5563, 1832, *nomen nudum*. – *Atylosia crassa* Prain., J. As. Soc. Beng. 66: 45, 1897.

Vines scandent, herbaceous of indefinite length, more or less pubescent. Leaflets rhomboid-ovate, acuminate, base slightly cordate, lateral ones somewhat oblique, 3-9 cm long. Racemes axillary, few-flowered, 3-8 cm long, bracteoles ovate to oblong-ovate, green, deciduous, up to 2 cm in length.

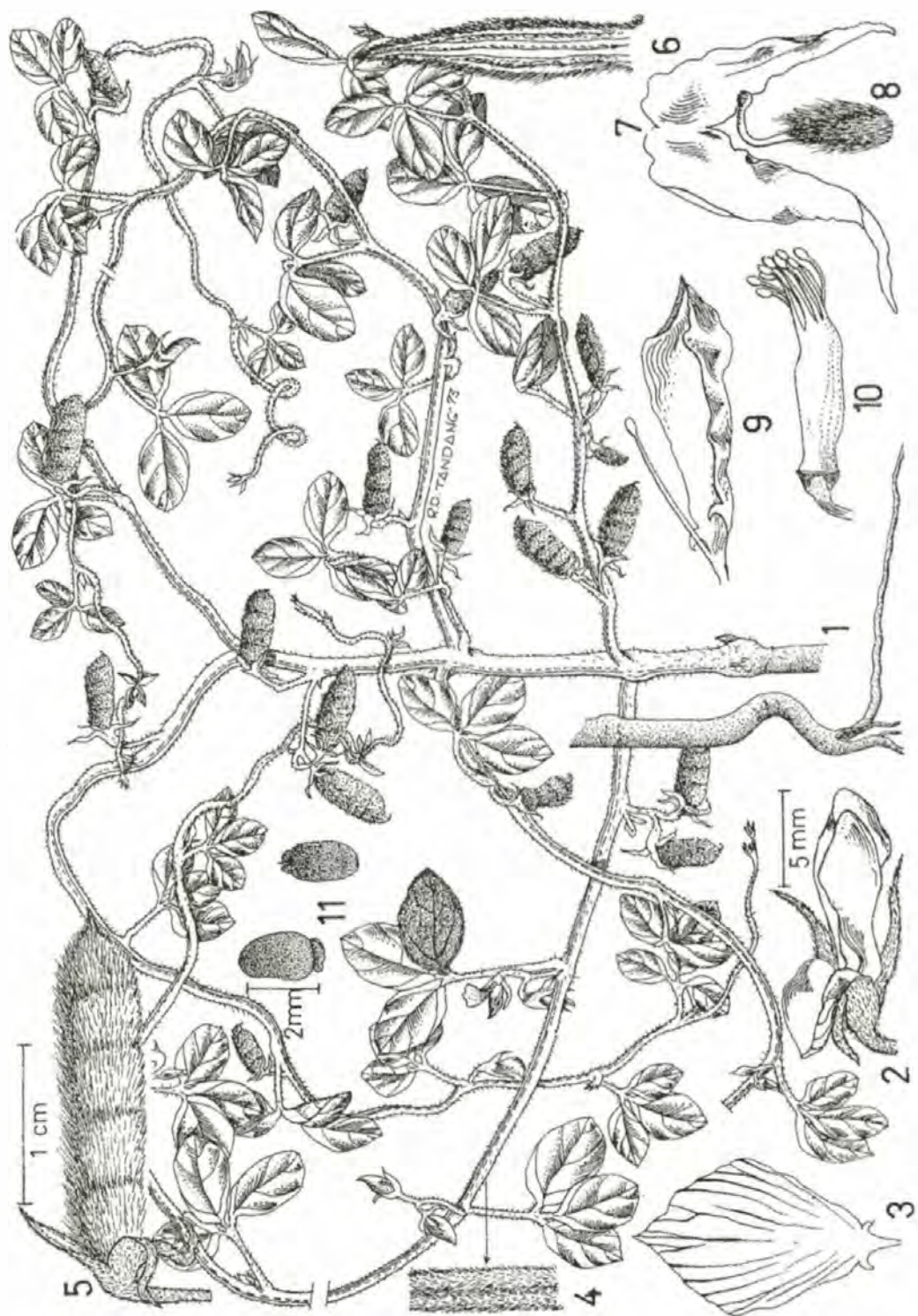


Figure 28. *Atylosia scarabaeoides*: 1. habit; 2. flower; 3. standard, back view; 4. portion of stem, enlarged; 5. pod; 6. sepal; 7. wing petal; 8. pistil; 9. standard, side view; 10. stamens; 11. seed, 2 views.

Flowers yellow, about 2 cm long, calyx-teeth acuminate. Pods oblong, villous, 4-5 cm long, about 1.3 cm wide, with 4-6 seeds.

India to Indochina, Malay Peninsula and Archipelago. Philippines: Luzon (Lepanto, La Union, Nueva Vizcaya, Rizal) and Sulu Archipelago; in thickets at low and medium altitudes.

Exsicc. – *Gruèzo WM24005* (CAHP).

27. CAJANUS A.P. de Candolle, *nom. cons.*

Shrubs erect. Stems laxly rebranched, 2 m high; branchlets slender, sulcate, gray-silky. Leaves trifoliolate; stipules minute; leaflets oblong to broad-lanceolate, silky-hairy. Flowers racemose from axils or in terminal panicles; calyx tubes campanulate, with short lobes; pedicels slender; corolla much-exserted, petals equal with yellow standard and truncate keel; stamens diadelphous; anthers uniform; ovaries subsessile; styles long, slender, upwardly curved; stigma capitate. Pods linear, straight, narrowed at both ends, 3- to 5-seeded, torulose with oblique depressions.

Species 2, in Africa; now pantropic.

1. *Cajanus cajan* (L.) Huth., *Helios* 11:133, 1893; Backer & Bakh. *f.*, *Fl. Jav.* 3: 651, 1968. – *Cytisus cajan* L., *Sp. Pl.* 2: 739, 1753.

Shrubs erect, white-lined. Leaf rachis 1-7 cm; petiole 0.5-4.5 cm. Leaflets oblong-lanceolate, acute, mucronate, dull on upper surface, with dense short hairs on lower surface. Inflorescences 0.75-4 cm long, with dense white hairs also on peduncle; corolla yellow, often tinged with reddish brown; limb of standard 1.25-1.75 cm wide, keel falcate. Pods sessile, 3.5-9 x 0.75-1.25 cm: seeds 2-7, yellow, red, brown or black.

Probably of prehistoric introduction from tropical Asia or Malaya. Throughout the Philippines in the settled areas, cultivated and in some regions spontaneous; it occurs from sea level to 2400 m.

Com. names – *Kadios* (Mang., P.Bis., Tag.); Pigeon pea (Engl.).

Exsicc. – *Pancho CA 8858*; *Gates CA 1278, 1280*; *Baltazar CA 1281* (CAHP).

28. CALOPOGONIUM Desvaux

Herbs tall, climbing. Leaves trifoliolate; leaflets lobulate, stipellate. Flowers small, blue or violet, fasciculate-racemose in axillary, elongate or short peduncle, fascicles nodose; bracts and bracteoles caducous: upper 2 calyx lobes separate or connate into 1-2 lobes; standard obovate, appendaged at base with inflexed auricles; wings narrow, adherent to shorter keel; vexillary

stamens free, others connate; anthers uniform; ovaries sessile, with numerous ovules; styles filiform; stigmas capitate. Pods linear, plano-compressed, 2-valved, septate inside between seeds; seeds orbicular, compressed. ecarunculate.

Species 6, Central and South America to the West Indies; 1 or 2 in the Philippines.

1. *Calopogonium mucunoides* Desv., Ann. Sc. Nat. I, 9: 423, 1826; Backer & Bakh. f., Fl. Jav. 631, 1963. Figure 29

Herbs twining to creeping. Stems clothed with deflexed or patent long hairs. Leaf rachises, 2-15 cm long, long-hairy; terminal leaflets oval or oval-rhomboid, 3.5-12 x 2-10 cm. Inflorescences partly sessile, fasciculiform, 2- to 4- flowered; peduncles long-hairy, 2-15 cm long; pedicels 1.5 mm; calyx 6-7 mm long, long hairy; corolla blue-violet, standard 8-9 mm long, with greenish yellow blotch; pods patent or reflexed, brown-hairy, 1.5-4 cm x 4-5 mm, 4- to 8-seeded.

Native of tropical America (Guiana). In the Philippines, naturalized; common weed in open lowland areas.

Com. name – Calopogonium (Engl.).

Exsicc. – Barroga CA 4804; Blancaver CA 4781*; Mendoza CA 1283 (CAHP).

29. TERAMNUS P. Browne

Herbs slender, twining. Leaves trifoliolate. Flowers small, in axillary, paniced racemes; calyx campanulate, lobes distinct; corolla little exerted, petals equal in length; standard not spurred; stamens monadelphous, alternate; anthers small, abortive; ovaries many-ovuled; styles short. Pods linear, somewhat compressed, septate between seeds, curved or hooked at apex.

Species 6, tropical and subtropical regions of both hemispheres; 2 in the Philippines.

1. *Teramnus labialis* (L.f.) Spreng., Syst. 3: 235, 1826; Merr., En. Philip. 2: 305, 1923. – *Glycine labialis* L.f., Suppl. 325, 1781.

Annual herbs slender, twining, pubescent, up to 4 m long. Leaflets oblong-elliptic to oblong-ovate, 5-8 cm long, obtuse or acute, green and shiny on upper surface, pale and appressed-pubescent beneath. Racemes 3-12 cm long, solitary or 2- to 3-nate in leaf axils; pedicels 3-5 mm long; calyx appressed-pubescent; corolla purple. Pods linear, flat, curved at apex, 4 x 0.3 cm, slightly pubescent, containing about 10 seeds.

Pantropical. Throughout the Philippines, in thickets.

Com. name – *Mani-manihan* (Tag.).

Exsicc. – Gates CA 1452; Velasco CA 3738 (CAHP).



Figure 29. *Calopogonium mucunoides*: 1. habit; 2. flower; 3. flower, opened to show stamens; 4. perianth, expanded; 5. stamens; 6. pistil; 7. pod, partly excised; 8. pod, cross section; 9. portion of stem, enlarged, to show stipules; 10. seed, 2 views.

30. **CANAVALIA** A.P. de Candolle, *nom. cons.*

Annual or perennial vines coarse, twining. Leaves trifoliolate; leaflets stipellate. Flowers large; calyx limbs 2-lipped, upper lip projecting, entire or emarginate, lower one shortly 3-toothed. Corolla much-exserted, standard large, roundish; wings shorter, equaling incurved keel; stamens monadelphous; ovaries many-ovuled. Pods large, linear to oblong, flat, sometimes swollen with a rib on each valve near upper suture.

Species 50, mostly in tropical America; 6 in the Philippines.

1. ***Canavalia ensiformis*** (L.) DC., *Prod.* 2: 404, 1825; Sauer, *Brittonia* 16: 142, 1964. – *Dolichos ensiformis* L., *Sp. Pl.* 2: 725, 1753. **Figure 30**

A scandent, herbaceous or suffrutescent annual, 2-5 m long, glabrous to pubescent. Leaflets narrow-ovate to oblong-ovate, 8-16 cm long, apex acuminate or acute, base rounded. Racemes axillary, solitary, to 40 cm long, flowering only near apex and with only 2 or 3 flowers open at a time; flowers nearly sessile, reflexed; calyx green, 1.5 cm long, upper lip cleft into 2 broad lobes, lower reduced to small teeth; corolla pink, 3.5 cm long. Pods 14-17 x 2-2.5 cm, flattened, 8-10 mm thick along upper suture, containing 15 white seeds.

Native of the West Indies, now cultivated in the tropics and subtropics of both hemispheres. Occasionally planted throughout the Philippines; a recent introduction probably from seeds of American origin.

Com. name – Sword bean (Engl.).

Exsicc. – *Gruèzo WM24006* (CAHP).

31. **DIOCLEA** Humboldt, Bonpland & Kunth

Herbs or shrubs robust, climbing. Stem with blood red sap. Leaves pinnately trifoliolate, stipellate. Flowers blue or purplish or even white, in axillary, elongated racemes with thickened nodes, fascicled on tubercles of rachis; bracts and bracteoles caducous long before anthesis; calyx with 2 basal bracteoles; calyx tube campanulate, teeth as long as tube; 2 upper segments connate at base; lowermost segment longest; standard obovate-orbicular, with 2 deflexed basal auricles; keel more or less equaling wing, obtuse; stamens monadelphous, sometimes partially reduced to antherless staminodes, uppermost free at base; anthers uniform; ovary sessile, 2- to many-ovuled; style incurved, beardless with capitate, more or less oblique stigma. Pod sessile above calyx-scar, oblong or linear with a broad flat ventral suture, turgid, 1 to 5-seeded, farctate between seeds; hilum very large; caruncle none; albumen none.



Figure 30. *Canavalia ensiformis*: 1. flowering twig; 2. pod; 3. seed, 2 views; 4. perianth, expanded; 5. stamen, 2 views; 6. staminal tube; 7. pistil. (After Pancho 1983, with permission).

Species 18; chiefly in tropical America, few in eastern tropics; 2 species in the Philippines.

1. Pods densely and softly villous with long, spreading, persistent, ferruginous hairs 1. *D. umbrina*
1. Pods slightly pubescent with short, appressed hairs, ultimately subglabrescent 2. *D. hexandra*

1. ***Dioclea umbrina*** Elm., Leafl. Philip. Bot. 1: 224, 1907; Merr., Philip. J. Sc. 5(Bot.): 119, 1910; Enum. Phil. Pl. 2: 311, 1923.

Vines rigid sprawling climbing. Rough bark with blood red sap. Young branches sparsely pubescent. Petiole 10 cm long, articulate, subtended at base by 1 cm long stipules with broad bases, 2 cm extended beyond first leaflets, woolly pubescent; petiolule 5 cm long, pubescent, articulate, subtended by 8 mm long, awl-shaped stipules. Leaflet 14 cm long, one half as wide, elliptic or lower ones ovate, acutely pointed, truncately rounded at base, coriaceous, upper side strigosely pubescent, more densely covered with umber colored hairs beneath, with 9-11 pairs of ascending prominent veins; midvein also prominent. Flowers sessily clustered; calyx velvety brown; petals at least twice as long as 3.5 mm, purplish blue. Infrutescence upon slender terminal or subterminal spikes, rigid stalk gradually tapering into a small tip, pubescent. pods upon 1 cm long and half as thick recurved stalk, 15 x 5 cm, oblong, ventral suture grooved, apex abruptly pointed, base obtuse, sides thick and rigid, obscurely constricted between 3 to 5 seeds, densely covered with 3 mm long, soft, umber colored hairs. Seeds dull to shining brown, globose to lenticular, 2.5 cm in diameter, 2 cm thick, marble-like, with a double white band extending over one half around.

Endemic in the Philippines. Found in Luzon (provinces of Benguet, Nueva Vizcaya, Rizal, Laguna); Leyte, Samar and Panay; in forests at low and medium altitudes.

Com. name – *Baai* (lg.)

Exsicc. – *Gruèzo WM24007* (CAHP).

2. ***Dioclea hexandra*** (Ralph) Mabb., Taxon 29(5-6): 605, 1980 (Nov. 1).
– *D. reflexa* Hook. f., Niger. Flora 306, 1849; Vidal, Phan. Cuming. Philip. 109, 1885; Perk., Frag. Fl. Philip. 87, 1904; Merr., Philip. J. Sc. 5 (Bot.): 119, 1910; Enum. Phil. Pl. 2: 311, 1923.

Vines woody; stem 4 cm in diameter, terete branches at first pubescent. Leaflets subcoriaceous, acute or obtuse, hairy beneath, 10-15 cm long. Flowers bright yellow, in peduncled, dense, spicate racemes, 15-30 cm long; bracts

linear, reflexed, milky, 12 mm long; calyx 9-12 mm in length, also milky, with a pair of small obtuse bracteoles; corolla purplish red, twice as long as calyx. Pods 7-10 cm long, when young covered with appressed silky hairs, ultimately glabrate, green turning black.

Pantropic. In the Philippines, it is found in Luzon (provinces of Laguna, and Rizal) Mindoro, Busuanga (Palawan island group) and Mindanao; in dry brushlands and forests at low altitudes, mainly along small streams.

Com. name – *Bai-baian* (lg.)

Exsicc. – *Gates CA 1368* (CAHP).

32. PUERARIA A.P. de Candolle

Vines slender or coarse, twining, herbaceous or suffrutescent. Leaves trifoliolate; leaflets stipellate. Flowers small to large, in few to many-flowered, simple or compound racemes; calyx lobes long or short, upper 2 connate; corolla exserted; standard as long as wings and keel; stamens monadelphous; ovary many-ovuled. Pods linear, compressed.

Species about 15; India to southern China, Japan, southward to Malaysia and the Philippines.

1. Stipules peltate; pods densely hirsute, about 8 mm wide..... 1. *P. lobata*
 1. Stipules basifixed; pods nearly or quite glabrous, less than 5 mm wide
2. *P. phaseoloides*

1. *Pueraria lobata* (Willd.) Ohwi, – *P. thunbergiana* (S. & Z.) Benth., J. Linn. Soc. Bot. 9: 122, 1867; Merr., Philip. J. Sc. 3(Bot.): 410, 1908.
 – *Pachyrrhizus thunbergianus* S. & Z., Fl. Jap. Fam. Nat. 2: 113, 1846.
 – *Neustanthus chinensis* Benth., Fl. Hongk. 86, 1861. – *Pueraria triloba* (Lour.) Makino.

Annual vines rather coarse, scandent, pubescent, up to 8 m long. Leaflets ovate, acuminate, entire or slightly repand, 10-20 cm long, upper surface glabrous or nearly so, lower rather densely pubescent with soft, grayish hairs. Racemes axillary. 15-30 cm long; flower about 2 cm long; calyx pubescent, lobes acuminate; corolla rather bright purple, standard 2 cm broad with large yellow spot near base. Pods 5-8 x 1 cm, hirsute with spreading brown hairs.

Japan to China, Taiwan and Java. In thickets, dry hillsides, etc.; local in the Philippines, occasionally on dikes in rice fields.

Com. names – *Baai* (lg.), Kudzu vine (Engl.)

Exsicc. – *Gruèzo WM24008* (CAHP).

2. *Pueraria phaseoloides* (Roxb.) Benth., J. Linn. Soc. Bot. 9: 125, 1895; F.-Vill., Novis. App. 64, 1880; Merr., Govt. Lab. Publ. Philip. 27: 39, 1906; Philip. J. Sc. 5(Bot.): 123, 1910; En. Philip. 2: 311, 1923; Pancho & Obien, Manual Ricefield Weeds Philip. 125, f. 72, 1995. – *Dolichos phaseoloides* Roxb., Fl. Ind., ed. 2, 3: 316, 1832. **Figure 31**

Vines slender, scandent, hairy, herbaceous, 2-4 m in length; stipules small, basifixed. Leaflets ovate, irregularly 3-lobed, somewhat sinuate, 6-12 cm long, upper surface green, lower pale and covered with long, appressed white hairs. Racemes axillary, solitary, 8-25 cm long or longer: flowers pale blue or purplish, about 12 mm long, fasciculate along the rachis; calyx appressed hirsute, Pods 5-8 cm x 4-5 mm, slightly appressed hirsute.

India to southern China and Malaya. Philippines: Batan Islands and Northern Luzon to Mindanao. In open grasslands and in thickets at low and medium altitudes.

Com. name – *Sinkamas-aso* (Tag.).

Exsicc. – *Gruèzo WM24009* (CAHP).

33. STRONGYLODON Vogel⁶

Vines woody, always climbing to the top of forest canopy; old branches glabrous, sulcate, sometimes lenticellate, young branches glabrous or hairy, striate, some branches modified as tendrils (Polhill 1972). Stipules lanceolate, ovate or triangular, peltate or basifixed, glabrous, striate, caducous, leaving a distinctive scar when deciduous. Leaves pinnately 3-foliolate, stipellate; terminal leaflets lanceolate, ovate or orbicular, 3-nerved or not., acute, acuminate or cuspidate at apex, rounded, truncate or slightly cordate at base, glabrous or sparsely hairy beneath; lateral leaflets similar in shape to terminal one, slightly smaller in size, slightly or strongly oblique at base; petiolules always grooved, rugose; stipels setaceous or linear. Inflorescences axillary pseudoracemes or pseudopanicles with 2-5 branches, many-flowered, sometimes 2-3 pseudoracemes fasciculate axillary; peduncles glabrous or sparsely hairy; axis glabrous or hairy with swollen nodes; brachyblast warty or cylindrical, (1-) 3- to 15-flowered; bracts ovate, inserted at base of nodes and pedicels; bracteoles 2 at base of calyx tube, ovate, striate, ciliate at margin; pedicels glabrous or hairy. Flowers orange-red, red, purplish blue or bluish green; calyx campanulate, 5-lobed, upper 2 lobes slightly connate or connate at tip; lobes truncate or retuse; standard glabrous, reflexed, acute: at apex, with 2 appendages above claw, usually with thick texture toward tip; wings glabrous, attached to keel at base, about half as long as standard; keels connate, beaked at apex, about equal in length as standard: stamens 10, diadelphous, vexillary stamen

⁶Genus description adopted from Huang (1991), with modification.



Figure 31. *Pueraria phaseoloides*: 1. flowering branch; 2. calyx, opened; 3. staminal tube, opened; 4. perianth, expanded; 5. flower, petals removed; 6. pistil; 7. pod; 8. seed.

free, filaments glabrous, anthers uniform, dorsifixed, slit longitudinally; pistil with discoid nectary at base, stipitate; ovary glabrous or hairy, 1-to 12-ovuled; style long, glabrous or hairy at lower portion; stigma terminal. Pods reticulate-veined or rugose, inflated or constricted between seeds, continuous or semi-septate, tardily dehiscent. Seeds black or brown, orbicular or irregular, smooth or rugose, hilum linear or circumferential, short to $\frac{3}{4}$ circumference of seed, with spongy tissue (epihilum).

1. *Strongylodon macrobotrys* A. Gray, Bot. Wilkes U.S. Explor. Exped. 448, t. 49, 1854; Merr., Philip. J. Sc. 1: Suppl. 66, 1906; Philip. J. Sc. 3: 81, 1908; Philip. J. Sc. 5 (Bot.): 114, 1910; En. Philip. 2: 307, 1923; Huang, Wageningen Agric. Univ. Papers 90-8: 52, figs. 1-4, 7, 12, t. 1, 2, Map 10, 1991 – *S. warburgii* Perk., Fragm. Fl. Philip. 1: 85, 1904. – *S. megaphyllus* Merr., Philip. J. Sc. 10:16, 1915, *pro parte*. Figure 32

Woody vines, young branches glabrous, striate, old branches sulcate; stipule ovate-triangular, peltate, striate, 3-4 mm long, 1.5-2 mm wide, caducous. Leaves pinnately 3-foliolate, stipellate; rachis glabrous, subjugal part 4.5-9 cm long; suprajugal part 5-15 mm long; terminal leaflet elliptic or ovate-elliptic, 3-nerved acuminate at apex, rounded at base. 12-15.5 cm long, 5.5-7.3 cm wide; lateral leaflets ovate, oblique and truncate or rounded at base, 9-15 cm long, 3.5-8 cm wide; petiolules 6-7 mm long; stipels setaceous, 2.5 mm long. Inflorescences up to 150 cm long; peduncles glabrous, long; axis glabrous; brachyblast warty, 2-5 mm long, 1-3 mm wide, 5-8-flowered bracts caducous; bracteoles ovate, striate, basifixed and auricled at base, ciliate at margin, 1.5 mm long, 1.2 mm wide; pedicels glabrous, 1.8-4 cm long. Flowers bluish-green, brilliant green or jade green, 4-6 cm long (to 8.5 cm long in *S. warburgii*); calyx campanulate, 9-12 mm long, 5-lobed, hairy inside at upper portion, glabrous outside; lobes separated, wavy, c. 0.7 mm long; standard ovate, reflexed, 37-48 mm long, 17-25 mm wide; with claw, 5 mm long, with 2 appendages, 7-10 mm long above claw; wings oblong-elliptic, rounded at apex, auricled at base, 20-24 x 8-10 mm, with claw 11 mm long; keel lanceolate, slightly auricled at base, 45-48 x 11-13 mm, with claw 11-13 mm long; stamens 48-72 mm, filaments glabrous; anthers dorsifixed, oblong, 1.5 mm long; pistils with discoid nectary at base; stipe glabrous or hairy, 13-14 mm long; ovary oblong, 10-12-ovuled, 6 mm long, covered with densely appressed hairs; style flat, glabrous, 38-55 mm long; stigma terminal. Pods elliptic, inflated, rugose, 8.5-13 x 6 cm, 6-12 seeded, valve 2-6 mm thick. Seeds black, reniform, smooth, 30-40 mm wide, 12-20 mm long; hilum linear, 25-40 mm long, with spongy tissue.

Endemic. Philippines: Luzon (Cagayan, Bataan, Cavite, Laguna, Quezon, Sorsogon), Mindoro and Catanduanes. In damp forested ravines along streams at low and medium altitudes.

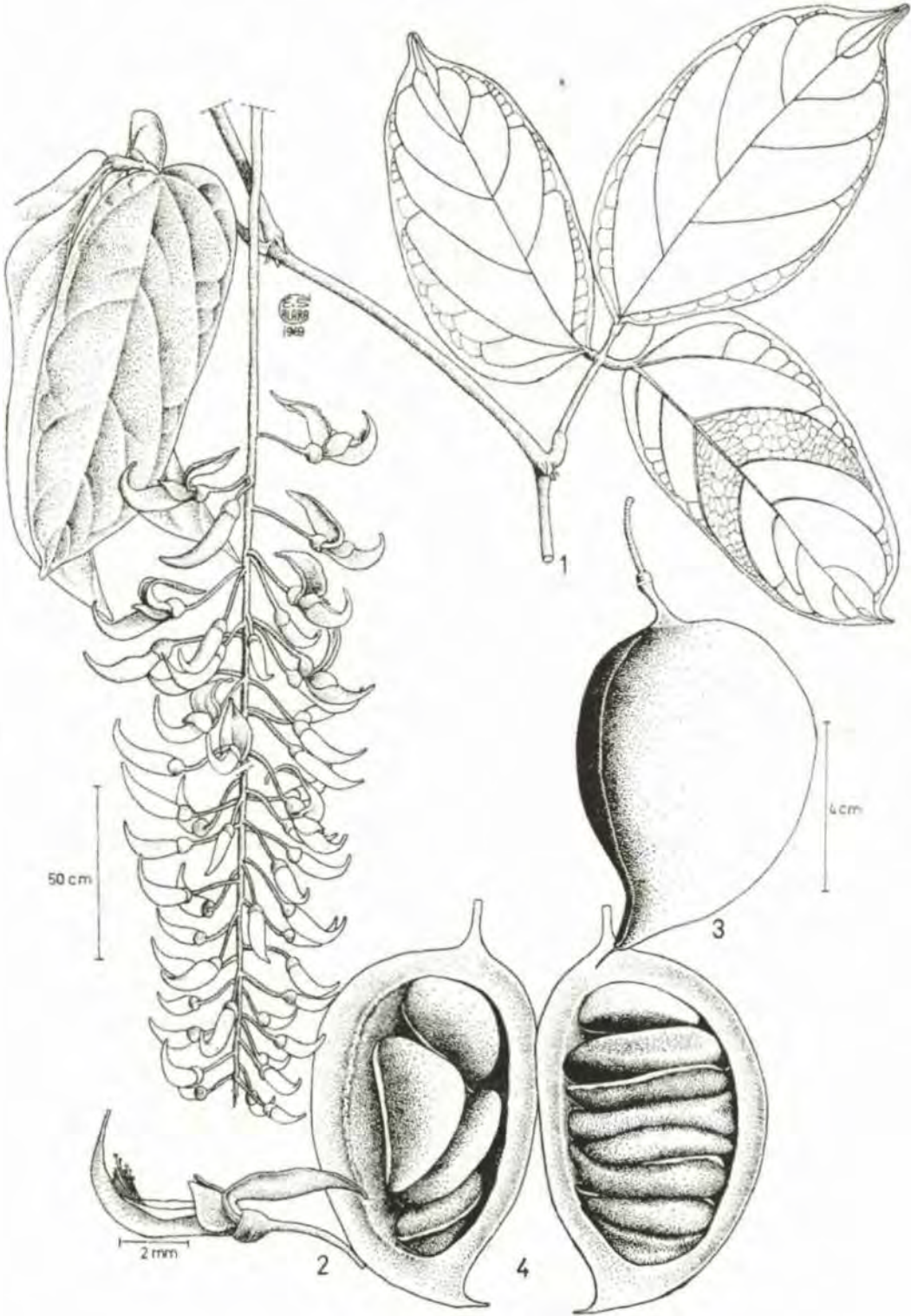


Figure 32. *Strongylodon macrobotrys*: 1. flowering twig, 2. flower; 3. pod; 4. pod, opened to show seeds

Com. names – *Bayou* (Neg.); *Tayabak* (Tag.); Jade vine (Engl.).

Exsicc. – *Gates CA 1442, 1443, 1444; Hernaez CA 12426; Orlido CA 10250; Pancho CA 18190; Reyes CA 2921* (CAHP).

34. **CENTROSEMA** (DC.) Bentham, *nom. cons.*

Vines scandent, herbaceous. Leaves trifoliolate; stipules persistent, basifixed; leaflets stipellate. Flowers rather large, showy, in axillary racemes, bracts and bracteoles persistent; calyx shortly campanulate, lobes subequal or upper 2 connate; corolla much-exserted; standard broadly orbicular, longer than wings; stamens usually diadelphous; ovary sessile, many-ovuled; style somewhat enlarged upward, incurved. Pods linear, valves longitudinally 2-ribbed.

Species about 50, all American.

1. Plants pubescent; flowers bright or pale lilac, with numerous dark violet stripes running obliquely towards claw; pods 7-9 x 0.5-0.7 cm 1. *C. pubescens*
1. Plants glabrous or nearly so; flowers white, magenta at center; pods 10-15 x 1 cm..... 2. *C. plumieri*

1. ***Centrosema pubescens*** Benth. ; Pancho & Obien, Manual Ricefield Weeds Philip. 130, f. 74A, 1995. **Figure 33A**

Vines twining, herbaceous. Leaflets elliptic or ovate-elliptic 3-9 x 1.5-6 cm, pubescent on both surfaces, obtuse or shortly obtuse-acuminate. Two upper calyx lobes ovate-triangular, 1.5-3 mm long; standard bright or pale lilac with numerous dark violet stripes or blotches on the greenish-yellow median bands running obliquely towards claw. Pods 7-9 x 0.5-0.7 cm, straight or twisted; seeds 12-20, brown, blotched or not, 3-4 x 4-5 mm.

Native of South America. Introduced and naturalized in the Philippines; a weed in cultivated fields and occasionally along dikes and canals of rice fields.

Com. name – Hairy centrosema (Engl.).

Exsicc. – *Blancaver CA 4782; Estioko CA 1308; Velasco CA 2359* (CAHP).

2. ***Centrosema plumieri*** (Turp.) Benth., Ann. Wien Mus. 2: 118, 1838; F.-Vill., Novis. App. 65, 1880; Merr., Philip. J. Sc. 5(Bot.): 109, 1910; Fl. Manila 258, 1912; En. Philip. 2: 303, 1923; Pancho & Obien, Manual Ricefield Weeds Philip. 130, f.74B, 1995. – *Clitorea plumieri* Turp., Pers. Syn. 2: 303, 1807. – *Bradburya plumieri* O. Kuntze, Rev. Gen. Pl. 164, 1891.

Figure 33B

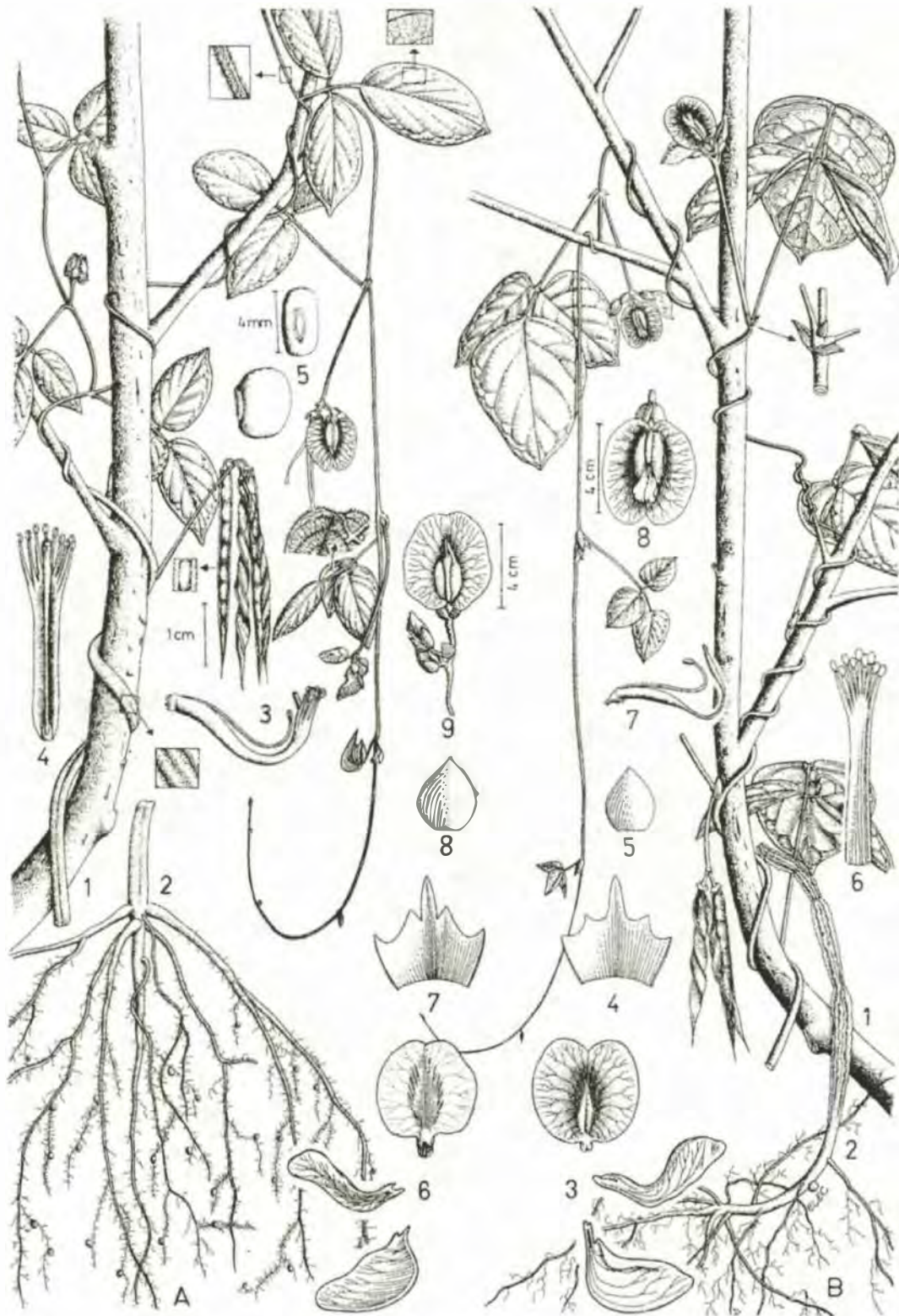


Figure 33. A. *Centrosema pubescens* : 1. habit; 2. root system; 3. flower, sepals and petals excised; 4. staminal lobe, opened; 5. seed, 2 views; 6. perianth, expanded; 7. bracts; 8. bracteole; 9. flower. B. *Centrosema plumieri*: 1. habit; 2. root system; 3. perianth, expanded; 4. bract; 5. bracteole; 6. staminal lobe, opened; 7. flower, sepals and petals excised; 8. flower. (After Pancho & Obien 1995, with permission).

Vines twining. herbaceous with a woody base, reaching a length of 5 m or more, glabrous or nearly so. Leaflets ovate, shortly acuminate. 5-15 cm long, entire. Racemes axillary, few-flowered; flowers 4-5 cm long, white, center magenta. Pods 10-15 x 1 cm long, acuminate, prominently longitudinally 2-ribbed along each valve.

Native of South America. Introduced and naturalized throughout the Philippines. In thickets, hedges, *etc.*; a common weed in cultivated fields and occasionally along dikes and canals of rice fields.

Corn. name – *Centrosema* (Engl.).

Exsicc. – *Gruèzo WM24012* (CAHP).

35. **MUCUNA** Adanson, *nom. cons.*

Annual or perennial vines, herbs or shrubs, usually coarse. Leaves stipulate, pinnately 3-foliolate, leaflets simple, stipellate. Flowers axillary or arising from old wood, racemose, large, showy, dark purple or pale greenish yellow. Calyx tube campanulate, 2 upper teeth quite connate, lowest longer than middle ones; corolla much-exserted; standard not more than one half as long as beaked keel, wings usually a trifle longer than keel. Stamens diadelphous; anthers dimorphous. Pods linear to oblong, compressed or turgid, smooth or transversely ridged, keeled along sutures or not, softly pubescent or often covered with very irritating, brown, bristle-like hairs. Seeds 1 to many, ecarunculate, exalbuminous.

Species 30, in all tropical countries, 10 in the Philippines.

1. Flowers pale yellow or whitish; pods covered with non-irritating hairs 1. *M. longipedunculata*
1. Flowers pale or dark purple to almost black; pods covered with irritating hairs
 2. Corolla dark purple to almost black; pods compressed 2. *M. pruriens*
 2. Corolla pale purple; pods otherwise
 3. Pods ridged or winged transversely 3. *M. nigricans*
 3. Pods without transverse ridges or wings 4. *M. sericophylla*

1. *Mucuna longipedunculata* Merr., Govt. Lab. Publ. Philip. 29: 18, 1905; Philip. J. Sc. 5(Bot.): 117, 1910; En. Philip. 2: 308, 1923. – *Mucuna macmillanii* Elm., Leaf. Philip. Bot. 8: 2736, 1915.

Liana-like vines. Stem subterete, heavy, porous, branches with appressed brown pubescence. Leaflets upon 7 cm long pubescent petioles, 9-12 x 5-8 cm, subacuminate, sparsely hirsute beneath, with subulate stipels and 5-6 pairs of lateral nerves. Peduncles axillary, hanging, green, often several meters in length, flowers racemously crowded at ends, curing coal black. Pedicels upon short branchlets, pubescent, 1.5 cm long; calyx subtended by broad bracts, grayish brown hairy, unequally toothed; corolla succulent, ivory white, different parts 5-8 cm long. Pod subcylindric, 10-30 cm long, 3.5 cm thick, covered with short, non-irritating hairs.

Endemic. Philippines: Luzon (Benguet, Rizal, Laguna, Quezon), Biliran, Panay to Mindanao (Bukidnon, Misamis, Surigao). Along creeks in the forests and ravines at medium altitudes up to 1400 m.

Com. name – *Baykutkut* (Tag.), *Kanipai* (Buk.)

Exsicc. – *Gates & Quisumbing CA 6475* (CAHP).

2. *Mucuna pruriens* (L.) DC., Prodr. 2: 405, 1825; F.-Vill., Novis. App. 63, 1880; Merr., Philip. J. Sc. 1: Suppl. 67, 1906; Philip. J. Sc. 5(Bot.): 117, 1910; Fl. Manila 259, 1912; En. Philip. 2: 309, 1923. – *Dolichos pruriens* L. in Stickm., Herb. Amb. 22, 1754. – *Mucuna atropurpurea* F.-Vill. Novis. App. 63, 1880 *non* DC. Figure 34

Annual vines climbing or spreading, reaching a length of several meters, more or less pubescent. Leaves thin, ovate to oblong-ovate, rounded or subacute, apiculate, 5-12 cm long, lateral ones oblique. Racemes pendulous, many-flowered, 10-25 cm long. Calyx gray-pubescent, with intermixed, brown, stinging hairs. Corolla dark purple, almost black, 4 cm long. Pod stout, compressed, slightly curved near apex, 6-11 x 2 cm, densely covered with stiff, somewhat appressed, brown, very irritating, stinging hairs.

India to Malaya. Philippines: Luzon (Laguna, Rizal) and Negros. In dry thickets and secondary forests at low altitudes.

Com. name – *Nipai* (Bis., Tag.).

Exsicc. – *Corbo CA 8776, 8777; Hernaez CA 17395; Pancho CA 20128, 20137; Velasco CA 1405* (CAHP).

3. *Mucuna nigricans* (Lour.) Steud., Nomencl. ed. 2, 2: 163, 1841; Merr., Philip. J. Sc. 5(Bot.): 116, 1910; Sp. Blancoanae 187, 1918; En. Philip. 2: 309, 1923. – *Citta nigricans* Lour., Fl. Cochinch. 456, 1790. – *Mucuna imbricata* DC., Prodr. 2: 406, 1825; Merr., Govt. Lab. Publ. Philip. 27: 38, 1905; Philip. J. Sc. 1: Suppl. 67, 1906.

Woody climbers. Branches slender, glabrescent. Leaflets membranous, sparsely gray pubescent beneath, otherwise glabrous, one end oblongish and cuspidately pointed, 12-15 cm long. Racemes few-flowered, lax and drooping



Figure 34. *Mucuna pruriens*: 1. fruiting and flowering branch; 2. flower; 3. flower, corolla removed to show diadelphous stamens.

with 5-30 cm long peduncles, axillary or subterminal; pedicels 6-18 mm long; bracts large, roundish, caducous; calyx 18 mm long, with a few irritating bristles or stiff hairs, teeth nearly as long as tube; corolla pale purple, glabrous, drying black, fleshy, 5-6 cm long; keel abruptly inflexed at tip; wings 12 mm broad; standard half as long as keel, 2.5 cm wide. Pods oblong, suture wings 10 mm broad, 10-15 x 5 cm, 2 to 4-seeded, with abundant, deciduous, irritating hairs.

India to Indo-China and Malaya. Northern Luzon (Cagayan) to Mindanao, Philippines. In thickets and secondary forests at low and medium altitudes; locally abundant.

Common name – *Duglo* (Tag.).

Exsicc. – *Gates CA 1401, 1402, 1404; Pancho CA 9824, 9825 (CAHP).*

4. *Mucuna sericophylla* Perk., *Fragm. Fl. Philip.* 86, 1904; Merr., *Philip. J. Sc.* 5(Bot.): 117, 1910; En. *Philip.* 2: 310, 1923. – *Mucuna luzoniensis* Merr., *Philip. J. Sc.* 1: Suppl. 196, 1906.

Perennial and scandent. Leaves alternate, upon 7-10 cm long pubescent petioles; leaflets densely gray tomentose, apex obtusely rounded, truncately rounded at base, lateral ones slightly larger, 8 x 6 cm, broadly ovate except subelliptic terminal one, with 5-7 nerves on each side of prominent midvein. Racemes axillary or subterminal, cinereous; calyx 1 cm long or twice as long as pedicels, with reddish brown stinging hairs; corolla black purple, 3 cm long, glabrous, succulent, petals subequal, curing black. Pods flat, straight, abruptly hooked at apex, provided with stinging hairs, with about 5 seeds.

Endemic. Philippines: Luzon (Lepanto, Bontoc, Benguet, La Union, Nueva Vizcaya, Pampanga, Bataan, Laguna), Mindoro, Leyte. Mindanao and Jolo. In dry thickets at low and medium altitudes.

Common names – *Nipai, Duglo* (Tag.).

Exsicc. – *Gruèzo WM24010 (CAHP).*

36. PHASEOLUS Linnaeus

Herbs twining or erect. Leaves trifoliolate; leaflets stipellate. Flowers in axillary racemes; calyx campanulate, lower ones usually longer than others, upper 2 subconnate; corolla much-exserted, keel prolonged, spirally twisted; stamens diadelphous; ovaries many-ovuled; styles filiform, twisted with keel, bearded along one side below stigma. Pods linear to oblong, compressed or swollen.

Species about 130; chiefly tropical, many cultivated; 9 in the Philippines.

1. Pods linear, subcompressed. 4-10 cm long, 5 mm wide, appressed-pubescent; flowers dark purple
 2. Erect suffrutescent herb; leaflets oblong to oblong-ovate, never lobed; stipules lanceolate, acuminate, 6-8 mm long..... 1. *P. lathyroides*
 2. Twining vine; leaflets broad, ovate or rhomboid, usually deeply lobed; stipules deltoid, 5 mm long..... 2. *P. atropurpureus*
1. Pods oblong, flat, 6-12 x 2 cm, glabrous or slightly pubescent; flowers white, greenish or pale yellowish 3. *P. lunatus*

1. ***Phaseolus lathyroides*** L., Sp. Pl. ed. 2, 1018, 1763; Merr., En. Philip. 2: 318, 1923. – *Macroptilium lathyroides* (L.) Urb., Symb. Antill. 1: 457, 1928. **Figure 35**

Herbs erect, suffrutescent, branched, 1-1.5 cm high, branches flexuous, clothed with deflexed hairs. Leaflets oblong to oblong-ovate, 4-7 cm long; stipules lanceolate, acuminate, 6-8 mm long. Racemes axillary, 20 cm long or shorter, peduncles as long or longer than 20 cm. Flowers 2 cm long; calyx green, 6-7 mm long; standard 1 cm wide, greenish; keel and wings dark purple. Pods reflexed, 8-10 x 0.4 cm, somewhat compressed, appressed-pubescent; seeds numerous, 3 mm long.

Native of tropical Africa, introduced in the tropics of the Old World. Throughout the Philippines, in open grasslands and rice fields.

Com. name – *Malamungo* (Tag.).

Exsicc. – *Bardenas CA 10572, 10583**; *Guantes CA 10695* (CAHP).

2. ***Phaseolus atropurpureus*** DC., Prodr. 2: 395, 1825. – *Macroptilium atropurpureum* (DC.) Urb., Symb. Antill. IX, 457, 1928.

Vines perennial twining; stems pubescent. Leaves trifoliolate, leaflets broad ovate or rhomboid, obtuse, 4-6 cm long, sometimes deeply lobed, conspicuously pubescent on both surfaces; stipules deltoid, 5 mm long. Flowers on long axillary racemes, dark purple, 5-20 mm long; calyx campanulate, teeth short pubescent. Pods linear, spreading, nearly straight, 4-8 cm long, 5 mm or less wide; seeds 5-8.

Native of southwestern United States. Widely distributed in North, Central and South America. Throughout the Philippines, in open grasslands.

Com. name – Purple beans (Engl.).

Exsicc. – *Lugod & Orildo CA 16565, 16566, 16567, 16568*; *Pancho & Hemaes CA 38963* (CAHP).



Figure 35 *Phaseolus lathyroides*: 1. habit, 2. flower, 3. flower, petals removed, 4. perianth, expanded; 5. stamen; 6. ovary, cross section; 7. ovary, vertical section, 8. pod, dehiscent; 9. seed; 10, 11. portions of stem showing leaf bases and stipules.

3. *Phaseolus lunatus* L., Sp. Pl. 2: 724, 1753, Merr., En. Philip. 2: 318, 1923.

Figure 36

Annual slender, glabrous or sparingly pubescent, herbaceous vine, 4 m or longer; stipules small, basifixed. Leaflets ovate, 6-12 cm long, acuminate, thin. Racemes axillary, solitary, peduncled, 8-10 cm long; flowers long-pedicelled, 12 mm long; calyx pale greenish; corolla much longer than calyx, greenish or pale yellowish. Pods oblong, 6-12 x 2 cm, somewhat curved; seeds 1-4, large, white or variously colored.

Native of tropical America. Cultivated in all tropical and warm countries. Thoroughly naturalized in the Philippines and common in thickets at low and medium altitudes.

Com. names – *Patani* (P. Bis., Tag.); Lima bean (Engl.).

Exsicc. – *Desamero CA 10912*; *Gates & Quisumbing CA 1410*; *Hernaez CA 12497**; *Lugod CA 4892*; *Orlido CA 10913*; *Peña CA 8166* (CAHP); *Robinson & Foxworthy BS 17260, 902296* (US).

37. PACHYRRHIZUS L.C. Richard ex A.P. de Candolle, *nom. cons.*

Vines herbaceous, twining with large, turnip-shaped, fleshy roots. Leaves trifoliolate, lobed or sinuate; leaflets stipellate. Racemes axillary, long; flowers in fascicles at thickened nodes; calyx 2-lipped, tube as long as lips, upper lip notched, lower 3-toothed; corolla exserted, petals subequal; keel obtuse; stamens diadelphous; ovaries many-ovuled; styles bearded down on inner side below oblique stigma. Pods linear, swollen, depressed between seeds.

Species 2 or 3, in Mexico and tropical Africa; 1 in the Philippines.

1. *Pachyrrhizus erosus* (L.) Urban, Symb. Antill. 4: 311, 1905; Merr., En. Philip. 2: 321, 1923. – *Dolichos erosus* L., Sp. Pl. 2: 726, 1753.

Vines coarse, scandent, pubescent, herbaceous; root fleshy, large, edible, turnip-shaped. Terminal leaflets broader than long, up to 15 x 20 cm, base deltoid, irregularly and shallowly lobed at upper half, lateral ones inequilateral. Racemes up to 45 cm long, lower nodes produced into short branches, each node with several flowers; flowers pale blue or blue and white, 2-2.5 cm long; standard 1.5 cm wide. Pods 10 x 1-1.2 cm, flat, pubescent; seeds 8-10.

Native of tropical America, now widely distributed in the tropics; cultivated throughout the Philippines.

Com. name – *Sinkamas* (P. Bis., Tag.).

Exsicc. – *Salva Cruz CA 5003*; *Sulit CA 1451* (CAHP).



Figure 36. *Phaseolus lunatus*: 1. flowering and fruiting branch; 2. seed, 2 views; 3. flower; 4. perianth, expanded; 5. stamens; 6. ovary, cross section, 7. ovary, vertical section. (After Pancho 1983, with permission).

38. VIGNA Savi

Herbs, twining or not. Leaves trifoliolate, stipulate; leaflets stipellate. Racemes axillary. Flowers germinate on tubercles of rachis; calyx campanulate, lobe long or short, upper 2 often connate; corolla much exserted; keel truncate, with ascending or slightly recurved beak; stamens diadelphous; ovaries many-ovuled; styles twisted not more than 180°, bearded along one side below stigma. Pods linear.

Vigna forms a connecting link between *Dolichos* and *Phaseolus*. It differs from the former in having a lateral stigma and from the latter in having a curved keel.

Species 150, in tropical regions of both hemispheres; 4 in the Philippines.

1. Erect, bushy herb; corolla yellow; pods 6-7 cm long, brown strigose 1. *V. radiata*
1. Scandent vine; corolla yellowish or pale purplish; pods pendant, flaccid or inflated when young, up to 90 cm long, glabrous 2. *Vigna unguiculata* ssp. *sesquipedalis*

1. ***Vigna radiata*** (L.) R. Wilcz. in Fl. Congo Belge & Ruanda-Urundi 6: 386, 1954. – *Phaseolus radiatus* L., Sp. Pl. 2: 725, 1753; Hara, J. Jap. Bot. 30: 140, 1955. – *P. aureus* Roxb., Hort. Beng. 55, 1814; Fl. Ind. ed. 2, 3: 297, 1832. – *P. mungo* L. *sensu* Savi, Nouv. Giorn. Letter 3: 308, f. 1, 1822.

Figure 37

Annual herbs erect or bushy; branched from base, clothed with brownish hairs. Leaflets ovate, 8-15 cm long, entire, acuminate, lateral ones inequilateral. Flowers 1 cm long, yellow, racemously arranged near ends of short peduncles; pedicels very short. Pods linear, 6-8 cm x 6 mm, spreading, hirsute with scattered, long brownish hairs; seeds 4-6 mm long.

Native of the Old World tropics, now cultivated in most warm countries. In the Philippines, extensively cultivated; scarcely spontaneous.

Com. names – *Mungo* (Bis., Tag.); Mungbean, Golden gram (Engl.).
Exsicc. – *Pancho* CA 20167, 20217 (CAHP).

2. ***Vigna unguiculata*** (L.) Walp. ssp. ***sesquipedalis*** (L.) Verdc. in Davies, Fl. Turkey 3: 266, 1970; Kew Bull. 24: 544, 1970. – *Vigna sesquipedalis* (L.) Fruw., Unbau Huelsenfrucht 254, 1898. – *Dolichos sesquipedalis* L., Sp. Pl. ed. 2, 1019, 1763.

Annual vines, scandent, herbaceous, nearly glabrous; stipules 1 cm long, attached above middle. Leaflets ovate-rhomboid, 6-15 cm long, acute, entire or nearly so, nerves often purplish. Racemes few, axillary, long-peduncled;

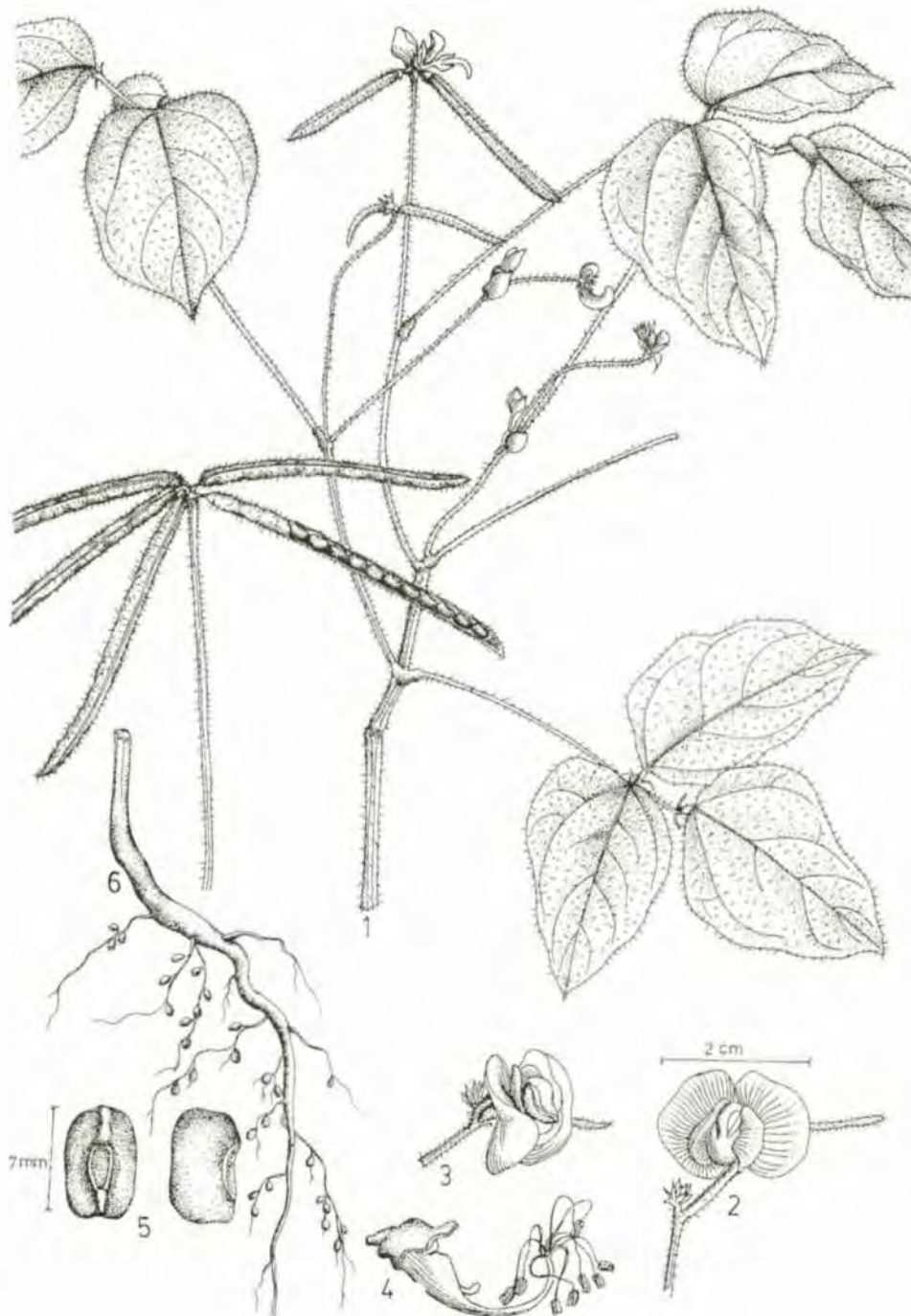


Figure 37. *Vigna radiata*: 1. flowering and fruiting twig, 2. flower, front view; 3. flower, side view; 4. flower, petals removed; 5. seed, 2 views.

flowers 3-6, crowded at ends of peduncles: calyx greenish, 1 cm long, lobes lanceolate, long-acuminate; corolla pale purplish, 2 cm long. Pods slender, pendent, green or purplish, 30-90 x 1 cm, flaccid or inflated when young, many-seeded.

Probably a native of China; cultivated in most warm and tropical countries. In the Philippines, widely cultivated for its edible pods and beans.

Com. names – *Sitao* (Tag.); *Utong* (Ilk.); *Yardlong bean*, *Asparagus bean* (Engl.).
Exsicc. – *Lugod* CA 8394 (CAHP).

39. DOLICHOS Linnaeus

Herbs twining. Leaves trifoliolate; leaflets stipellate. Flowers axillary, solitary or in racemes; calyx tubes campanulate, lobes long or short; corolla exserted, petals equal or subequal in length, keel obtuse or bearded; stamens diadelphous; ovaries many-ovuled; styles bearded down on inner side or around stigma. Pods flat, linear to oblong.

Species 100, in the tropics of both hemispheres; 3 in the Philippines.

1. Flowers 2 cm long; pods 7-12 x 2 cm; cultivated..... 1. *D. lablab*
1. Flowers 1 cm long; pods 5-7 x 0.8 cm; wild..... 2. *D. trilobatus*

1. *Dolichos lablab* L., Sp. Pl. 2: 725, 1753; Merr., En. Philip. 2: 321, 1923.
– *Lablab purpureus* (L.) Sweet, Hort. Brit. ed. 1, 481, 1827; Verdc., Kew Bull. 24: 410, 1970. – *Dolichos purpureus* L., Sp. Pl. ed. 2, 1021, 1763.
– *Lablab niger* Medik., Vorles. Church. Phys. Ges. II, 354, 1787; Wilcz. in Fl. Congo Belge & Ruanda-Urundi VI: 36, 1954.

Annual vines, glabrous, 6 m or longer; stems purplish. Leaves trifoliolate; stipules small, basifixed; leaflets ovate, 7-15 cm long, acute or acuminate, entire. Racemes erect, 15-25 cm long, long-peduncled; flowers few to many, pink; purple or nearly white, 2 cm long. Pods oblong, 7-12 x 2 cm, flattened, acuminate; seeds 3-5.

Tropics of the Old World. Throughout the Philippines, cultivated for its edible beans.

Com. name – *Bataw* (Bik., P. Bis., Tag.); *Parda* (Ilk.).
Exsicc. – *Ballesteros* CA 8243; *Gibe* CA 1340; *Novero* CA 8126 (CAHP); *Sulit* 2244123 (US).

2. *Dolichos trilobatus* L., Sp. Pl. 726, 1753; Verdc., Taxon 17: 170, 1968, *non auctt. al.* – *D. falcatus* Willd., Sp. Pl. 3: 1047, 1902; Merr., En. Philip. 2: 321, 1923.

Annual vines, 3-4 m long, slender, glabrous. Leaflets ovate to oblong-ovate, 2-6 cm long, subentire to 3-lobed, apex acute to acuminate, base broad. Peduncles solitary, axillary, slender, equalling or exceeding petioles, each bearing 1-4 flowers at apex; flowers pink and white or purplish, 1 cm long. Pods oblong, 5-7 x 0.8 cm, curved.

India, Sri Lanka to Malaysia. Luzon, Philippines, in thickets, at low altitudes.

Com. name – *Paayap-gubat* (Tag.).

Exsicc. – *Gates & Clemente CA 1339* (CAHP); *Gray 40714*; *Serviñas BS 16909, 900666* (US).

40. PSOPHOCARPUS A.P. de Candolle, *nom. cons.*

Vines twining, herbaceous or suffrutescent from tuberous roots. Leaves trifoliolate; stipules produced below point of attachment; leaflets stipellate. Flowers large, pale blue or purplish; calyx lobes shorter than tube, upper 2 connate; corolla much-exserted; petals equal, keel incurved; stamens monadelphous, upper one free below; ovaries many-ovuled; styles long, bearded around stigma. Pods square, oblong or longitudinally winged along each angle, septate between seeds.

Species 5, tropical Asia and Africa; 1 in the Philippines.

1. *Psoplocarpus tetragonolobus* (L.) DC., Prodr. 403, 1825; Merr., En. Philip. 2: 322, 1923. – *Dolichos tetragonolobus* L., Sp. Pl. ed. 2, 1020, 1763.

Annual vines, glabrous, 6 m or longer. Leaflets ovate, 8-14 cm long, entire, apex acuminate, base deltoid. Racemes few-flowered, up to 15 cm long; flowers light blue, 3-3.5 cm long. Pods 10-20 cm long, 2 cm thick.

India to Malaya in cultivation. Introduced in the Philippines; cultivated, semi-cultivated and occasionally spontaneous in many places at low and medium altitudes.

Com. names – *Cigarillas* (Pang., Tag.); *Kalamismis* (Tag.); *Asparagus bean* (Engl.).

Exsicc. – *Gruèzo WM24013* (CAHP).

69. OXALIDACEAE

Herbs, shrubs or trees. Leaves subopposite or alternate, trifoliolate, digitately or pinnately compound, sometimes simple by suppression of lateral leaflets, glabrous or pubescent, occasionally with free or adnate stipules, often wanting. Inflorescences axillary or cauline; flowers umbellate or cymosely arranged, perfect, regular, small though more or less showy; sepals usually 5, imbricate; petals 5, rarely fewer by suppression or contortion; stamens 10, in 2 series, all fertile or occasionally 5 sterile; filaments somewhat united toward base; anthers 2-celled, cells parallel, opening lengthwise; gland none; ovaries 5-celled, each cell with 1 to many ovules; styles free; stigmas capitate. Fruits capsular or fleshy, dehiscent or indehiscent.

Genera 7, species about 900, in the tropics and subtropics of both hemispheres; 4 genera and 7 species in the Philippines.

1. Herbs; fruits capsular
 2. Leaves trifoliolate; valves of capsule cohering with axis 1. *Oxalis*
 2. Leaves pinnate; valves of capsule separating from axis to base 2. *Biophytum*
1. Trees or shrubs; fruits fleshy, indehiscent 3. *Averrhoa*

.1. OXALIS Linnaeus

Herbs small, acid in taste, usually prostrate and creeping. Leaves alternate, trifoliolate; stipules small. Flowers on axillary 1- to few-flowered peduncles, regular, yellow; sepals 5, imbricate; petals 5, hypogynous. Stamens 10, free or united at base, all anther-bearing; ovaries 5-lobed, 5-celled; styles 5, distinct. Capsules dehiscent loculicidally.

Species about 850, chiefly in the tropical and temperate South America and South Africa; 2 in the Philippines.

1. *Oxalis corniculata* L., Sp. Pl. 435, 1753; Merr., En. Philip. 2: 323, 1923.
– *O. repens* Thunb., Diss. Oxal. 16, 1781. Figure 38

Stem creeping, up to 50 cm long, pubescent with long, scattered hairs, usually rooting at nodes. Petioles 5 cm long or less; leaflets obcordate, 0.5-1.5 cm long, sessile. Flowers yellow, one to several on each peduncle, subumbellate, 1 cm long; petals obcordate. Capsules tomentose, subcylindric, 1-1.8 cm long.

A weed widely distributed in temperate and tropical parts of the world. Throughout the Philippines; common in wastelands.

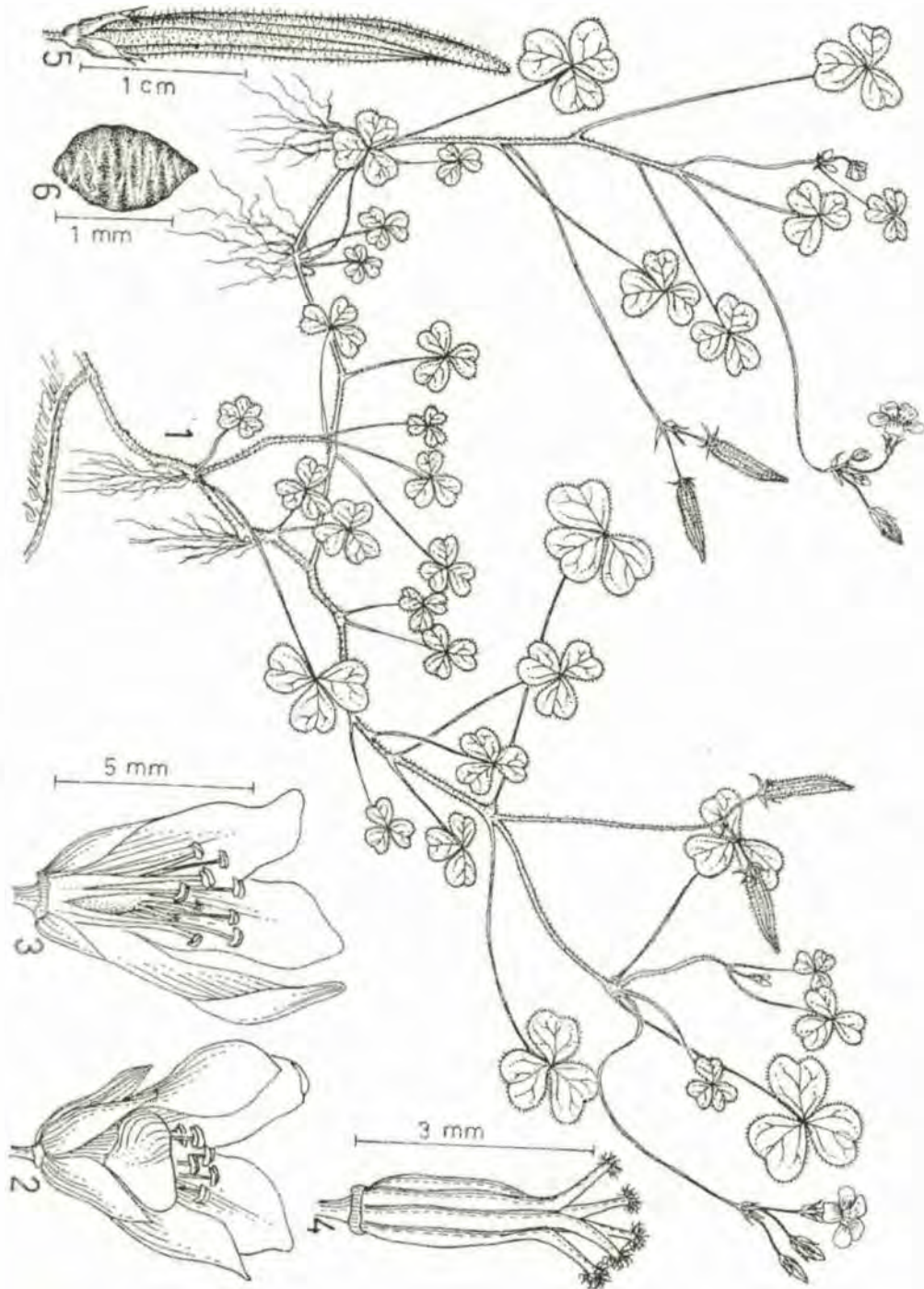


Figure 38. *Oxalis corniculata*: 1. habit; 2. flower; 3. flower, partly excised to show stamens; 4. flower, perianth removed; 5. fruit; 6. seed.

Com. name – *Taingang-daga* (Tag.).

Exsicc – *Orlido* CA 10613*, 10384; *Daza* CA 1466 (CAHP).

2. BIOPHYTUM A.P. de Candolle

Annual herbs erect, small, unbranched. Leaves abruptly pinnate, crowded at top of stem; leaflets opposite; petioles swollen at base. Peduncles terminal; flowers umbellate, small, yellow; sepals 5, lanceolate, acuminate; petals 5; stamens 10; filaments free, outer 5 smaller. Capsules ovoid to oblong, loculicidally dehiscent.

Species 20. in tropical Asia, Africa and America; 2 in the Philippines.

1. *Biophytum sensitivum* (L.) DC., Prodr. 1: 690, 1824; Merr., En. Philip. 2: 324, 1923. – *Oxalis sensitiva* L., Sp. Pl. 434, 1753. **Figure 39**

Stems up to 30 cm high, usually shorter. Leaves numerous, crowded at apex of stem, 5-12 long; leaflets 8-14 pairs, upper ones gradually increasing in size, oblong to oblong-obovate, 1.5 cm long or shorter, often somewhat curved, apex rounded or apiculate. Peduncles numerous, usually as long as leaves; flowers many, crowded at apex of peduncle, shortly pedicelled; sepals subulate-lanceolate, striate, 7 mm long; petals yellow. Capsules shorter than persistent calyx.

Pantropic. Widely distributed in the Philippines, at low and medium altitudes.

Com. name – *Damong-bingkalat* (Tag.).

Exsicc. – *Orlido* CA 4806, 10614*, 10615; *Cabrera* CA 5038; *Blancaver* CA 4863; *Lugod* CA 4683; *Gates* CA 1464 (CAHP).

3. AVERRHOA Linnaeus

Trees small. Leaves alternate, odd-pinnate; leaflets opposite or nearly so, estipulate. Flowers small, regular in paniced cymes, axillary or from trunk and larger branches: sepals 5, imbricate; petals 5, contorted; stamens 10, united at base, all perfect or 5 without anthers; ovaries 5-lobed, 5-celled; styles 5, distinct; stigmas capitate; ovules numerous. Fruits fleshy, oblong, cylindrical or longitudinally 5-lobed; seeds naked or arillate; albumen scanty, fleshy; embryo straight.

Species 2, tropical America; now widely cultivated in the tropics.

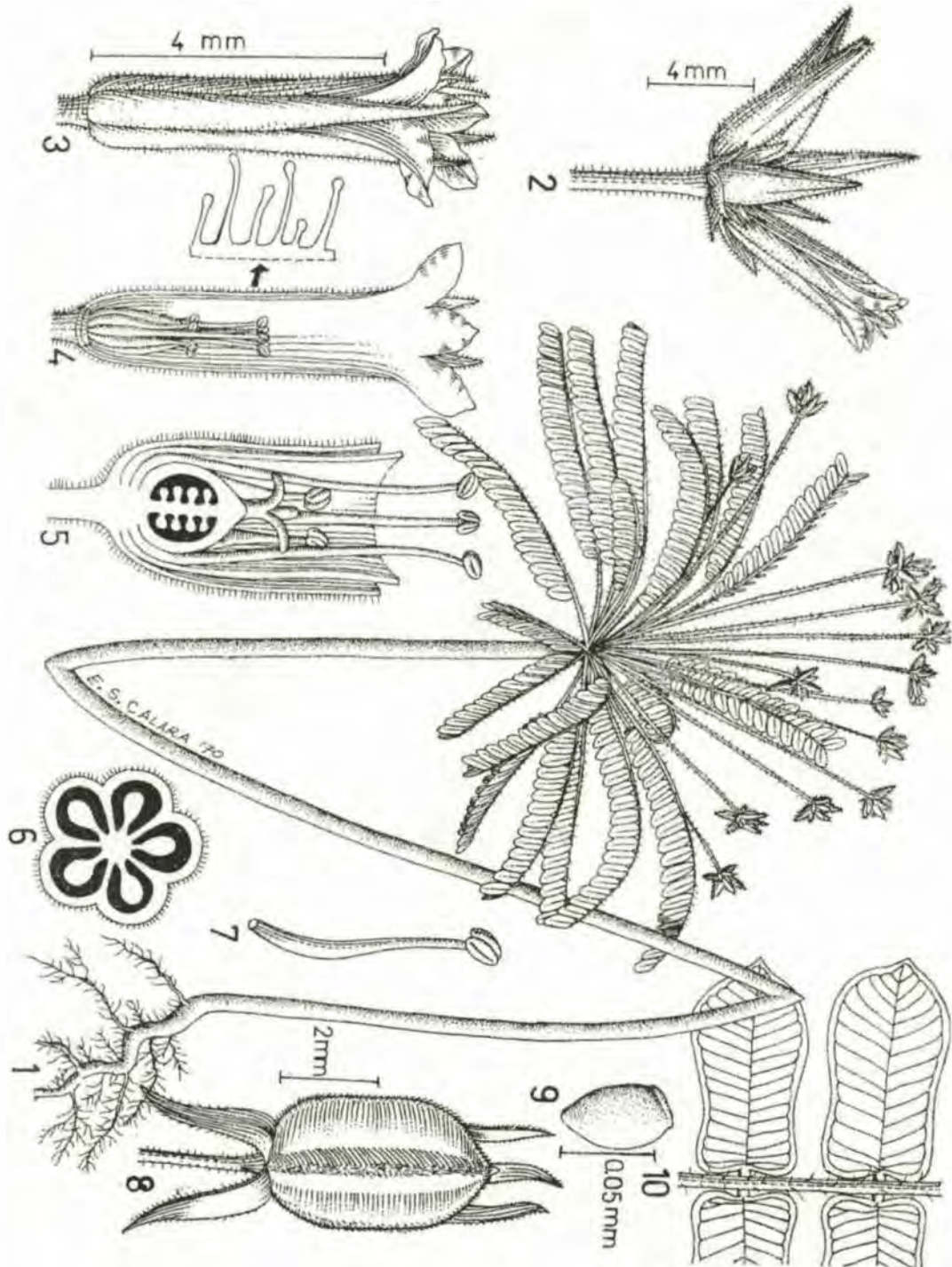


Figure 39. *Biophytum sensitivum*: 1. habit; 2. inflorescence; 3. flower; 4. flower, perianth excised; 5. ovary, vertical-section; 6. ovary, cross section; 7. stamen; 8. fruit; 9. seed; 10. leaflets, enlarged.

1. Inflorescences mostly axillary; leaflets usually 5 pairs, glabrous; fruits with 5 sharp lobes, star-shaped in cross section 1. *A. carambola* 1.
1. Inflorescences borne on trunk and larger branches; leaflets 10-17 pairs, pubescent; fruits cylindrical or with 5 obscure rounded lobes... 2. *A. bilimbi*

1. *Averrhoa carambola* L., Sp. Pl. 428, 1753; Merr., En. Philip. 2: 324, 1923.

Shrubs or small trees, 6 m or higher. Leaves pinnate, 15 cm long; leaflets quite glabrous, usually 5 pairs, ovate to ovate-lanceolate, acuminate, upper ones 5 cm long, lower ones shorter. Panicles small, axillary, 3 cm long; flowers 5-6 mm long, campanulate; calyx reddish purple; petals pale to bright purple, often margined with white; stamens 10, shorter ones usually without anthers. Fruits fleshy, green or greenish yellow, 6 cm long with 5 longitudinal, sharp, angular lobes, acidic, edible; seeds arillate.

Native of tropical America. Widely distributed in the tropics including the Philippines.

Com. name – *Balimbing* (Bik., Tag.).

Exsicc. – *Novero CA 7079; Lugod CA 7024; Lande CA 9978; Trinidad CA 1461; Gates CA 1463; Halos CA 1463A (CAHP); Forest Guard BF 20920, 1237860 (US).*

2. *Averrhoa bilimbi* L., Sp. Pl. 428, 1753; Merr., En. Philip. 2: 324, 1923.

Trees small, 5-12 m high. Leaves pinnate, 20-60 cm long, rachis and leaflets pubescent; leaflets 10-17 pairs, oblong, acuminate, fascicled, pubescent, 15 cm long or shorter. Flowers 1.5 cm long, somewhat fragrant; calyx pubescent; corolla purple, often marked with white. Fruits subcylindric or with 5, obscure, broad, rounded, longitudinal lobes, green, acidic, edible, 4 cm long; seeds not arillate.

Native of tropical America, now widely cultivated in the tropics of both hemispheres. Throughout the Philippines; cultivated.

Com. name – *Kamias* (Tag.).

Exsicc. – *Gates & Quisumbing CA 1460 (CAHP).*

70. GERANIACEAE

Annual or perennial herbs, sometimes shrubs. Leaves opposite or alternate, simple or compound, stipulate. Flowers bisexual, mostly regular; sepals 5, distinct; petals typically 5, hypogynous or nearly so, usually imbricate; stamens 5 or two or three times number of petals, some sterile; filaments more or less connate at base; pistil single, 3- to 5-celled; placentation axile; styles as many as ovary cells; ovules 1-2 in each cell. Fruits dry, 1-seeded in each carpel, valves dehiscent from base and joined by styles.

Genera 11, species 650, chiefly in temperate and subtropical regions; 2 genera and 5 to 6 species in the Philippines.

1. PELARGONIUM L' Heritier ex W. Aiton

Mostly succulent herbs. Leaves mostly opposite, digitately or pinnately veined, lobed or dissected, often strong-smelling. Flowers of various colors; calyx with nectar-spur joined to pedicel for much of its length; sepals and petals usually 5, two outer petals larger and prominently colored; stamens 10, connate at base, some without anthers. Fruits with 5 valves which coil a dehiscence.

Species 230, mostly in South Africa; 1 species and 2 to 3 cultivars in the Philippines.

1. *Pelargonium graveolens* L' Her. ex Ait., Hort. Kew 423, 1739; Geran. t. 17, 1930; Moore, Bailey 3: 88, 1955. **Figure 40**

Bushy, 60-90 cm tall. Stems becoming woody, grayish green, hairy-pubescent. Leaves fragrant when crushed, broadly cordate-ovate to circular, with 5-7 lobes closed together extending nearly to base, lobes again lobed into flat divisions, margins variously dentate; petioles long. Flowers small, in dense umbels on short peduncles among leaves; corolla 1.25 cm long, pinkish with purple veins.

Native of South Africa. Cultivated extensively as a pot-plant in the Philippines but it rarely flowers.

Com. name – *Malvarosa* (Sp.).

Exsicc. – *Pancho CA 39661**, 39475 (CAHP).

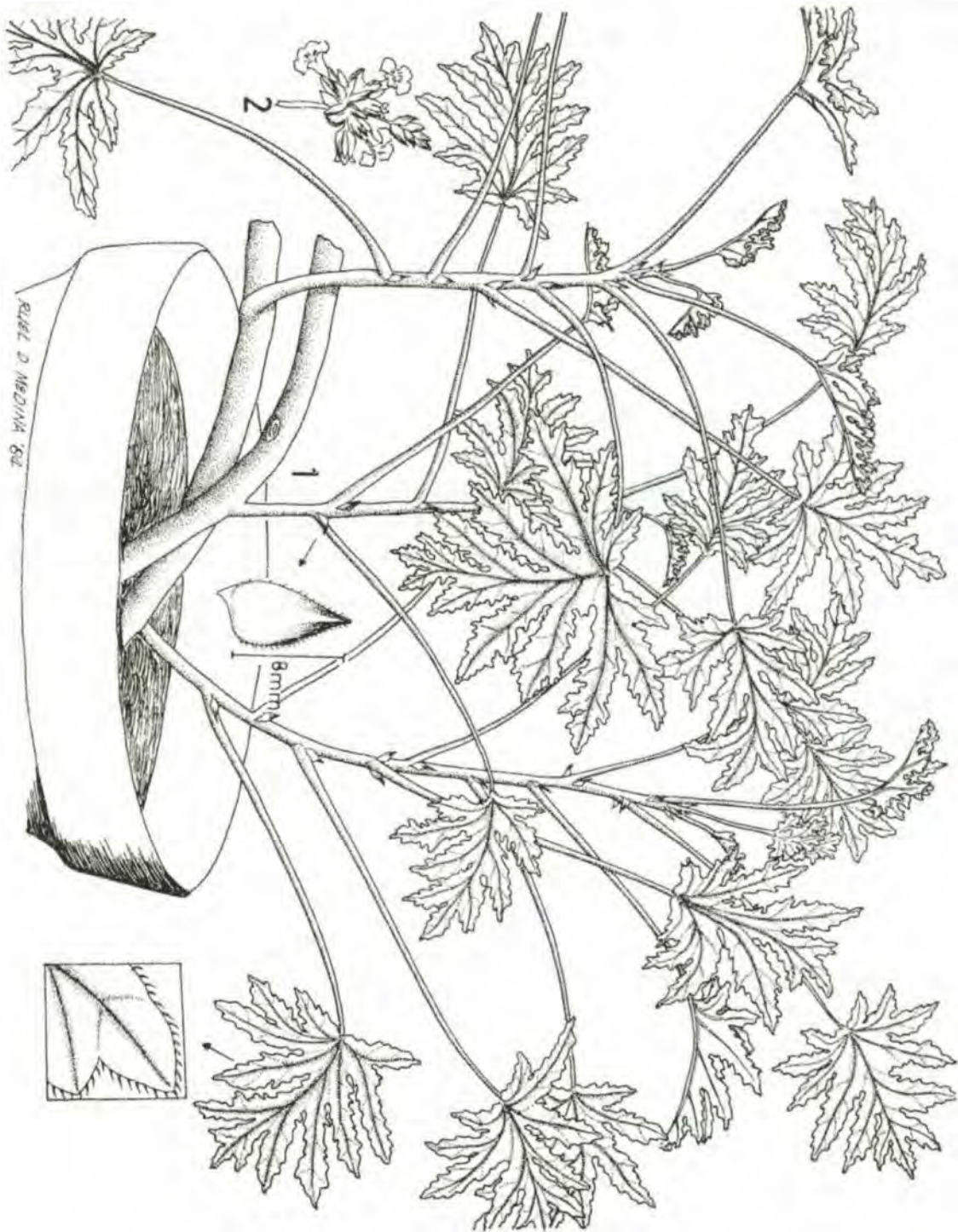


Figure 40. *Pelargonium graveolens*: 1. habit; 2. flower.

71. ZYGOPHYLLACEAE

Herbs prostrate, hairy. Leaves opposite, abruptly pinnate, stipulate. Peduncles axillary, solitary, 1-flowered; flowers perfect, regular, rather showy, yellow; sepals 5, imbricate, deciduous; petals 5, spreading, imbricate; disc annular, 10-lobed; stamens 10, inserted at base of disc, 5 longer ones opposite petals, 5 shorter ones with basal scales; ovaries sessile, lobed, usually with 4-5 carpels. Fruits with several spinous, indehiscent cocci; seeds obliquely pendulous.

Genera 26, species more than 200, chiefly tropical and subtropical; 1 genus and 1 species in the Philippines.

1. **TRIBULUS** Linnaeus

Annual or perennial herbs, prostrate, ascending or erect with long tap roots. Leaves equally pinnate, those of same pair usually different in size; stipules well developed. Flowers pseudo-axillary, solitary or in several-flowered dichasia or cymes, yellow or white; sepals 5, free, persistent; petals 5, imbricate, during anthesis widely patent, caducous; stamens 10, 5 episepalous ones occasionally sterile; ovaries 5-celled, appressed-pubescent; style 1; stigmas 5. Fruits 5-lobed or 5- to 12-winged; cocci 5 or less, spinose, winged or warty.

Species 20, in the tropics and subtropics of both hemispheres; 1 in the Philippines.

1. *Tribulus cistoides* L., Sp. Pl. 387, 1753; van Steenis, Fl. Mal. I. 4: 64, 1949. **Figure 41**

Perennial. Stems up to 1 m long. Leaves 4-6 cm long; leaflets 6 pairs, oblong or oblong-lanceolate, apiculate, 0.7-1.5 cm long, gray-pubescent beneath; peduncles 2-4 cm long; flower 3 cm in diameter. Fruits subglobose, 1 cm in diameter, hairy, each coccus with about 2 stout, sharp spines.

Pantropic. In the Philippines, cultivated in wastelands near the seashore; introduced in the University campus, Los Baños, Laguna, Luzon.

Com. name – Punctured vine (Engl.).

Exsicc. – *Pancho* CA 20049, 20077* (CAHP).

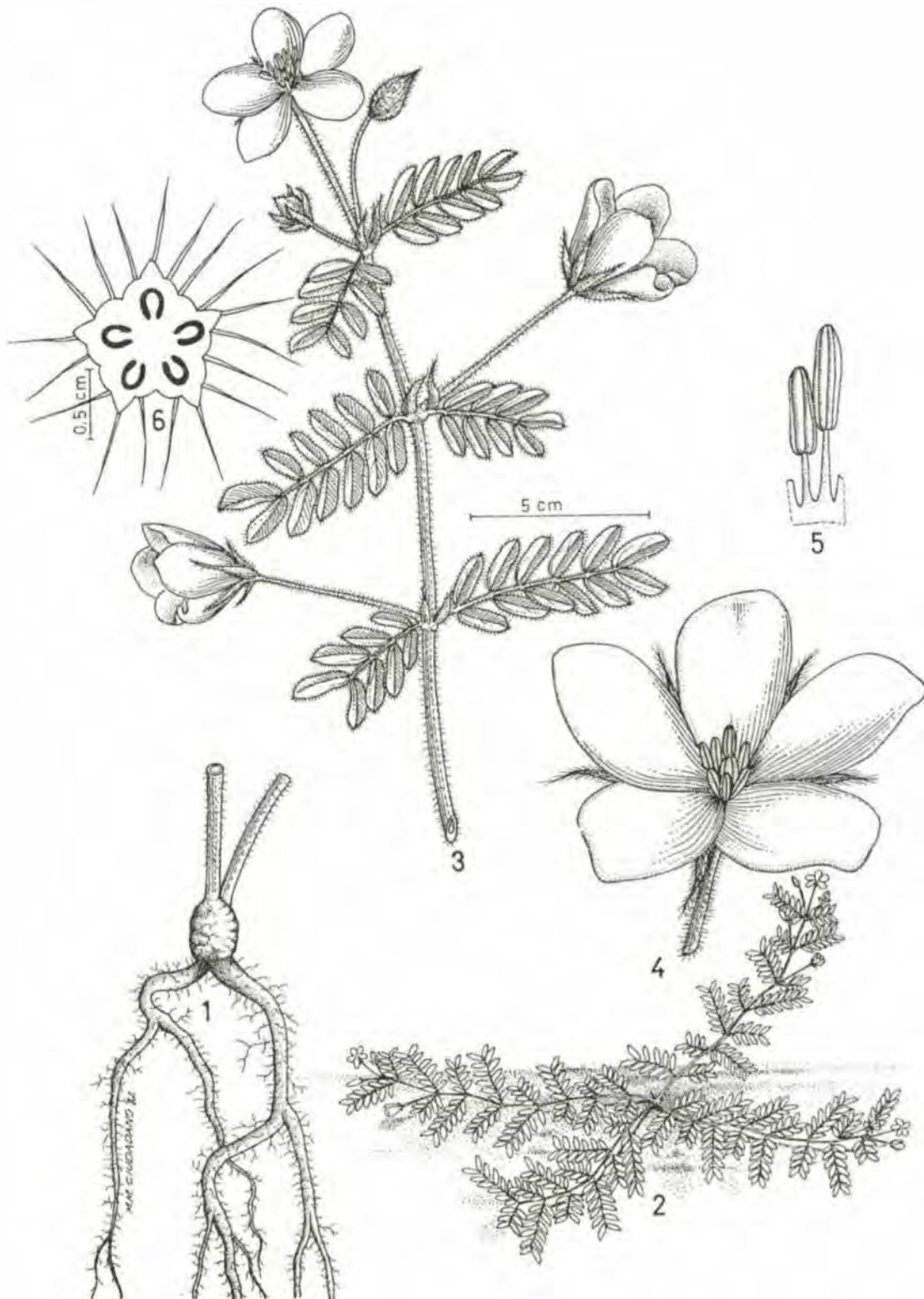


Figure 41. *Tribulus cistoides*: 1. root system; 2. habit; 3. flowering branch; 4. flower; 5. stamens; 6. ovary, cross section. (After Pancho, *Kalikasan*, Philipp. J. Biol. 12, 1983; with permission).

72. ERYTHROXYLACEAE

Shrubs or small trees glabrous, slender. Leaves alternate, entire, involute in bud; stipules solitary, intrapetiolar. Flowers axillary, solitary or fascicled, 5-merous, perfect; calyx persistent, 5-lobed; petals 5, free, clawed, ligulate inside at base; stamens 10 in 2 whorls of 5; filaments connate into a shallow cup; ovaries superior, 3-celled, 2 cells usually sterile, third with 1 ovule; styles 3, free or connate. Fruits drupaceous. the pulp scanty.

Genera 3, species 200 or more, of wide tropical distribution, but mostly in tropical America; 1 genus and 2 species in the Philippines.

1. ERYTHROXYLUM P. Browne

Shrubs or trees. Stipules intrapetiolar, mostly entirely connate. Leaves distichous, simple, pinnately nerved. Flowers axillary, solitary or fascicled, often 2- to 4-morphous, 5-merous; calyx persistent, connate, imbricate; petals free; stamens 10, 2-seriate; filaments connate into a short, dentate tube; anthers basifixed, longitudinally dehiscent; ovaries 1- to 3-celled (usually only one fertile); 1 ovule in each cell; styles 3, free or connate. Fruit a drupe.

Species 200, pantropic; 1 introduced in the Philippines.

1. *Erythroxylum coca* Lam., Encycl. 2: 393, 1786; Payson, Fl. Mal. I, 5: 547, 1958 **Figure 42**

Shrubs erect, branched, glabrous, 1-2 m high. Leaves thin, elliptic-oblong or narrowly obovate-elliptic, 2-7 cm long, obtuse, mucronulate, base acute; longitudinal nerves 2 or 4, slender, more distinct in young leaves. Flowers white, axillary in clusters of 6-12, rarely more; pedicels 3-4 mm long; petal yellow or yellowish green, oblong, convex, 4 x 2 mm. Fruits oblong, 7-10 mm long, red, the pulp thin.

Native of South America, now cultivated in many tropical countries. Recently introduced in the Philippines; cultivated on the University campus, Los Baños, Laguna, Luzon..

Com. name – Coca plant (Engl.).

Exsicc. – *Orlido* CA 4870, 10862*, 10863; *Desamparo* CA 10864; *Peña* CA 8154; *Champhaka* CA 8063; *Cabrera* CA 6068; *Lugod* CA 4636, 4654; *Ela* CA 1470; *Gates & Quisumbing* CA 1469; *Gates & Foxworthy* CA 1471; *Pancho* CA 3045, 3368 (CAHP).



Figure 42. *Erythroxylum coca*: 1. flowering twig; 2. fruiting twig; 3. flower; 4. flower, vertical, section; 5. petal; 6. fruit; 7. seed, 2 views.

73. EUPHORBIACEAE

Herbs, shrubs or trees, rarely vines, often with milky sap. Leaves alternate or opposite, entire or toothed, sometimes deeply lobed, seldom compound or wanting. Inflorescences various; flowers mostly small, unisexual or bisexual; perianth simple, calyx-like, often wanting in one or both sexes, sometimes with an inner series of 4 or 5 small petals; pistils solitary, surrounded by few to many naked stamens enclosed in perianth-like involucre; filaments free or variously united; ovaries superior, 1- to many-celled, usually 3-celled, carpels more or less united; styles as many as carpels, free or united, entire or variously divided; ovules 1 or 2 in each cell. Fruit a capsule composed of 2-valved cocci separating central axis, or drupaceous, stone 1- to 4-celled berry-like or nut-like.

Genera 283, species 7300, throughout the world, but chiefly tropical; 60 genera and 401 species in the Philippines.

1. Cells of ovary 2-ovulate
 2. Calyx lobes valvate; petals present 1. *Bridelia*
 2. Calyx lobes imbricate; petals absent (present in *Baccaurea*)
 3. Leaves trifoliolate 2. *Bischofia*
 3. Leaves simple or pinnate
 4. Flowers in spikes or upon elongated racemes
 5. Ovary cells 2-5; fruits 1- to 2-seeded
 6. Spikes 2 cm long or less; stamens 2-3 3. *Aporosa*
 6. Spikes 3-8 cm long; stamens 4-8 4. *Baccaurea*
 5. Ovary cell 1; fruits 1-seeded 5. *Antidesma*
 4. Flowers in axillary fascicles or glomerules (or on nodules along branches below leaves in *Phyllanthus acidus*)
 7. Fruits capsular (or fleshy and berry-like in *P. acidus*)
 8. Flowers with disc 6. *Phyllanthus*
 8. Flowers without disc
 9. Flowers bisexual; fruit a capsule of 3- to many 2-valved cocci 7. *Glochidion*
 9. Flowers unisexual; fruit fleshy 8. *Sauropus*
 7. Fruits drupaceous or berry-like
 10. Trees; stamens 8 to many 9. *Drypetes*
 10. Shrubs; stamens 3-5
 11. Flowers bisexual; enlarged in fruit 10. *Breynia*
 11. Flowers unisexual; not enlarged in fruit 11. *Securinea*

1. Cells of ovary 1-ovulate
 12. Flowers enclosed in cup-like involucre
 13. Involucre regular, campanulate; glands 4-5 or fewer, outside lobes and alternate with them 12. *Euphorbia*
 13. Involucre irregular, shoe-shaped; glands 4, inside appendix
..... 13. *Pedilanthus*
 12. Flowers not enclosed in cup-like involucre
 14. Stamens inflexed in bud, with curved anthers 14. *Croton*
 14. Stamens upright in bud, with erect anthers
 15. Staminate flowers petaliferous
 16. Leaves broad, digitately 3- to 5-nerved
 17. All parts stellately tomentose 15. *Doryxylon*
 17. Not stellately tomentose
 18. Shrubs; flowers bisexual 16. *Jatropha*
 18. Trees; flowers unisexual
 19. Leaves cordate
 20. Inflorescences canescent; fruits angular
 20. Inflorescences glabrous; fruits not angular 18. *Vernicia* (*V. fordii*)
 19. Leaves ovately elongated 19. *Aleurites* (*A. moluccana*)
 16. Leaves oblong, pinnately nerved
 21. Sepals enlarged in fruit 20. *Dimorphocalyx*
 21. Sepals not enlarged in fruit
 22. Stamens 15-30, free; styles entire
..... 21. *Codiaeum*
 22. Stamens 3-5, united; styles 2- to 3-parted.....
..... 22. *Trigonostemon*
 15. Staminate flowers apetalous
 23. Staminate calyx imbricate in bud
 24. Flowers unisexual 23. *Endospermum*
 24. Flowers bisexual
 25. Stamens 2 or 3
 26. Trees or shrubs
 27. Plants with acrid, milky latex; racemes lateral or terminal; staminate calyx 3-partite..... 24. *Excoecaria*
 27. Plants otherwise; racemes terminal; staminate calyx 2- to 3-lobed.....
..... 25. *Sapium*
 26. Vines 26. *Omphalea*
 25. Stamens 6 or more

- 28. Leaves deeply lobed 27. *Manihot*
- 28. Leaves not lobed
 - 29. Large trees; trunks spiny; flowers apetalous 28. *Hura*
 - 29. Shrubs or small trees; trunks smooth; flowers petalous
..... 29. *Omalanthus*
- 23. Staminate calyx valvate in bud
 - 30. Leaves trifoliolate 30. *Hevea*
 - 30. Leaves simple or lobulate
 - 31. Styles fimbriate or lacerate 31. *Acalypha*
 - 31. Styles not fimbriate or lacerate
 - 32. Stamens 6-8 32. *Alchornea*
 - 32. Stamens more than 8 or indefinite
 - 33. Leaves opposite; fruits drupaceous 33. *Neotrewia*
 - 33. Leaves alternate or opposite; fruits capsular
 - 34. Filaments variously united in bundles
 - 35. Leaves peltate, palmately lobed; flowers in
terminal panicles; capsules echinate.....
..... 34. *Ricinus*
 - 35. Leaves narrowly-linear; flowers in axillary spikes;
capsules unarmed 35. *Homonoia*
 - 34. Filaments free
 - 36. Anthers two-celled
 - 37. Fruits hairy, muricate, powdery or foveolate
 - 38. Capsules 2-celled; disc developed in
pistillate flowers 36. *Melanolepis*
 - 38. Capsules 3-celled; disc wanting in
pistillate flowers 37. *Mallotus*
 - 37. Fruits smooth 38. *Claoxylon*
 - 36. Anthers 3- or 4-celled
 - 39. Pistillate flowers in spikes or panicles.....
..... 39. *Macaranga*
 - 39. Pistillate flowers solitary 40. *Cleidion*

1. BRIDELIA Willdenow

Shrubs or trees. Leaves alternate, entire, flowers small, bisexual or unisexual in axillary or spicate clusters, bracteate, sessile or shortly pedicelled; calyx usually 5-cleft, lobes valvate; petals smaller than calyx lobes; disc broad, in staminate flowers cushion-like or adnate to calyx tube, in pistillate flowers often enclosing the ovary; stamens 5; filaments united below into a column which bears rudimentary ovary, free, spreading above; ovaries 2- or 3-celled; styles usually 2, forked; ovules 2 in each cell. Fruits drupaceous,

often with scanty flesh, cocci or pyrenes 1 or 2, each containing a solitary seed.

Species 30, tropical Africa, Asia, through Malesia to Australia; 5 in the Philippines.

- 1. Stipules large; calyx accrescent in fruit 1. *B. stipularis*
- 1. Stipules small; calyx not accrescent in fruits
 - 2. Leaves 3-7 cm long or shorter 2. *B. tomentosa* var. *glabrifolia*
 - 2. Leaves twice as long as above
 - 3. Blades subglaucous and pubescent beneath..... 3. *B. glauca*
 - 3. Blades green and glabrous beneath..... 4. *B. penangiana*

1. *Bridelia stipularis* (L.) Bl., Bijdr. 597, 1826; Merr., En. Philip. 2: 424, 1923. – *Clutia stipularis* L., Mant. 1: 127, 1767.

Shrubs suberect or scandent. Leaves elliptic, subglaucous, finely pubescent beneath, copious, terminal ones usually much smaller, average ones 7 x 4 cm, obtuse or rounded at both ends, 7-10 lateral nerves ascending, parallel, cross bars quite evident; petioles 5-10 mm long, velutinous; stipules setaceous acuminate, caducous. Flowers in small glomerules, axillary, subtended by deciduous, pubescent bracts or perianth; calyx glabrate, leathery, acutely toothed; ovaries puberulous at apex. Fruits drupaceous, ellipsoid, 1.25 cm long, nearly black when ripe, subtended by persistent, enlarged calyx.

India to China southward to the Moluccas. In the Philippines, characteristic of the *parang* formation; in Mt. Makiling, Luzon, from 30 m to about 250 m altitude; in open areas.

Com. name – *Lubalub* (Tag.).

Exsicc. – *Estioko*, Jr. CA 1572; *Velasco* CA 1573; *Mabanag* CA 1570; *Raymundo* CA 1569; *Bulalacao* CA 2850 (CAHP); *Padolina* 34130; *Sulit* 12170 (PNH); *Padolina* 2376316; *Sulit* 2125723 (US).

2. *Bridelia tomentosa* Bl. ssp. *glabrifolia* (Muell.-Arg ex Jabl.) Airy-Shaw, Kew Bull. 31: 383, 1976. – *B. glabrifolia* (Muell.-Arg. ex Jabl.) Merr., En. Philip. 2: 422, 1923. – *B. tomentosa* Bl. var. *glabrifolia* Muell.-Arg. ex Jabl. in DC., Prodr. 15: 502, 1866. – *B. tomentosa* Bl. var. *lanceifolia* Muell.-Arg. in DC., Prodr. 15: 502, 1866.

Shrubs. Leaves glabrous, broadly lanceolate or oblong, 3-7 cm long, frequently smaller, 5-9 pairs of ascending nerves rather faint, gradually acute, obtuse or subcuneate at base; petioles slender, glabrous, 5 mm long.

Flowers in small axillary fascicles, glabrous, subsessile, surrounded by persistent bracts; calyx toothed. Fruits globose, 5-8 mm across, purplish black when mature, smooth, subsessile, subtended by calyx vestiges.

Endemic in the Philippines, in dry thickets; in Mt. Makiling, Luzon, in open areas at 75-350 m.

Com. name – *Agai* (Tag.).

Exsicc. – *Pancho CA 20063, 20092* (CAHP).

3. *Bridelia glauca* Bl., Bijdr. 597, 1826; Merr., En. Philip. 2: 423, 1923.

Trees low, spreading. Branches slender, terete, glabrous when old. Leaves diverse in size, subglaucous and puberulous or velutinous beneath, shiny on top, ovately oblong, 6 x 14 cm, but often much smaller and occasionally larger, abruptly or gradually acute to subacuminate, rounded at base; petioles 1 cm long, glabrate. Flowers axillary, densely clustered, pubescent and bract-subtended, staminate at least pedicelled, pistillate subsessile; calyx sharply 5-lobed. Fruits ellipsoid, smooth, turning dark wine-red, 1 cm long, subtended by persistent, slightly enlarged calyx.

India and the Malay Archipelago. In the Philippines, along watercourses or in damp ravines in low forested regions; in Mt. Makiling, Luzon, along streams at lower elevations.

Com. name – *Balitahan* (Tag.).

Exsicc. – *Pancho CA 20058, 20269* (CAHP).

4. *Bridelia penangiana* Hook.f., Fl. Brit. Ind. 5: 272, 1887; Airy-Shaw, Euph. Born. 64, 1975. – *B. minutiflora* Hook. f., Fl. Brit. Ind. 5: 273, 1887; Merr., En. Philip. 2: 423, 1923. – *B. ovata* Merr., Bull. Bur. For. Philip. 1: 30, 1903, *non* Decne.

Trees small. Branches lenticelled. Leaves glabrous, elliptic-oblong, larger ones 7-16 cm, abruptly acute, base broadly obtuse or rounded; nerves 8-12 pairs, oblique; petioles 1 cm long. Flowers in dense glomerules, at axils of fallen leaves, pubescent or subglabrous, subtended by perianth-bracts; calyx lobed. Fruits subellipsoid, 8 mm long, ultimately dark red, smooth, short-stipitate.

Tenasserim to New Guinea. In the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, at 50-350 m.

Com. name – *Subiang* (Tag.).

Exsicc. – *Rivera 33483* (PNH); *Curran BF 17634, 710016*; *Rivera 2212545* (US).

2. **BISCHOFIA*** Blume

Trees glabrous. Leaves alternate, trifoliolate; leaflets often crenate. Flowers unisexual on axillary or lateral panicles, minute; staminate flowers with 5 concave, obtuse, imbricate sepals, concealing anthers; stamens 5; disc absent; pistillodes short; pistillate flowers with ovate, caducous sepals; staminodes 5, small or absent; ovaries exserted, 3- to 4-celled; ovules 2 in each cell. Fruits globose, fleshy with 3-4 cells lined with 2-valved endocarp; seeds oblong.

Species 2. India to central-southern China and Taiwan through Malesia to tropical Australia and Polynesia; 1 in the Philippines.

1. *Bischofia javanica* Bl., Bijdr. 1168, 1827; Merr., En. Philip. 2: 418, 1923.

Leaflets ovate to ovate-oblong, 6-12 x 3-7 cm, apex caudate-cuspidate, base acute or obtuse, margins crenately dentate; petioles 3-15 cm long. Staminate panicles 9-18 cm long, much-branched; pistillate panicles less branched, sometimes reduced to simple racemes. Drupes 8-16 mm.

Throughout the Philippines, in open areas and along streams in forests at low and medium altitudes to 1500 m; in Mt. Makiling, Luzon, from sea level to the mid-mountain forest (0-900 m altitude).

Com. name – *Tuai* (Tag.).

Exsicc. – *Icke CA 10471; Calayag CA 2787, 2788; Gates & Agana CA 1565; Guantes CA 10073; Labanan CA 3022 (CAHP); Curran BF 13239, 901983; Elmer 17619, 1237112 (US).*

3. **APOROSA** Blume

Trees or shrubs. Leaves distichous or spirally arranged, often with sessile glands along margins; stipules caducous. Inflorescences spikes or racemes in axils of leaves or fallen leaves; staminate spikes in broadly bracteate clusters; calyx deeply 3- to 6-partite; stamens 2-3; filaments free; pistillate in few-flowered spikes or racemes; calyx 4- to 5-partite, persistent, lobes imbricate; ovary cells 2-3, 2-ovuled. Fruits dry, irregularly dehiscent, often 1- to 2-seeded.

Species 70, southeastern Asia to Malaysia; 9 in the Philippines.

Bischofia was placed in a separate family – Bischofiaceae, by Airy-Shaw (1965) on account of the 3-foliolate leaves and the fleshy indehiscent fruits. Whitmore (1972) classified it with the Staphyleaceae.

1. *Aporosa alvarezii* Merr., Philip. J. Sc. 9 (Bot): 470, 1914; En. Philip. 2: 409, 1923.

Trees, about 10 m high. Leaves oblong, 13-17 x 5 cm, entire, slenderly caudate-acuminate, base rounded to subcordate; lateral nerves 8-10 on each side, midrib and nerves densely villous; petioles 1 cm long, densely villous, stipules strongly falcate, 1.5 cm long, acuminate. Pistillate inflorescences densely ferruginous-villous, solitary or in pairs, rachis 2 cm or less long. Fruits ovoid, 1.5 cm in diameter, ferruginous-villous, 2- or 3-celled.

Endemic. Philippines: Luzon (Laguna, Camarines), Samar; in primary forests at low altitudes; in Mt. Makiling, (Laguna) at 50-250 m altitude.

Com. name – *Bigloi* (Tag.)

Exsicc. – *Mabesa BF 26793, 1294866* (US)

4. **BACCAUREA** Loureiro

Trees or shrubs. Leaves spirally arranged, petioled, subentire; stipules caducous. Inflorescences many-flowered spikes, racemes or panicles, axillary, staminate ones mostly 2- to 5-flowered, pistillate mostly 1-flowered, perianth lobes 3-5, free or connate at base, imbricate; stamens 4-8, free; pistillate flowers larger than staminate; ovary cells 2-5, cells 1- to 2-ovuled; styles absent or short, connate; stigmas small, 2-lobed. Fruits dehiscent or indehiscent, 1- to 2-seeded.

Species 70, southeastern Asia through Malaysia to Tahiti; 4 in the Philippines.

1. *Baccaurea tetrandra* (Baill.) Muell.-Arg. in DC., Prodr. 15: 465. 1866; Merr., En. Philip. 2: 412, 1923; Fern., *Kalikasan*, Philipp. J. Biol. 8: 307, f. 4, 1979. – *Adenocrepis tetrandra* Baill., Etud. Gen. Euphorb. 601 1858. *nom. nud.*, Adansonia 4: 135, 1863. – *Baccaurea terminalifolia* Elm., Leaf. Philip. Bot. 4: 1277, 1911. **Figure 43**

Shrubs or small trees. Leaves obovately oblong, 15 x 6 cm, with 5-7 pairs of lateral nerves, pale green beneath, obtuse or abruptly acute, subcuneate at base; petioles 1-3 cm long, glabrous; bud bracts 7.5 mm long, acute, hairy along dorsal median line. Spikes 3-8 cm long, descendingly curved; flowers subtended by small bracteoles; stamens 5. Fruits juicy drupes, globose, 1.25-7.5 mm long, 2-ovulate, but usually only 1 maturing and bearing sessile, brown stigma; pedicels 3 mm long.

Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 75-550 m in the forest.



Figure 43 *Baccaurca tetrandra* 1 flowering branch 2 portion of staminate inflorescence 3 staminate flower, 4 stamen, 5 young infructescences; 6 fruit; 7 fruit, basal view, 8 ovary, vertical section, 9 seed

Com. name – *Dilak* (Tag.).

Exsicc. – *Aldos 33468** (PNH), 2212509 (US).

5. ANTIDESMA Linneaus

Trees or shrubs. Leaves alternate, entire, stipulate. Flowers minute, unisexual, apetalous, upon slender, axillary or terminal, simple or branched spikes or racemes. Staminate flowers with 3- to 5-toothed calyx imbricate in bud; disc entire or lobed; stamens 2-7, exserted, inserted around disc; rudimentary ovaries small or none, glabrous or hairy. Pistillate flowers with calyx as in staminate, sometimes truncate; disc annular or cushion-like; ovaries 1-celled, 2-ovuled; stigmas 2-4. Fruits small, ovoid to globose, fleshy, often compressed drupes, crowned by terminal or sublateral, persistent stigmas; endocarp 1-seeded, usually compressed, rugose.

Species 160, tropics of the Old World; 34 in the Philippines.

- 1. Leaves rounded at apex 1. *A. ghaesembilla*
- 1. Leaves pointed at apex
 - 2. Panicles usually axillary, bracteate..... 2. *A. spicatum*
 - 2. Racemes spicate, usually terminal, not bracteate
 - 3. Stigmas lateral.....3. *A. pleuricum*
 - 3. Stigmas terminal
 - 4. Twigs, petioles, lower leaf surface and rachis pubescent.....
 -4. *A. pentandrum*
 - 4. Twigs, petioles, lower leaf surface and rachis glabrous.....
 - 5. *A. bunius*

1. *Antidesma ghaesembilla* Gaertn., Fruct. 1: 189, t. 39, 1788; Merr., J. Arn. Arb. 33: 216, 1952.

Trees erect, stout, medium-sized. Branches freely rebranched, young tips usually hairy. Leaves elliptic, broadly rounded at both ends, 7 cm long by half as wide, frequently smaller, much paler on neither pubescent surface, midrib prominent but 6-9 lateral pairs relatively faint; petioles 5-8 mm long, pubescent, slender. Inflorescences chiefly terminal, with numerous spicate branches near base, 5 cm or less long; flowers numerous, densely clustered, terete, catkin-like, yellowish brown-tomentose; stamens much-exserted. Drupes subglobose, 5 mm across, glabrous when mature.

Western India, tropical Himalayan region to Sri Lanka, eastward to southeastern China and southward through Malesia and tropical Australia. Throughout the Philippines, in open grasslands (cogonales) at low and medium altitudes; in Mt. Makiling, Luzon, mostly in *Imperata* fields at low elevations.

Com. name – *Binayuyu* (Tag.).

Exsicc. – *Gibe* CA 1557; *Gates & Asuncion* CA 1558; *Pancho* CA 3385; *Mercado* CA 10152 (CAHP).

2. ***Antidesma spicatum*** Blco., Fl. Filip. 794, 1837; Merr., En. Philip. 2: 417, 1923. – *A. edule* Merr., Gov. Lab. Publ. Philip. 17: 26, 1904.

Shrubs or small trees. Branches densely brown-pubescent. Leaves ovately lanceolate or broadly oblong, 15 cm long by half as wide, glabrate on upper side, uniformly short-pubescent beneath, acute or more often acuminate, base rounded or subacute; petioles 1-1.5 cm long, tomentose. Panicles axillary, densely velvety, 3 cm long, shortly branched, branches subtended by lanceolate, deciduous bracts. Staminate flowers numerous; calyx obscurely 5-lobed, ciliate; stamens 4, twice as long. Pistillate flowers sessile; calyx lobed, strongly ciliate; stigmas terminal, forked; styles short, distinct. Drupes ellipsoid or subglobose, 3.75 mm long, pink or wine-red when ripe.

Endemic, in dry woods at low altitudes throughout Luzon to northern Mindanao, Philippines; in Mt. Makiling, Luzon, at low altitudes in open, dry areas.

Com. Name – *Tanigi* (Pamp., Tag.).

Exsicc. – *Pancho* CA 20061, 20296 (CAHP).

3. ***Antidesma pleuricum*** Tul., Ann. Sci. Nat. 111. 15: 213, 1851; Merr., En. Philip. 2: 417, 1923.

Trees. Leaves ovately elliptic to broadly oblong, 12 cm long by half as wide, with 5-7 nerves on each side of stout midrib, abruptly acute to acuminate, base broadly obtuse to rounded, glabrous; petioles 5-15 mm long. Flowers solitary or in branched, terminal spikes, 5 cm long, puberulous or glabrate, shortly pedicelled; calyx glabrous, subtruncate; stamens 3 or 4, exserted, arising from a glabrous disc or pistillode; ovaries somewhat pubescent; stigmas lateral, glabrous, lobulate, sessile. Fruits stalked, ellipsoid, 4-5 mm across, pink or purple when mature.

Endemic in the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 50-500 m.

Com. name – *Bignai-kalabau* (Tag.).

Exsicc. – *Serviñas* BS 16911, 900668, *Elmer* 18299 (US).

4. *Antidesma pentandrum* (Blco.) Merr., Philip. J. Sc. 9 (Bot.): 462, 1914; En. Philip. 2: 416, 1923. – *Cansjera pentandra* Blco., Fl. Filip. 73, 1837.

Shrubs erect, laxly branched. Leaves elliptic-oblong, 4-10 cm, paler green beneath, fine-hairy along conspicuous midrib, acute or subacuminate, broadly obtuse or rounded at base; petioles short, densely pubescent. Inflorescences usually terminal, of 1 or few racemose spikes, 5 cm long, rachis velutinous, flowers short-stipitate, subtended by minute bracts; calyx ciliate especially at top; stamens 5, much-exserted. Fruits ovately elliptic or ellipsoid, pink to red when mature.

Philippines to southern Taiwan. In thickets at low and medium altitudes, ascending to 1800 m; in Mt. Makiling, Luzon, from 30 m to the mid-mountain forest.

Com. name – *Bignai-pugo* (Tag.).

Exsicc. – *Novero CA 7963; Velasco CA 1569; Diloy CA 1560; Francia & Paysan CA 8900; Domingo CA 4555; Jarmin CA 1561; Valencia CA 1562; Gibe CA 1563; Orlido CA 4871; Champhaka CA 8067; Espiritu CA 8196; Peña CA 6065 (CAHP); McGregor BS 22882, 898236; Foxworthy's collector BS 10915580; Villamil BF 20495, 902852; Elmer 17478, 1050026; Salvoza BF 28285, 1262335 (US).*

5. *Antidesma bunius* (L.) Spreng., Syst. 1: 826. 1825; Merr., En. Philip. 2: 412. 1923; Gruèzo, PROSEA No. 2, 78, *f.s.n.*, 1991. – *Stilago bunius* L., Mant. 1: 122, 1767. Figure 44

Trees erect. Branches freely rebranched, forming a dense crown, young portions glabrous. Leaves coriaceous, glabrous, shiny on top, 8-16 x 5 cm, occasionally larger and frequently smaller, abruptly acute or merely obtuse, base cuneate or rounded; petioles stout, 1 cm long. Spicate inflorescences mainly terminal, occasionally branched from near base, up to 15 cm long, glabrous; staminate flowers sessile, yellowish white, with saucer-shaped, membranous calyx; pistillate flowers with terminal stigmas, pedicellate, cup-shaped calyx subcoriaceous. Fruits short-ellipsoid, 1 cm long or shorter, upon half as long stalks, shining deep red when mature.

Wild in the wetter parts of India, from the Himalaya southwards and eastwards in Sri Lanka, Burma and Malaysia. It may not be native in the Philippines and Peninsular Malaysia, but if so, it must have been introduced in prehistoric times and have become widely naturalized, at least, in the Philippines (Gruèzo 1991). Throughout the Philippines, common in thickets, vicinity of towns and settlements, occasional in forest; in Mt. Makiling, Luzon, in open areas at low altitudes, occasional in forests.



Figure 44. *Antidesma bunius*: 1. flowering twig; 2. fruiting twig; 3. portion of young staminate inflorescence; 4. portion of mature staminate inflorescence; 5. staminate flower; 6. seed.

Com. names – *Bignai* (Bik., Mang., Sbl., Tag.); Chinese laurel, Salamander tree (Engl.).

Exsicc. – *Ballesteros* CA 8012; *Peña* CA 8155; *Espiritu* CA 6079; *Braganza* CA 4554; *Gates & Copeland* CA 1556; *Alviar* CA 1554; *Champhaka* CA 8066; *Novero* CA 7062; *Orlido* CA 10347* (CAHP); *Elmer* 17620, 1237213 (US).

6. PHYLLANTHUS Linnaeus

Herbs or shrubs. Leaves 2-ranked, alternate, entire, flowers small, bisexual, apetalous, in axillary clusters; disc various, rarely none; staminate flowers with 4-6 sepals, imbricate in 2 series; stamens 3-5 at center of flower; filaments free or united; anthers oblong, cells parallel or diverging, slits vertical or transverse; pistillate flowers with sepals as in staminate; ovaries 3- or more-celled; styles free or connate, usually 2-fid; ovules 2 in each cell. Fruits of 3 or more, crustaceous, 2-valved cocci or fleshy and berry-like.

Species 500, in all warm countries; 35 in the Philippines.

1. Shrubs or trees with berry-like fruits or capsular and crustaceous
 2. Fruits capsular, crustaceous..... 1. *P. myrtifolius*
 2. Fruits fleshy and berry-like
 3. Fruits globose, 1-1.5 cm in diameter, 6- or 8-grooved; greenish white when mature 2. *P. acidus*
 3. Fruits depressed-globose, 5-7 mm in diameter, smooth, black when mature..... 3. *P. reticulatus*
1. Herbs with dehiscent capsules
 4. Anthers dehiscing vertically; flowers sessile or nearly so; capsules often muricate..... 4. *P. urinaria*
 4. Anthers dehiscing horizontally; flowers distinctly pedicelled; capsules smooth
 5. Much-branched; leaves 2-5 mm wide; pedicels 1-2 mm long..... 5. *P. debilis*
 5. Slightly or not at all branched; leaves 6-9 mm wide; pedicels 5 mm long..... 6. *P. virgatus*

1. *Phyllanthus myrtifolius* Moon, Cat. Ceyl. Pl. 65, 1824.

Shrubs small. Branchlets suberect, tips puberulous. Leaves linear-oblong or oblanceolate-oblong, 1-1.25 cm long, obtuse or acute, base narrowed, cordate, shortly petioled; stipules minute. Flowers small, often clustered; pedicels in both sexes very unequal in length, sometimes equaling leaves; sepals broadly oblong, thick, those of pistillate flowers slightly enlarged in fruit and spreading; disc of staminate flowers with very large, tubercled glands and those of pistillate ones, an almost entire cup. Capsules depressed-globose, slightly 3-lobed, crustaceous; seeds reticulated.

Sri Lanka. Introduced recently as an ornamental in the Philippines; in Mt. Makiling, Luzon, also cultivated as an ornamental.

Com. name – Ceylon bush (Engl.).

Exsicc. – *Lugod* CA 4235, 4236, 4402; *Orlido* CA 4878, 4873; *Barroga* CA 4943; *Jarmin* CA 1944; *Ramos* CA 1943; *Hernaes* CA 12421 (CAHP).

2. *Phyllanthus acidus* (L.) Skeels in U.S. Dept. Agric. Bur. Pl. Ind. Bull. 148: 17, 1909; Airy-Shaw, Euph. Born. 182, 1975. – *Cicca acida* (L.) Merr., Int. Rumph. 314, 1917, En. Philip. 2: 396, 1923. – *Averrhoa acida* L., Sp. Pl. 428, 1753. **Figure 45**

Trees small, glabrous, deciduous, 4-9 m high. Leaves 20-40 cm long; leaflets alternate, entire, oblong-ovate, 2-7 cm long, pointed. Racemes 10-15 cm long; flowers pink, small, crowded in many-flowered fascicles. Fruits globose, 1-1.5 cm in diameter, 6- or 8-grooved, greenish white.

India to Madagascar, Malaya and Polynesia. Introduced in tropical America, widely distributed in the Philippines, of prehistoric introduction. Occasionally cultivated in the Philippines in and about towns for its edible fruits.

Com. name – *Iba* (Pamp., Tag.).

Exsicc. – *Pancho* CA 20089, 20320* (CAHP).

3. *Phyllanthus reticulatus* Poir. in Lam. Encycl. 5: 298, 1804; Merr., En. Philip. 2: 394, 1923; Airy-Shaw, Euph. Philip. 42, 1983.

Shrubs erect or scandent, 1.5-5 m high. Branches elongated, often pendulous, pubescent or glabrous. Leaves distichous, oblong to elliptic-oblong, 1.5-4 cm long, rather pale beneath, obtuse or acute, base rounded or obtuse, short-petioled. Flowers axillary, solitary or few at each axil, slenderly pedicelled, 2-3 mm long, green, tinged with purple. Fruits depressed-globose, 5-7 mm in diameter, soft and fleshy, smooth, black when mature.

India to southern China and Taiwan southward through Malesia. Widely distributed in the Philippines, in thickets at low and medium altitudes; in Mt. Makiling, Luzon, from 0-900 m altitude (mid-mountain forest).



Figure 45. *Phyllanthus acidus*: 1. flowering twig; 2. flower, (a) close and (b) open; 3. fruiting twig; 4. fruit, 3 views; 5. seeds, 2 views.

Com. name – *Tinta-tintahan* (Bik., Tag.).

Exsicc. – *Ordoño CA 10135; Gates CA 1653; Orlido CA 10880, 10881; Baptista CA 10114, 10115* (CAHP).

4. *Phyllanthus urinaria* L., Sp. Pl. 2: 982, 1753; Merr., En. Philip. 2: 396, 1923; Airy-Shaw, Euph. Philip. 43, 1983. **Figure 46**

Herbs erect, branched, slender, glabrous, 10-40 cm high, branches angled. Leaves distichous, imbricate, alternate, pale beneath, sessile, elliptic-oblong to oblong, 5-10 mm long, thin, obtuse or apiculate, base slightly oblique; stipules lanceolate. Flowers very small, 1 mm in diameter, 5-merous, axillary, sessile or very shortly pedicelled; sepals greenish; stamens 3; filaments united below; anthers erect, slits vertical. Capsule 2 mm in diameter, muricate or smooth, of 3 dehiscent cocci.

Tropics. Introduced in the Philippines and now found in wastelands throughout the country; in Mt. Makiling, Luzon, a common weed at low altitudes.

Com. name – *Iba-ibaan* (Tag.).

Exsicc. – *Esteban CA 1649; Guantes CA 10698** (CAHP).

5. *Phyllanthus debilis* Klein ex Willd. – *Phyllanthus amarus* auct. non

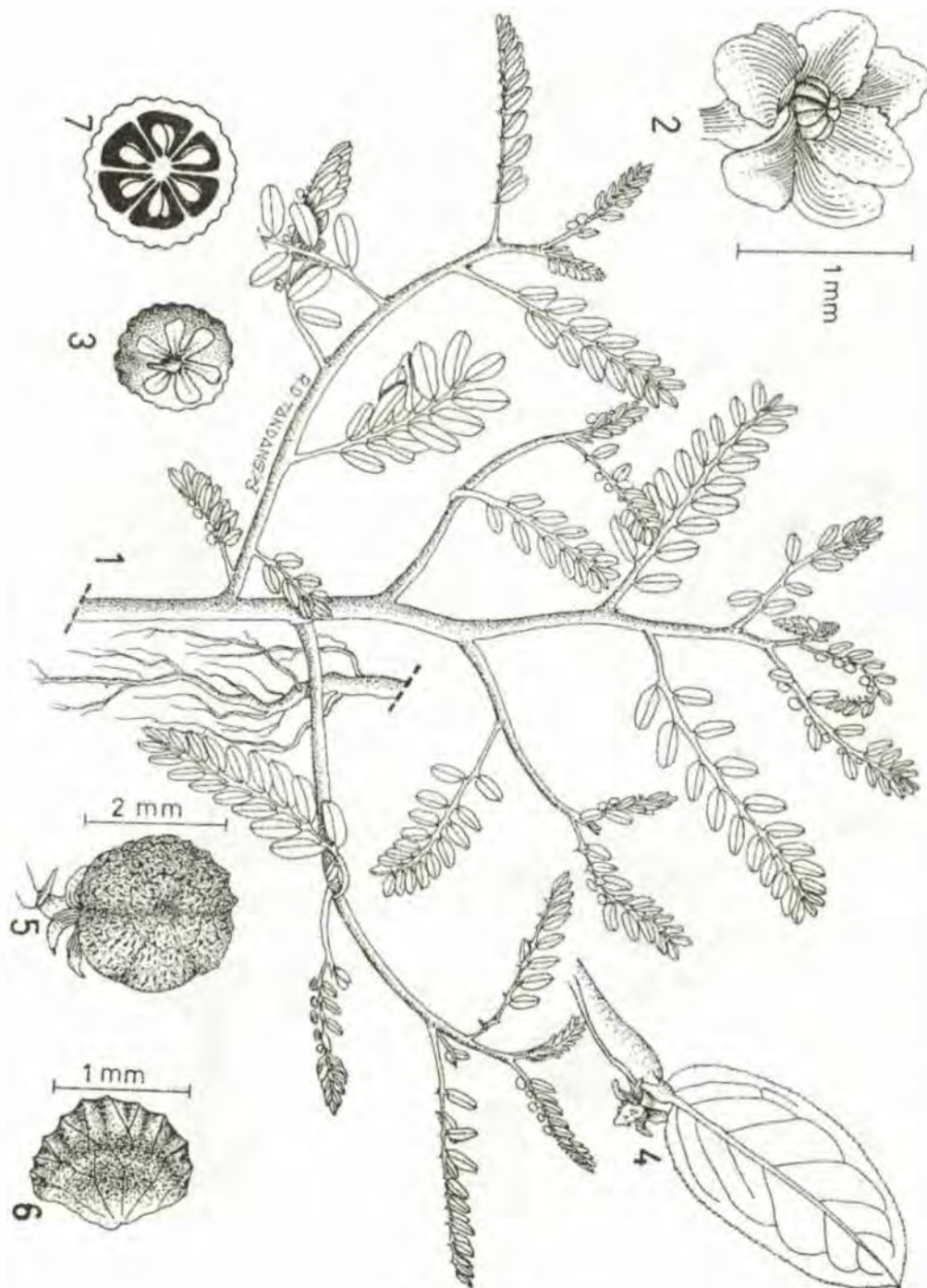
Schum. & Th. Kongl., Danske Vidensk. Selsk. Skr. 4: 195-196, 1829; Airy-Shaw, Euph. Philip. 40, 1983; Webster, J. Arn. Arb. 37: 13, 1956; 38: 313, 1957; Pancho & Obien, Manual Ricefield Weeds Philip. 158, f.93, 1995. – *P. niruri sensu Sw.*, Obs. Bot. 354-355, 1791. – *P. niruri* var. *genuinus* Muell.-Arg. in DC., Prodr. 15: 406, 1866; *et auct. seq., non P. niruri* L. **Figure 47**

Herbs erect, slender, branched, glabrous, 10-60 cm high, branchlets distichous. Leaves distichous, often imbricate, oblong to elliptic-oblong, 5-8 cm long, obtuse or rounded, pale beneath, shortly petioled; stipules small, subulate. Flowers axillary, shortly pedicelled, whitish or pale green, 0.5 mm long; sepals 5, oblong, green, margined with white; pedicels distinct, 1-2 mm long; anthers dehiscing horizontally. Capsules depressed-globose or globose, 1.5-2 mm in diameter, smooth.

Old World tropics. Throughout the Philippines, in wastelands, roadsides, etc.; introduced. A common weed in wastelands at low altitudes in Mt. Makiling, Luzon.

Com. name – *Sampa-sampalokan* (Tag.).

Exsicc. – *Bardenas CA 10556**; *Esteban CA 1652; Gates CA 1651; Guantes CA 10717; Lugod CA 4734; Orlido CA 10624; Valencia CA 1650* (CAHP).



NOTE: LANDSCAPE LAY-OUT

Figure 46. *Phyllanthus urinaria*: 1. habit; 2. flower; 3. base of capsule; 4. leaf and flower, enlarged; 5. capsule; 6. seed; 7. ovary, cross section.

6. *Phyllanthus virgatus* Forst. f., Fl. Ins. Austr. Prodr. 65, 1786; Airy-Shaw, Euph. Born. 186, 1975; Euph. Philip. 43, 1983. – *P. simplex* Retz., Obs. Bot. 5: 29, 1789.

Annual herbs slender, erect, simple or slightly branched, glabrous, 20-50 cm high. Stems compressed, usually purplish. Leaves 2-ranked, subsessile or shortly petioled, oblong-linear, 1.5-3 x 6-9 mm, acuminate; stipules small. Flowers axillary, solitary, staminate ones very small on short pedicels, pistillate ones pedicellate, 8 mm long or less. Capsules depressed-globose, 3-3.5 mm in diameter, smooth.

India to China, Malesia and Polynesia. Throughout the Philippines, in cultivated areas and open grasslands, possibly introduced; a common weed at low altitudes in Mt. Makiling, Luzon.

Com. name – *Kaya-an* (Bag.).

Exsicc. – *Pancho CA 20090, 20321* (CAHP).

7. GLOCHIDION J.R. & G. Forster, *nom. cons.*

Shrubs or trees. Leaves alternate or distichous, short-petioled, entire; stipules mostly persistent. Flowers bisexual, small, apetalous in axillary clusters; disc glands absent; sepals of staminate flowers 6, rarely 5, imbricate in 2 series; anthers 3-8, connate in an oblong column, linear cells extrorsely dehiscent, connectives usually produced; pistillodes none or minute; calyx of pistillate flowers toothed; ovaries 2- to 4-celled; styles connate into a column, lobed at top; ovules 2 in each cell. Capsules globose or depressed, of 3- to many 2-valved cocci, often longitudinally ridged or lobed; seeds hemispherical or laterally compressed.

Species 300, chiefly Asiatic, few in America and Africa; 47 in the Philippines.

1. Branchlets and lower leaf surface pubescent
 2. Leaves 15 cm long or more; fruits white 1. *G. album*
 2. Leaves 12 cm long or less; fruits not white
 3. Capsules crowded, numerous sulcate 2. *G. philippicum*
 3. Capsules scattered, trigonous 3. *G. luzonense*
1. Branchlets and leaves glabrous
 4. Anthers usually 5
 5. Leaves falcate; fruits 1.5 cm across 4. *G. nitidum*
 5. Leaves not falcate; fruits less than 1 cm across
 - 5. *G. urophylloides*
 4. Anthers usually 3

- 6. Leaves subglaucous beneath; styles free..... 6. *G. triandrum*
- 6. Leaves green beneath; styles more or less united
 - 7. Foliage membranous; style column long..... 7. *G. trichogynum*
 - 7. Foliage coriaceous; style column short or discoid
 - 8. Capsules greatly compressed; styles forming an apical disc 8. *G. williamsii*
 - 8. Capsules slightly compressed; styles as long as ovaries
 - 9. Ovaries glabrous..... 9. *G. merrillii*
 - 9. Ovaries pubescent..... 10. *G. rubrum*

1. *Glochidion album* (Blco.) Boerl., Handl. Fl. Nederl. Ind. 3: 275, 1900; C.B. Rob., Philip. J. Sc. 4 (Bot.): 99, 1909; Merr., En. Philip. 2: 397, 1923; Airy-Shaw, Euph. Philip. 27, 1983. – *Kirganelia alba* Blco., Fl. Filip. 1837.

Shrubs or small trees. Branchlets hairy, slender. Leaves oblong, 15 cm long by half as wide, with 7 nerves on each side of midrib, reticulations evident, lower side pale green, finely pubescent, acute or subobtuse, broadly rounded at base; petioles short. Flowers ciliate, pubescent, fascicled; pistillate pale green, sessile, with toothed calyx; staminate yellowish upon slender, 1-1.5 cm long pedicel, calyx lobes nearly free, oblanceolate, slightly unequal. Capsules sparsely hairy, compressed-globose, 3 cm across, white, numerous sulcate, carpels membranous.

Celebes. Throughout the Philippines, widely scattered in thickets or dry woods; in Mt. Makiling, Luzon, often in open areas at low altitudes.

Com. name – *Malabagang* (Tag.).

Exsicc. – *Stern CA 12131* (CAHP).

2. *Glochidion philippicum* (Cav.) C.B. Rob., Philip. J. Sc. 4 (Bot.): 103, 1909; Merr., En. Philip. 2: 401, 1923; Airy-Shaw, Euph. Philip. 30, 1983. – *Bradleia philippica* Cav., Ic. 3: 48, t. 371, 1797. **Figure 48**

Trees small. Branches slender, finely pubescent, pulverulent or subglabrous. Leaves ovately oblong, up to 12 cm long by one-third as wide, frequently much smaller, with ascendingly curved 5-7 pairs of obscure nerves, finely pubescent or glabrate, much paler or subglaucous beneath, acute to acuminate, usually inequilateral or obtusely rounded at base; petioles short. Flowers in dense axillary clusters, pubescent, yellowish staminate, pedicellate, pistillate sessile, greenish. Capsules cinereous, densely clustered along branchlets, short-stalked, much-compressed, 1 cm wide, dull red, numerous sulcate.

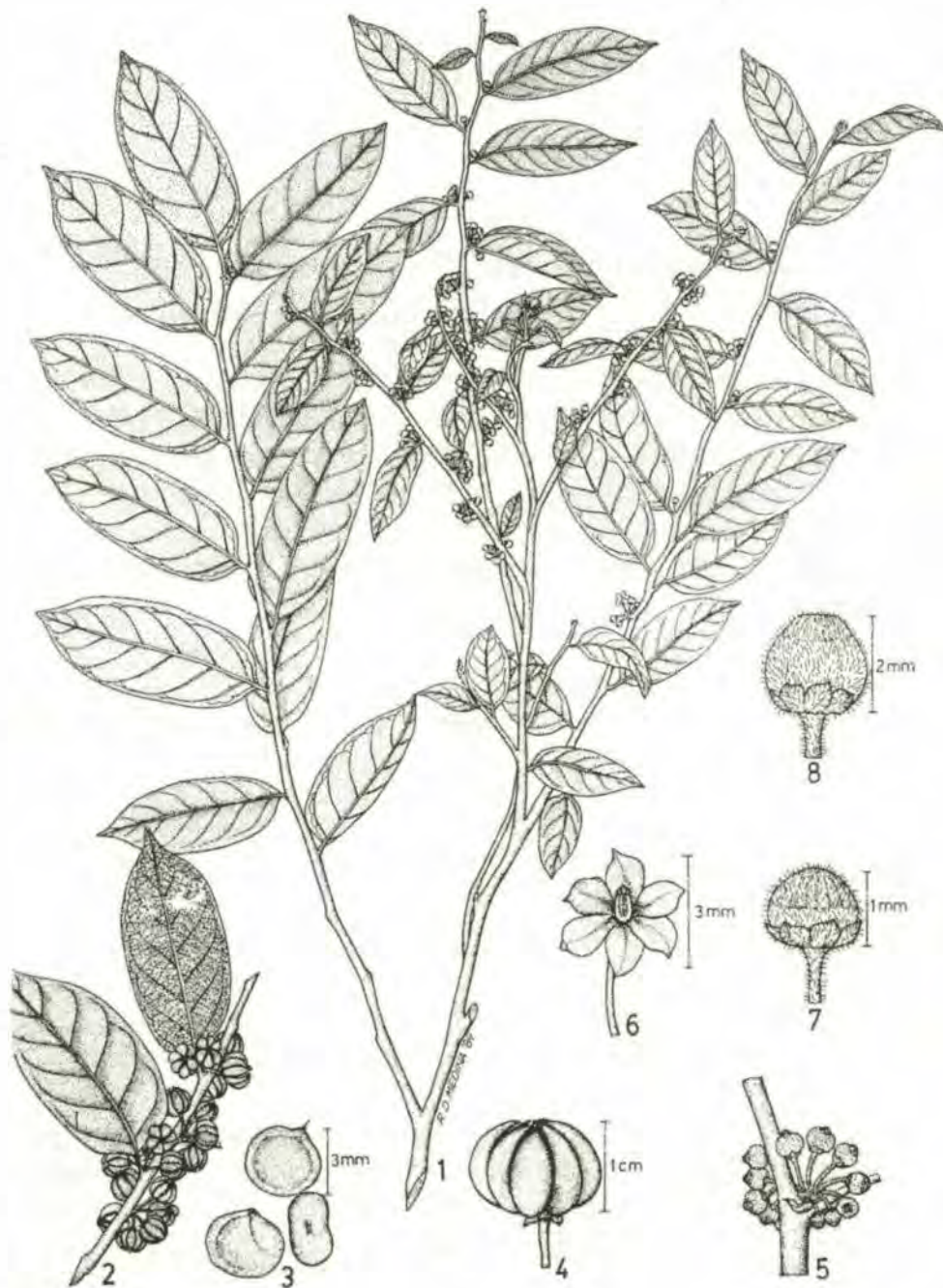


Figure 48. *Glochidion philippicum*: 1. flowering branch; 2. fruiting twig; 3. seed, 3 views; 4. fruit; 5. staminate flowers in axillary cluster; 6. pistillate flower; 7. 8. staminate flowers.

Taiwan to Sumatra, Java, Celebes and New Guinea. Throughout the Philippines, in thickets and forested ravines at low and medium altitudes; in Mt. Makiling, Luzon, in thickets at 50-600 m altitude.

Com. name – *Iba-ibaan* (Tag.).

Exsicc. – *Stern CA 12134**; *Estuara CA 9987* (CAHP); *Elmer 17928, 1237439*; *Serviñas BS 16912, 900669* (US).

3. *Glochidion luzonense* Elm., Leaf. Philip. Bot. 1:301, 1908; Merr., En. Philip. 2: 400, 1923; Airy-Shaw, Euph. Philip. 30, 1983.

Shrubs erect. Branches olivaceous-pubescent. Leaves ovate to elliptic, 2 x 4 cm, soft-pubescent especially beneath, midrib and nerves evident beneath, subobtusate, broadly rounded at base, subsessile; stipules setaceous. Staminate flowers 1- to 3-clustered; pedicels 5-8 mm long, slender; perianth 6-segmented, pubescent along median dorsal side; anthers 3, united to connective. Pistillate flowers sessile, usually 3-lobed. Capsules 3-celled, compressed at both ends, 1 cm in diameter, subpendulous, upon slender stalk, pubescent, trigonous or sulcate.

Endemic in the Philippines, in dry shrubberies of the mountains of northern Luzon, ascending to 1400 m; in Mt. Makiling, Luzon, in *kaingin* areas to the mid-mountain forest.

Com. name – *Kakadli* (Tag.).

Exsicc. – *Pancho CA 20073, 20298* (CAHP); *Catalan 26830, 1376289* (US).

4. *Glochidion nitidum* Merr., Philip. J.Sc. 9 (Bot.): 483, 1914, En. Philip. 2: 401, 1923; Airy-Shaw, Euph. Philip. 30, 1983.

Trees, up to 8 m high. Branches glabrous. Leaves falcate, glabrous, shiny on both sides, oblong, 12-15 x 3-5.5 cm, midrib ridged beneath with 6 pairs of divaricate nerves, acuminate, base obtusely inequilateral; petioles 5 mm long. Flowers axillary, fascicled, pedicelled, 5-merous; perianth segments short. Fruits glabrous, subglobose, 1.5 cm in diameter, pink or reddish tinged when mature, 4-celled, composed of 8 crustaceous valves; pedicels 3-4 mm long; seeds strongly recurved.

Endemic, in the lower wooded belt of Laguna de Bay region, Luzon, Philippines.

Com. name – *Bagnang-gubat* (Tag.).

Exsicc. – *Elmer 17750, 1237394* (US).

5. *Glochidion urophyloides* Elm., Leafl. Philip. Bot. 1: 300, 1908; Merr., En. Philip. 2: 403, 1923; Airy-Shaw, Euph. Philip. 32, 1983. – *G. fenicis* Merr., Philip. J. Sc. 3 (Bot.): 414, 1908. – *G. longifolium* C.B. Rob., Philip. J. Sc. 4 (Bot.): 90, 1909.

Shrubs with small branches. Leaves ovate to oblong or smaller ones elliptic, glabrous, frequently a trifle inequilateral, pale green beneath, 3-5 nerves much-ascending, acute to subobtuse, base obtuse or rounded; petioles 3-5 mm long. Flowers yellowish, in axillary glomerules, glabrous; pedicels subflexuous, 5 mm long, arising from very short, densely bracteate tubercles; calyx of pistillate 6-segmented; ovaries glabrous, 4-celled. Capsules dull purplish brown when mature, glabrous, 7 x 4 mm, much-compressed with sunken apex, 4-celled with about 8 seeds.

Endemic, in forests at low and medium altitudes, northern Luzon to Mindanao (Davao), Philippines; in Mt. Makiling, Luzon, at 200-500 m altitude.

Com. name – *Halakan* (Ig.).

Exsicc. – *Mabesa BF 263559, 1294035* (US).

6. *Glochidion triandrum* (Blco.) C.B. Rob., Philip. J. Sc. 4 (Bot.): 92, 1909; Merr., En. Philip. 2: 403, 1923; Airy-Shaw, Euph. Philip. 31, 1983. – *Kirganelia triandra* Blco., Fl. Filip. 711, 1837.

Trees with spreading crowns. Branches slender, angularly striate, finely olivaceous-pubescent. Leaves oblong, 3-8 cm long, glabrous, pale green or whitish beneath, 5-8 pairs of lateral nerves obscure, obtusely acute to subacuminate, base obliquely obtuse, petioles short, glabrous. Flowers solitary or 2- or 3-clustered, staminate upon slender, 2-cm long pedicels, pistillate sessile. Capsules compressed-globose, 1 cm wide, smooth, obscurely rugose, whitish, upon 5 mm long stalk.

Endemic, Luzon to the Visayan islands, Philippines, in dry woods of the cogon regions; in Mt. Makiling, Luzon, in open, abandoned *kaingin* areas.

Com. name – *Bagna* (Tag.).

Exsicc. – *Velasco CA 1604* (CAHP); *Villamil BF 20839, 837778* (US).

7. *Glochidion trichogynum* Muell.-Arg., Linnaea 32: 66, 1863; C.B. Rob., Philip. J. Sc. 4 (Bot.): 97, 1909; En. Philip. 2: 403, 1923; Airy-Shaw, Euph. Philip. 31, 1983.

Shrubs suberect. Twigs glabrous. Leaves ovately oblong, 12-15 x 5-7 cm, midrib stout with about 9 pairs of ascending nerves, glabrous, pale green beneath, acuminate, obtusely rounded or usually a trifle inequilateral at base,

petioles short. Pistillate flowers in dense, axillary, subsessile cluster; staminate upon slender pedicels, all subtended by minute bracteoles, glabrous except sparsely ciliate styles. Capsules short, obconic or subglobose, 1.5 cm across, sunken at apex, glabrous, whitish, sulcate; pedicels 5 mm long.

Endemic, in forests at low and medium altitudes, throughout the Philippines; in Mt. Makiling, Luzon, at 100-450 m.

Com. name – *Tabangan* (Tagb.).

Exsicc. – *Villamil BF 20490, 902849* (US).

8. *Glochidion williamsii* C.B. Rob., Philip. J. Sc. 3 (Bot.): 19, 1908; En. Philip. 2: 403, 1923; Airy-Shaw, Euph. Philip. 32, 1983.

Shrubs or small trees, 5-8 m high. Stems glabrous. Leaves oblong, elliptic or oblong-ovate, 5-9 cm long by half as wide, pale beneath, lucid above, stout midrib with 5-7 lateral nerves on each side, shortly acuminate, base inequilateral or obliquely obtuse; petioles 3-5 mm long. Flowers glabrous, fascicled, subsessile, staminate short-pedicelled; pedicels subtended by minute bracts; calyx-segments of staminate flowers ovate, 3 or 4, imbricate in bud; stamens 3 or 4, sessile, forming a globose mass; perianth of pistillate flowers shorter. Capsules compressed, 1.25 cm across, frequently 6-lobed, lobes bilobed, glabrate, bearing large, flattened stigmas.

Endemic in middle and northern Luzon, Philippines. In forested ravines and on ridges at 800-1500 m altitude; in Mt. Makiling, Luzon, in mid-mountain to mossy forests.

Com. name – *Tumuhan* (Bon.).

Exsicc. – *Merrill BS 421, 1312684* (US).

9. *Glochidion merrillii* C.B. Rob., Philip. J. Sc. 4 (Bot.): 100, 1909; En. Philip. 2: 400, 1923; Airy-Shaw, Euph. Philip. 30, 1983.

Shrubs or small trees. Leaves lanceolate or subelliptic, often somewhat falcate, 5-9 cm long by half as wide, shining but duller beneath, lateral nerves 6-9 on each side of pronounced midrib, glabrous, acute to acuminate, base strongly inequilateral; petioles 3 mm long. Fascicles few-flowered, axillary, both sexes together or separated, staminate upon 5 mm long, glabrate pedicels; perianth segments 6, biseriate, inner shorter and narrower; anthers 3; pistillate stilar column longer. Capsules 7- to 8-celled, subglobose, 1.5 cm across, glabrous, obscurely sulcate, splitting into numerous cocci with an umbilical apex, short-pedicelled or sessile.

Endemic in the alpine region of northern to central Luzon, Philippines; in Mt. Makiling, Luzon, in high forest.

Com. name – *Pudpud* (lg.).

Exsicc. – *Mabesa BF 23556, 1375877* (US).

10. *Glochidion rubrum* Bl., Bijdr. 586, 1826; Merr., En. Philip. 2: 402, 1923; Airy-Shaw, Euph. Philip. 31, 1983.

Shrubs erect or small trees. Leaves diverse, usually 10 x 4 cm, often much smaller, 5-7 lateral nerves obscure, glabrous, acute to acuminate, somewhat inequilateral at obtuse base; petioles 3-5 mm long. Flowers in small axillary fascicles, yellowish staminate slenderly pedicelled, pistillate sessile, often arising from very short bracteate stalks. Capsules 5-8 mm across, trigonous, glabrous, sessile, pale green to whitish, much sunken at apex.

Malay Peninsula, Sumatra, Java and Borneo. Widely distributed in dry, jungle woods in most parts of the Philippines; in Mt. Makiling, Luzon, in open woods or abandoned *kaingin* areas.

Com. name – *Bagnang-pula* (Tag.).

Exsicc. – *Elmer 18150, 1237601; McGregor BS 22992, 1238981; Ramos 13653, 714688; Tamesis BF 13322, 900308* (US).

8. SAUROPUS Blume

Shrubs glabrous. Leaves (along main branches spirally arranged) distichous, entire, shortly petioled, with persistent stipules. Flowers in axillary fascicles producing at first 1 or few pistillate, later several staminate flowers; corolla and disc absent; staminate calyx depressed-discooid, fleshy, its center excavate and bearing 6 biseriate, introrse, small lobes; stamens 3, connate into 3 branched column; anthers vertical or downwardly directed; pistillate calyx 6-fid, persistent, lobes 2-seriate; ovaries turbinate, 3-celled; ovules 2 in each cell; stigmas 3, terminating short style. Fruits depressed-globose, fleshy white or pink.

Species 30, Indo-Malesia; 4 in the Philippines.

1. *Sauropus villosus* (Blco.) Merr., Contr. Arn. Arb. 8: 86, 1934; Airy-Shaw, Kew Bull. 23: 49, 1969 & 26: 339, 1971. – *Glochidion Ilanosii* Muell.-Arg., Linnaea 32: 68, 1863. – *G. molle* Merr., Bur. For. Philip. Bull. 1: 29, 1903, non Bl.

Undershrubs low. Branches relatively long, pubescent. Leaves oblong or smaller ones ovately so, 5 x 2 cm, pubescent and pale green beneath, much-ascending nerves obscure, subobtuse, base truncately rounded, subsessile. Flowers in small axillary clusters, subsessile; calyx usually lobed, ciliate. Fruits globose, 1 cm across, smooth, deep yellow, mostly solitary in leaf axils, subpendent.

Malay Peninsula to Java. Throughout the Philippines, in open forests at low and medium altitudes; in Mt. Makiling, Luzon, in open areas at 100-500 m.

Com. name – *Banitan* (Tag.).

Exsicc. – *Pancho CA 20064, 20196* (CAHP).

9 DRYPETES Vahl

Trees or shrubs. Leaves alternate, entire or crenulate, base usually inequilateral. Flowers axillary, apetalous, racemed or fascicled, pedicelled; staminate flower sepals 4-6, broad, imbricate; stamens few or many, inserted around a flattened or depressed disc; filaments short, free; anthers erect; pistillodes none or minute; pistillate flower sepals as in staminate, but disc annular or none; ovaries 2- or 4-celled; styles elongate or absent; stigmas fleshy, each dilated into a peltate disc; ovules 2 in each cell. Fruits ovoid or subglobose, indehiscent, pericarp thick, 2-celled; seeds 1 or 2 in each fruit, rarely more.

Species 160, Africa, Indo-Malesia and tropical America; 21 in the Philippines.

1. Leaves 5-8 x 2-4 cm; fruits ellipsoid, felty-gray
 2. Leaves lanceolately oblong, crenate, 2 cm wide..... 1. *D. subcrenata*
 2. Leaves ovately elliptic, entire, 4 cm wide..... 2. *D. littoralis*
 1. Leaves 10-20 x 3-7 cm; fruits ovoid, not felty-gray (except in *D. longifolia*)
 3. Fruits 2- or more-celled, each cell 1- or many-seeded
 4. Fruits gray-pubescent, cells 1-seeded... 3. *D. longifolia*
 4. Fruits glabrous, cells many-seeded... 4. *D. grandifolia*
 3. Fruits 1-celled, 1-seeded..... 5. *D. maquilingsis*

1. *Drypetes subcrenata* (Merr.) Pax & G. Hoffm., *In Engl., Pfl. R.* 81: 274, 1922; Merr., *En. Philip.* 2: 409, 1923; Airy-Shaw, *Euph. Philip.* 24, 1983.
– *Cyclostemon subcrenatus* Merr., *Philip. J. Sc.* 7(Bot.): 388, 1912.

Shrubs or small trees. Leaves lanceolately oblong or somewhat falcate, 5-8 x 2 cm, raised midrib with 10 obscure or anastomosing nerves on each side, glabrous, margins crenate, rugulose, bluntly acuminate, base solitary, gray-felty, ellipsoidally oblong, 1 cm long, 6 mm thick, crowned by styles, subtended by subsistent calyx, 1-celled and 1-seeded; peduncles 4 mm long, slightly puberulous.

Endemic and rare in valley woods of southern Luzon, Philippines; in Mt. Makiling, Luzon, at 150-300 m altitude.

Com. name – *Kari-kari* (Bag.).

Exsicc. – *Pancho CA 20030, 20097* (CAHP).

2. *Drypetes littoralis* (C.B. Rob.) Merr., *Philip. J. Sc.* 29: 380, 1926; Keng, *Taiwania* 6: 41, 1955; Airy-Shaw, *Euph. Philip.* 22, 1983; Rojo, *Rev. Lexicon Philip. Trees* 133, 1999. – *Cyclostemon littoralis* C.B. Rob., *Philip. J. Sc.* 3(Bot.): 198, 1908; Merr., *En. Philip.* 2: 407, 1923. – *C. cumingii* Merr., *Philip. J. Sc.* 1: Suppl. 76, 1906, *non* Baill. – *C. iwahigensis* Elm., *Leafl. Philip. Bot.* 4: 1278, 1911; Merr., *En. Philip.* 2: 406, 1923. – *C. mindorensis* Merr., *Philip. J. Sc.* 9 (Bot.): 479, 1914. – *Drypetes mindorensis* (Merr.) Pax & K. Hoffm. *in Engl. Pfl. R.* 81: 274, 1922.

Small trees. Leaves ovately elliptic, 8 cm long by one-half as wide or larger, midrib raised beneath, lateral nerves indistinct, prominently anastomosing, glabrous, obtuse or bluntly acute; base rounded, often a trifle inequilateral; petioles 5 mm long, canaliculated. Flowers in fascicles, upon 15-mm long, sparsely pubescent, slender pedicels in dense cluster of minute bracts; sepals broadly ovate; stamens 10; filaments 2.5 mm long, inserted ovately ellipsoid, 1.25 cm long, grayish brown-felty, ultimately glabrate, tipped by 2 broad stigmas, subtended by calyx vestiges; peduncles 3-5 mm long.

Southern Taiwan to Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, at 30-250 m altitude.

Com. name – *Bato-bato* (Tagb.).

Exsicc. – *Elmer BF 25000, 1294422, 22235, 1238800* (US).

3. *Drypetes longifolia* (Bl.) Pax & K. Hoffm. *in Engl. Pfl. R.* 15: 245, 1922; Airy-Shaw, *Euph. Born.* 103, 1975; Rojo, *Rev. Lexicon Philip. Trees* 133, 1999. – *Cyclostemon longifolius* Bl., *Bidjr.* 598, 1825. – *C. bordenii* Merr., *Publ. Gov. Lab. Philip.* 17: 26, 1904; *Philip. J. Sc.* 1: Suppl. 76, 1906. – *Drypetes bordenii* (Merr.) Pax & K. Hoffm. *in Engl. Pfl. R.* 81: 244, 1922.

Trees large. Leaves oblong, 10-20 x 4-7 cm, prominent midrib with 7 pairs of obscure nerves, reticulations quite evident beneath, glabrous on both sides, acute to acuminate, base very unequal; petioles 8 mm long, rugosely thickened. Staminate flowers globose, 6 mm across, fasciculate; pedicels 3 mm long, densely pubescent; sepals 4, suborbicular, glabrous within; stamens many; disc broad, glabrate. Fruits subglobose, 1.5 cm in diameter, gray-pubescent when young, 2-celled, each cell with a large seed.

Throughout the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, at 100-250 m altitude.

Com. name – *Balibbikan* (Tag.).

Exsicc. – *Pancho CA 20038, 20096* (CAHP).

4. *Drypetes grandifolia* (C.B. Rob.) Pax & K. Hoffm. *in Engl., Pfl. R.* 15: 245, 1922; Rojo, *Rev. Lexicon Philip. Trees* 133, 1999. – *Cyclostemon grandifolius* C.B. Rob., *Philip. J. Sc.* 3(Bot.): 197, 1908. – *Drypetes megacarpa* (Merr.) Pax & K. Hoffm. *in Engl. Pfl. R.* 15: 248, 1922; Merr., *En. Philip.* 2:407, 1923. – *Cyclostemon megacarpus* Merr., *Philip. J. Sc.* 7(Bot.): 387, 1912. – *Drypetes megacarpa* (Merr.) Pax & K. Hoffm. *in Engl., Pfl. R.* 91: 248, 1922. – *Cyclostemon incarnatus* Elm., *Leafl. Philip. Bot. &* 2639, 1915. – *C. ramiflorus* Merr., *Philip. J. Sc.* 7(Bot.): 387, 1912. – *Drypetes ramiflora* (Merr.) Pax & K. Hoffm. *in Engl., Pfl. R.* 91: 248, 1922.

Trees erect, small or medium-sized. Leaves oblong, 15-20 x 4-7 cm, midrib raised beneath with 6-9 ascending nerves, reticulated toward their ends, glabrous, obtuse to subacute, base broadly obtuse, unequally sided; petioles 1.25 cm long. Flowers fascicled on larger branches; petioles 1.5 cm long, puberulent; perianth segments coriaceous, puberulous, broadly elliptic. Fruits spherical, up to 5 cm in diameter, upon short stalks, annular at base, glabrous, purplish red, many-seeded.

Philippines to Borneo. In primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 100-500 m.

Com. name – *Kalmol* (Neg.).

Exsicc. – *Ramos BS 13521, 714653; Mabesa 26768, 1375848* (US).

5. *Drypetes maquilingensis* (Merr.) Pax & K. Hoffm. *in Engl., Pfl. R.* 81: 240, 1922; Merr., *En. Philip.* 2: 407, 1923; Airy-Shaw, *Euph. Philip.* 23, 1983; Rojo, *Rev. Lexicon Philip. Trees* 133, 1999. – *Cyclostemon maquilingensis* Merr., *Philip. J. Sc.* 9 (Bot.): 477, 1914.

Trees medium-sized to large. Leaves oblong to broadly lanceolate, 12-20 x 3-6 cm, stout midrib with about 9 pairs of nerves, reticulations prominent beneath, glabrous on both sides, bluntly acute to subacuminate, broadly obtuse, inequilateral at base; petioles 5-7 mm long. Staminate flowers glabrous, fasciculate; pedicels 5-8 mm long; sepals 4, ovately elliptic, 4.5 mm long; stamens 12-15; anthers 3 mm long. Fruits lemon-yellow, ovoidly ellipsoid, 1-celled, with leathery pericarp surrounding solitary stone-like seed.

Endemic. Throughout the Philippines, in primary forests, ascending to 700 m; in Mt. Makiling, Luzon, at 200-550 m altitude.

Com. name – *Tinaan-pantai* (Tag.).

Exsicc. – *Elmer 17655, 1237233* (US).

10. BREYNIA J.R. & G. Foster, *nom. cons.*

Shrubs or small trees. Leaves alternate, simple, often distichous, entire, petioled. Flowers minute, bisexual, axillary, apetalous, disc absent; calyx of staminate flowers turbinate or hemispheric, truncate, rim sometimes much thickened, lobulate; stamens 3; filaments united into a column; rudimentary ovaries none; anthers adnate to column; calyx of pistillate, coriaceous, occasionally broadly 6-lobed, fleshy, cupular in fruit, without staminodes; ovaries globose, 3-celled at base; ovules 2 in each cell; styles 3, bifid or lobed. Fruits fleshy, globose, indehiscent, usually seated upon an enlarged persistent calyx.

Species 30, Africa, Asia and Polynesia; 4 in the Philippines.

1. Leaves white- and green-variegated, sometimes completely white.....1. *B. nivosa*
1. Leaves not variegated
 2. Leaves ovate or subovate; calyx turbinate or campanulate, much-acrescent in fruit, rim obscurely crenate 2. *B. cernua*
 2. Leaves elliptic; calyx funnel-shaped, subtruncate across broad tip, slightly accrescent in fruit, rim otherwise 3. *B. vitis-idāea*

1. *Breynia nivosa* (W.G. Sm.) Small, Bull. Tor. Bot. Cl. 37: 516, 1918.
– *Phyllanthus nivosa* W.G. Sm., Flor. Mag. New Ser., t. 120, 1874.

Shrubs much-branched, 1-2 m high. Leaves broad-ovate or elliptic, white- and green-variegated, sometimes completely white. Staminate flowers with top-shaped calyx, lower part thick, connate, lobes rhombic, narrowed to base; disc wanting; stamens 3; pistillate flowers with campanulate, dark-purpurescent calyx, unequally 5-lobed, enlarging in fruit.

Native of the South Sea Islands. Cultivated for ornamental purposes in most tropical countries; in Mt. Makiling, Luzon, Philippines, cultivated as an ornamental.

Com. name – Snow bush (Engl.).

Exsicc. – *Lapis* CA 8853; *Lugod* CA 4662, 4663; *Orlido* CA 4913; *Pancho* CA 9039 (CAHP).

2. *Breynia cernua* (Poir.) Muell.-Arg. in DC., Prodr. 15: 439, 1866; Merr., En. Philip. 2: 404, 1923; Airy-Shaw, Euph. Philip. 10, 1983; Rojo, Rev. Lexicon Philip. Trees 117, 1999. – *Phyllanthus cernua* Poir. in Lam., Encycl. 5: 298, 1804. – *Breynia cernua* (Poir.) Muell.-Arg. var. *acutifolia* Muell.-Arg. in DC., Prodr. 15: 439, 1866.

Trees small. Leaves ovate or subovate, 2-5 cm long, with 3-5 pairs of nerves, pale or subglaucous beneath, glabrous, subacute, obtuse at base; petiole short. Flowers pale green, drooping; pedicels capillary; calyx turbinate or campanulate, rim obscurely crenate, staminal tube produced beyond anther ovaries truncate; styles short, 3-forked. Fruits subglobose, 5 mm in diameter, sub-erect, 6- to 12-seeded, shining, red, juicy, seated upon green, succulent, saucer-shaped calyx often as wide as fruit.

Java to the Moluccas, New Guinea and Australia. Throughout the Philippines, in thickets at low and medium altitudes, ascending to 1500 m; in Mt. Makiling, Luzon, at 100-500 m.

Com. name – *Matang-katang* (Tag.).

Exsicc. – *Cortes* CA 2837 (CAHP); *Elmer* 17785, 1233727; *Robinson* BS 17355, 902775 (US).

3. *Breynia vitis-idaea* (Burm. f.) C.E.C. Fisher, Bull. Misc. Inf. Kew 1932: 65, 1932; Airy-Shaw, Kew Bull. 26:227, 1971; Rojo, Rev. Lexicon Philip. Trees 117, 1999. – *Rhamnus vitis-idaea* Burm. f., Fl. Ind. 61, 1768. – *Breynia rhamnoides* (Retz.) Muell.-Arg. in DC., Prodr. 15:440, 1866; Merr., En. Philip. 2: 404, 1923. – *Phyllanthus rhamnoides* Retz., Obs. Bot. 5: 30, 1791.

Shrubs. Leaves elliptic, 2-3 cm long by half as wide, midrib faint with obscure lateral nerves, glabrous, pale or subglaucous beneath, turning blackish brown while drying, obtusely rounded at both ends; petioles short, slender. Flowers solitary or in pairs, base subtended by sharply pointed bracts; pedicels filiform, 5-8 mm long; glabrous; calyx funnel-shaped, greenish, subtruncate across broad tip. Fruits compressed-globose, 5 mm in diameter, succulent, lucid, pale green but finally red, subtended by rim-like calyx; seeds several.

India to China and Malesia: Peninsular Malaysia and Philippines. In most parts of the Philippines, confined to thickets in dry areas; from 0-900 m altitude; in Mt. Makiling, Luzon, from sea level to the mid-mountain forest.

Com. name – *Matang-hipon* (Tag.).

Exsicc. – *Agutaya* CA 1568; *Estioko, Jr.* CA 1567 (CAHP).

11. **SECURINEGA** Commerson ex A.L. Jussieu *nom. cons.*

Shrubs erect. Leaves entire, spirally arranged along main branches, distichous along twigs. Flowers mostly unisexual, in axillary many-flowered fascicles, small; calyx deeply 5-partite, in pistillate, persistent; corolla absent; disc glands of staminate flowers 5, free, alternating with stamens; stamens 5 (sometimes less), free; anthers erect; disc of pistillate flowers annular, crenate; ovaries 3-celled; cells 2-ovuled; styles 3, shortly connate at base, bifid or twice bifid. Fruits fleshy; seeds trigonous, dorsally convex, ventrally acutangular.

Species 10, in temperate and subtropical to tropical regions; 2 in the Philippines.

1. ***Securinega virosa*** (Roxb. ex Willd.) Baill., *Adansonia* 6: 334, 1866 (*excl. descr.*); Airy-Shaw, *Euph. Born.* 196, 1975. – *Fluggea virosa* (Roxb. ex Willd.) Baill., *Étud. Gen. Euphorb.* 593, 1856; Merr., *En. Philip.* 2: 390, 1923. – *Phyllanthus virosus* Roxb. ex Willd., *Sp. Pl.* 4: 578, 1805.

Shrubs or small trees. Leaves elliptic, 2-4 cm long, often much smaller, midrib quite prominent with 5 pairs of obscure nerves, glabrous, much paler beneath, obtusely rounded at tip, base broadly obtuse; petioles 5 mm long. Staminate flowers densely crowded in upper leaf axils, yellow, glabrous; pedicels 5-8 mm long filiform; pistillate flowers in axillary clusters. Fruits spherical, 3 mm in diameter, glabrous, ultimately turning whitish with 3-6 seeds; pedicels slender.

Tropical Africa through India to China and Malaysia to tropical Australia. In the Philippines, in dry thickets or along stream beds; in Mt. Makiling, Luzon, from 30 m up to about 250 m altitude.

Com. name – *Sulyak-daga* (Tag.).

Exsicc. – *Pancho CA 20091, 20223* (CAHP).

12. EUPHORBIA Linnaeus

Annual or perennial, spreading or erect herbs or shrubs, sometimes fleshy and cactus-like. Flowers in cyathia, solitary or combined into cymes or corymbs, actinomorphic or nearly so (exclusive of glands); cyathical cup (involucre) 4- to 5-lobed, bearing 1 or 4-5 glands (often with petaline appendage); involucre fascicled or cymose; staminate flowers pedicelled, 3-celled, 3-ovuled ovaries in center of involucre; styles 3, free or united, simple or bifid. Capsules consisting of 3 dehiscent, 2-valved cocci, separating elastically from columella.

Species 1600, in all parts of the world; 16 in the Philippines.

1. Undershrubs with stipular spines..... 1. *E. millii*
1. Shrubs or herbs with stipular spines
 2. Inflorescence subtended by showy bracts, to pale or sometimes purple-spotted at base
 3. Plant shrubs; leaves 10-25 cm long, bracts or upper leaves bright red, pink or creamy white. 2. *E. pulcherimma*
 3. Plants suffrutescent herb; leaves 3-10 cm long, bracts or upper leaves bright red at base, pale or sometimes purple-spotted at base
 4. Bracts or upper leaves bright red at base; glands transversely elliptic-oblong; seeds not angular, sharply tuberculate 3. *E. cyathophora*
 4. Bracts or upper leaves pale or sometimes purple-spotted at base; glands circular; seeds angular, bluntly tuberculate 4. *E. heterophylla*
 2. Inflorescences not subtended by showy bracts
 5. Erect shrubs, leafless or nearly so; flowers clustered in forks of smaller branches 5. *E. tirucalli*
 5. Erect, spreading or prostrate herbs, fleshy flowers in axillary cymes or fascicles
 6. Erect, glabrous herbs with lax cymes; limb of involucrel-gland white, small but conspicuous
 7. Leaves linear, 1.5-6 cm long, serrulate..... 6. *E. reinwardtiana*
 7. Leaves elliptic to oblong, somewhat oblique, 1-1.5 cm long, minutely toothed..... 7. *E. hypericifolia*
 6. Prostrate or spreading plants with short, densely flowered cymes or fascicles; limb of involucrel-gland absent or inconspicuous

8. Plants prominently hirsute or hispid, pubescent; leaves 1-2 cm long..... 8. *E. hirta*

 8. Plants nearly glabrous or only slightly pubescent; leaves less than 1 cm long
 9. Capsules pubescent..... 9. *E. thymifolia*
 9. Capsules hispid-ciliate on keels of cocci, otherwise glabrous..... 10. *E. prostrata*

1. *Euphorbia millii* C. de Moulins, Bull. Hist. Nat. Soc. Linn. Bord. 1: 27-30, pl. 1, 1826. – *E. splendens* Boj. in Curtis's Bot. Mag. 56, pl. 2902, 1829; Merr., En. Philip. 2: 463, 1923.

Shrubs erect, branched, 1 m high or less, branches grayish, cylindric or obscurely angled, armed with slender, sharp, spreading, 4-12 mm long spines. Leaves few, alternate, oblong-obovate, 1.5-5 cm long, obtuse or apiculate-acuminate, entire. Inflorescences in uppermost axils, peduncled, forked or twice forked, each peduncle with 2-4 involucre, each involucre with 2 spreading, red, reniform lobes 8 x 10-12 mm.

Native of Madagascar, now widely cultivated as an ornamental. Cultivated as ornamental throughout the Philippines; in Mt. Makiling, Luzon, cultivated as an ornamental.

Com. name – *Corona de espines* (Sp.).
 Exsicc. – *Paysan CA 3158* (CAHP).

2. *Euphorbia pulcherrima* Willd. ex Klotz. in Otto & Dietr., Allgem. Gartenz. 2: 27, 1834; Merr., En. Philip. 2: 463, 1923; Airy-Shaw, Euph. Philip. 25, 1983. **Figure 49**

Shrubs erect, sparingly and laxly branched, 2-4 m high. Leaves elliptic to oblong-elliptic or upper ones lanceolate, 10-18 cm long, acute or acuminate, lower ones green, obscurely repand or slightly lobed, long-petioled, slightly pubescent beneath, upper uniformly bright-red at time of flowering. Inflorescences terminal; involucre ovoid, 1 cm long, margins toothed, each with one or two large, yellow glands; flowers crowded, red.

Native of tropical America, now cultivated in most tropical and subtropical countries. Cultivated throughout the Philippines; in Mt. Makiling, Luzon, cultivated as an ornamental.

Com. name – *Pascuas* (Sp.). *Poinsettia* (Engl.)
 Exsicc. – *Blancaver CA 4815; Orlido CA 10255; Pancho CA 3208, 8775, 8997** (CAHP).



Figure 49. *Euphorbia pulcherrima*: 1. flowering branch; 2. stamens; 3. cyathium; 4. cyathium, vertical section; 5. ovary, cross-section.

3. *Euphorbia cyathophora* Murr., Comm. Gotting. 7: 81, t. 1, 1736; Radcliffe-Smith in Airy-Shaw, Euph. New Guinea 83, 1980. – *E. heterophylla sensu* Merr., En. Philip. 2: 462, 1923, *non* L. Figure 50

Herbs erect, branched, glabrous or nearly glabrous, suffrutescent, 0.5-1.5 m high. Leaves alternate, variable, mostly oblong-ovate, acute, 3-10 cm long, lower ones usually entire, uppermost often blotched with red at base. Bracts leaf-like, much smaller than leaves, lower part bright-red, upper green; involucre clustered at ends of branches, 3 mm long, green; cyathium bearing transversely elliptic-oblong gland. Capsules nodding, 5 mm wide; seeds dark brown to black, not angular, sharply tuberculate, 2-2.5 mm across.

Native of Mexico, perhaps also the Greater Antilles. In some parts of the Philippines, frequently cultivated for ornamental purposes; in Mt. Makiling, Luzon, occasional in clearings, grasslands and roadsides as a weed; from sea level to 150 m altitude.

Com. name – *Pintado* (Tag.).

Exsicc. – *Estioko, Jr. CA 1592, 1593; Gates CA 1590**; *Orlido CA 1591; Velasco CA 1594* (CAHP).

4. *Euphorbia heterophylla* L., Sp. Pl. 453, 1753; Boiss. in DC., Prodr. 15: 72, 1862; Merr., En. Pl. 2: 462, 1923; Radcliffe-Smith in Kew Bull. 26: 264, 1972, *p.p.*, Airy-Shaw, Euph. New Guinea 84, 1980. – *E. geniculata* Ort., Hort. Matr. Dec. 18, 1797; Boiss. in DC., Prodr. 72, 1862. – *E. prunifolia* Jacq., Hort. Schoenbr. 3: 15, t. 277, 1798; Backer & Bakh. f., Fl. Jav. 1: 502, 1963.

Herbs erect. Larger leaves on a 2.5-6 cm long petiole; all leaves unlobed, acute, shallowly dentate-serrate or entire, glaucous beneath, upper ones pale or sometimes purple-spotted at base, but never bright-red as in *E. cyathophora* Murr. (*q.v.*), with circular gland and with coarsely and bluntly tuberculate angular seeds.

Naturalized in many parts of the Old World tropics. Origin in the New World tropics. Of recent introduction in the Philippines but now becoming a serious weed of roadsides, upland crops and gardens; also along river banks with alluvial soils

Com. name – *Kanaka* (Bis., Ilk.).

Exsicc. – *Pancho CA 19147, 9218, 28830, 27072; Pancho & Paller, Jr. 15151* (CAHP).

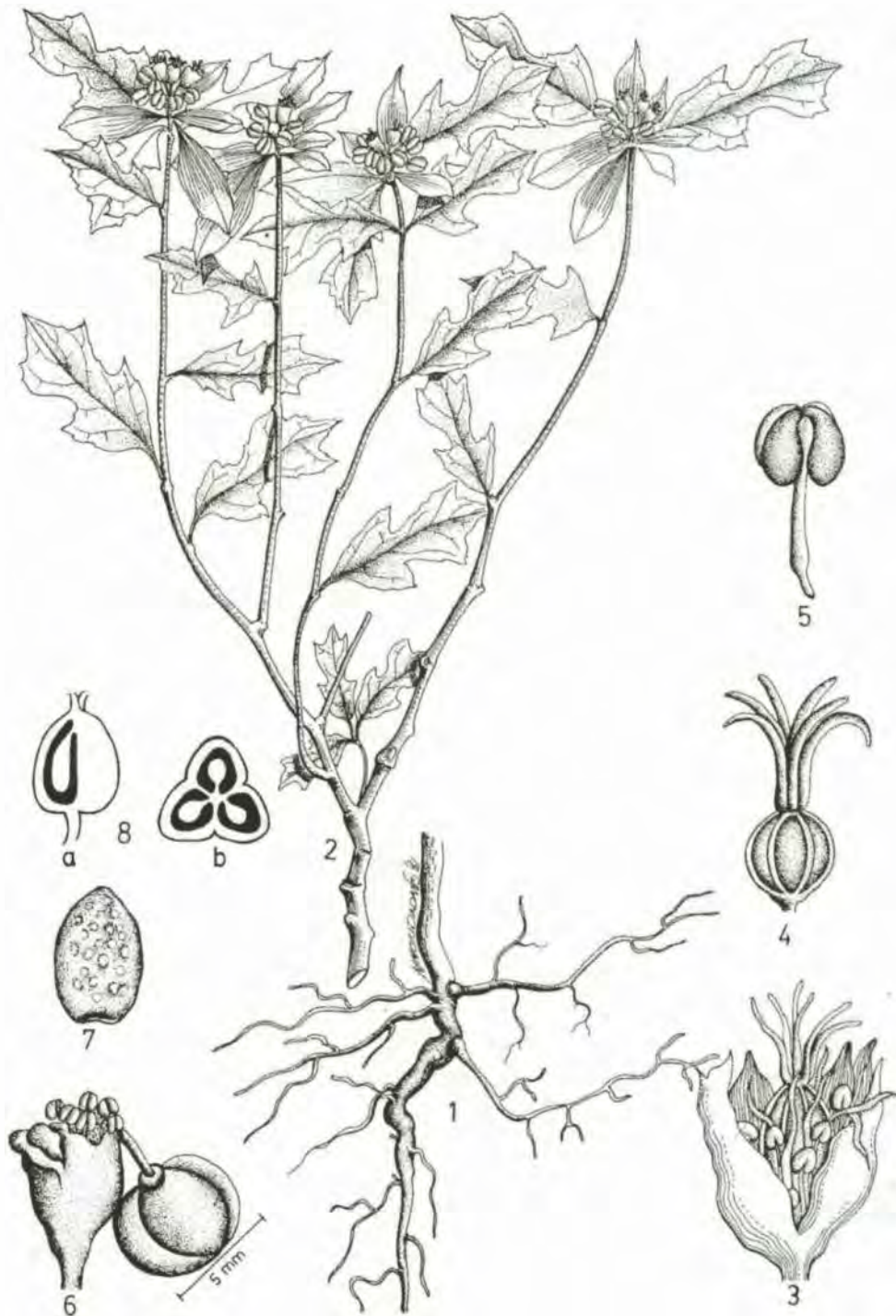


Figure 50. *Euphorbia cyathophora*: 1. root system; 2. flowering branch; 3. flower; 4. pistil; 5. anther; 6. cyathium; 7. seed; 8. ovary, (a) vertical and (b) cross-sections.

5. *Euphorbia tirucalli* L., Sp. Pl. 452, 1753; Merr., En. Philip. 2: 464, 1923; Airy-Shaw, Euph. Philip. 26, 1983. **Figure 51**

Shrubs unarmed or small trees erect, glabrous, 2-5 m high, branches green, somewhat fleshy, cylindric, clustered or scattered, ultimate ones 5 mm thick. Leaves none or few and scattered, linear-oblong, 1 cm long or less. Involucres shortly pedicelled, clustered in forks of smaller branches, small, turbinate.

Native of Africa, now naturalized in many tropical countries. Cultivated or an escape throughout the Philippines; in Mt. Makiling, Luzon, often cultivated as an ornamental.

Com. name – *Consuelda* (Sp.).
Exsicc. – Oña CA 8670 (CAHP).

6. *Euphorbia reinwardtiana* Steud., Nom. ed. 2, 614-615, 1840. – *E. serrulata* Reinw. ex Bl., Bidjr. 635, 1826, *non E. serrulata* Thuill., 1790. **Figure 52**

Plants slender, erect, glabrous, simple or branched, somewhat suffrutescent, wiry, 25-70 cm high; stems terete. Leaves opposite, linear to oblong-linear, 1.5-6 cm long, obtuse or apiculate with rounded base, margins remotely serrulate. Cymes small, axillary, terminal; heads small, pedicelled, 5-9 in each cyme; involucre purplish, ovoid, 2 mm long, each with about 4 white, petal-like, orbicular or reniform appendages 1-1.5 mm wide; styles short, bifid. Capsules ovoid, 2 mm long.

Southern China, Taiwan to Celebes and Timor. In open grasslands throughout the Philippines; in Mt. Makiling, Luzon, a common weed in cultivated and waste fields.

Com. name – *Kayutkaran* (Bag.).
Exsicc. – Pancho CA 20059, 20175* (CAHP).

7. *Euphorbia hypericifolia* L., Sp. Pl. 454, 1753; Merr., En. Philip. 2: 461, 1923; Airy-Shaw, Euph. Philip. 25, 1983. **Figure 53**

Plants erect, branched, glabrous, 20-60 cm high, branches slender, often purplish. Leaves shortly petioled, thin, oblong, 1-2.5 cm long, somewhat oblique, obtuse; base broad, rounded or cordate; margins serrulate. Involucre 1 mm long in axillary or terminal, leafy, many-flowered cymes, greenish; glands

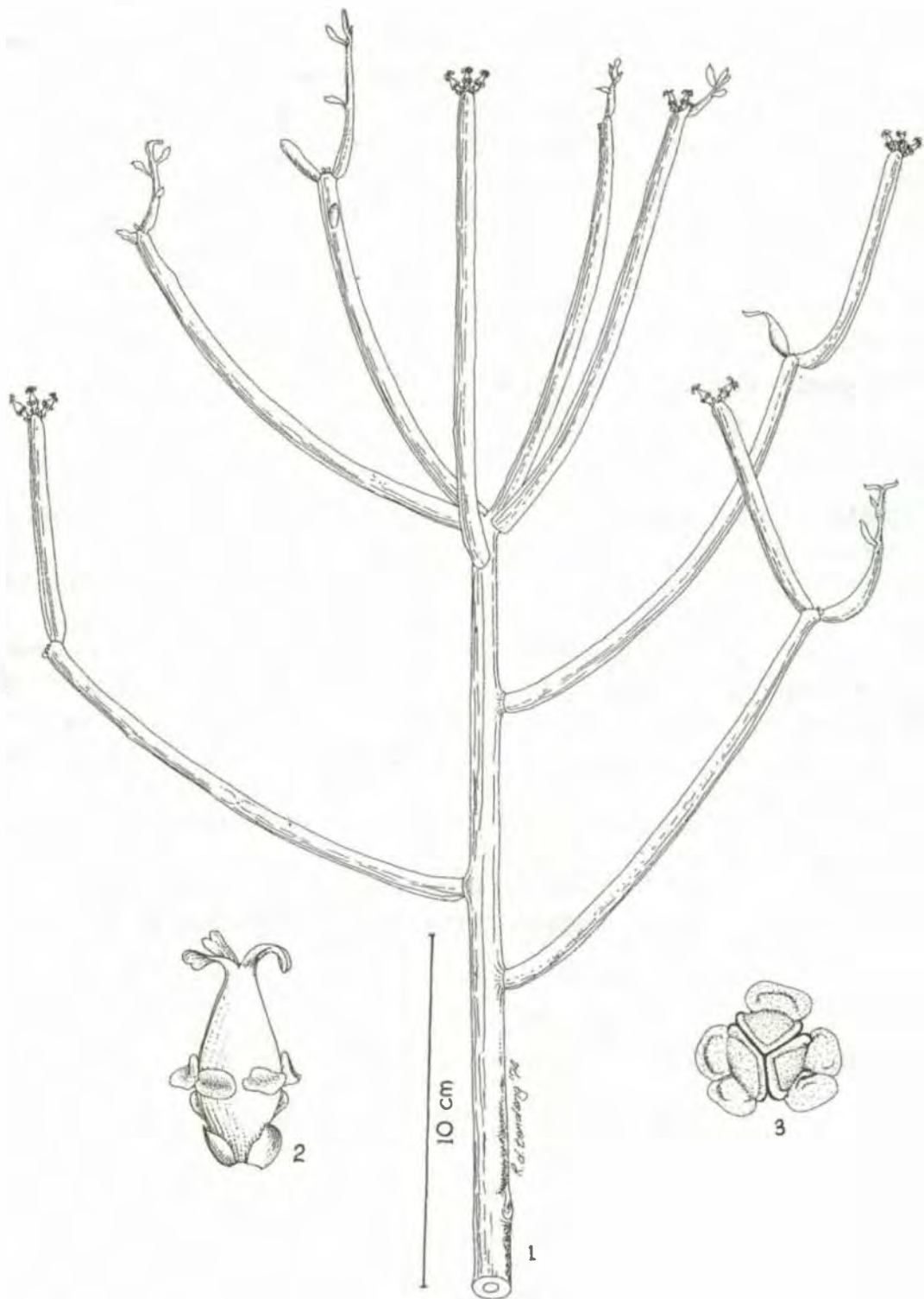


Figure 51. *Euphorbia tirucalli*: 1. portion of flowering branch; 2. pistillate flower; 3. staminate flower.

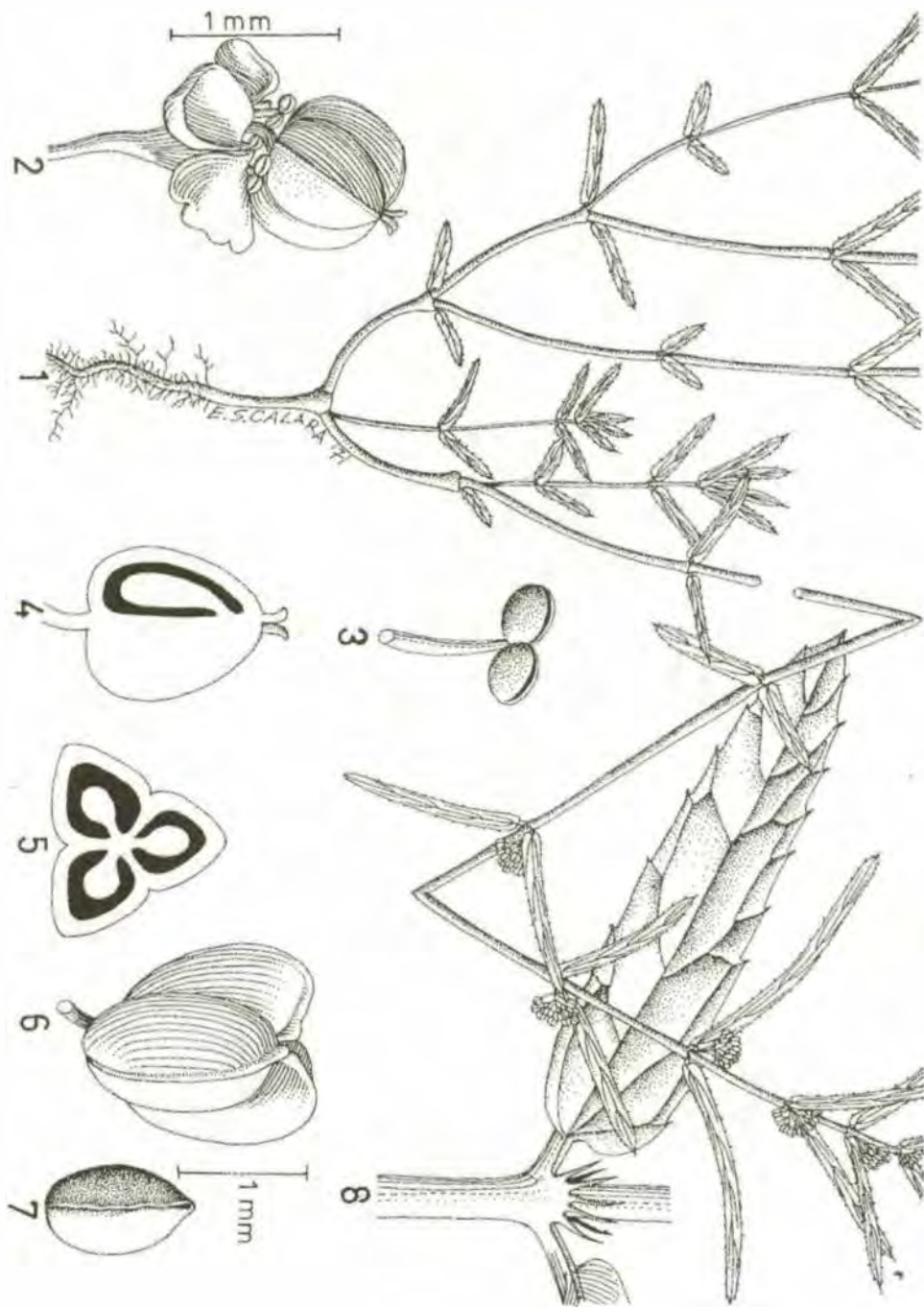


Figure 52. *Euphorbia reinwardtiana*: 1. habit; 2. cyathium; 3. stamen; 4. ovary, vertical section; 5. ovary, cross section; 6. capsule; 7. seed; 8. portion of stem with stipules and leaf.



Figure 53. *Euphorbia hypericifolia*: 1. habit; 2. portion of stem, enlarged to show leaf bases and stipules; 3. leaf, enlarged; 4. cyathium; 5. cyathium, vertical section; 6. ovary, cross section; 7. stamen; 8. capsule; 9. seed; 10. seedlings.

small; lobes white or pink, very small. Capsules trigonous, ovoid, 1.5 mm long, nodding.

Tropics generally. Of local occurrences in the Philippines, in open grasslands; in Mt. Makiling, Luzon, a common weed in cultivated and wastelands.

Exsicc.- *Lugod CA 18317**; *Velasco & Estioko, Jr. CA 1599 (CAHP)*.

8. *Euphorbia hirta* L., Sp. Pl. 454, 1753; Merr., En. Philip. 2: 462, 1923; Airy-Shaw, Euph. Philip. 24, 1983. – *E. pilulifera* L., Sp. Pl. 454, 1753; Merr., Philip. J. Sc. 1: Suppl. 83, 1906. **Figure 54**

Herbs hispid-pubescent, usually much-branched from base; branches ascending or spreading up to 40 cm long, simple or forked, often reddish or purplish. Leaves opposite, distichous, elliptic-oblong to oblong-lanceolate, 1-2.5 cm long, oblique, serrulate, acute, usually blotched with purple in middle. Involucres greenish or purplish, 1 mm long, numerous, in dense axillary, sessile or short-stalked clusters or crowded cymes. Capsules broadly ovoid, 1.5 mm long or less, hairy, 3-angled.

Tropics generally. Abundant in open waste places throughout the Philippines; in Mt. Makiling, Luzon, a common weed in cultivated and wastelands.

Com. name – *Golondrina* (Tag.).

Exsicc. – *Ballesteros CA 8013*; *Bardenas CA 10205**; *Blancaver CA 4773-A*; *Champaka CA 8068*; *Gates CA 1596*; *Guantes & Pancho CA 10694*; *Novero CA 7064*; *Orlido CA 5009, 10344*; *Velasco CA 1595 (CAHP)*.

9. *Euphorbia thymifolia* L., Sp. Pl. 454, 1753; Sherff, Ann. Mo. Bot. Gard. 23: 67, 1938; Airy-Shaw, Euph. Philip. 26, 1983. **Figure 55**

Herbs spreading or prostrate, much-branched, slender, glabrous or pubescent; stems reddish with a broad band of long hairs, up to 20 cm in length. Leaves opposite, distichous, somewhat oblique, elliptic to oblong, 4-7 mm long, obtuse, obscurely crenulate. Involucre 1 mm long, purplish in axils of much-reduced leaves or bracts on crowded, short branchlets. Capsules pubescent, 3-angled, 1.5 mm long.

Tropics generally. Common and widely distributed in the Philippines, in open wastelands, roadsides, etc., in Mt. Makiling, Luzon, a common weed in cultivated and wastelands.

Com. name – *Makikitot* (Ilk.).

Exsicc. – *Velasco & Estioko, Jr. CA 1599* (CAHP)*.

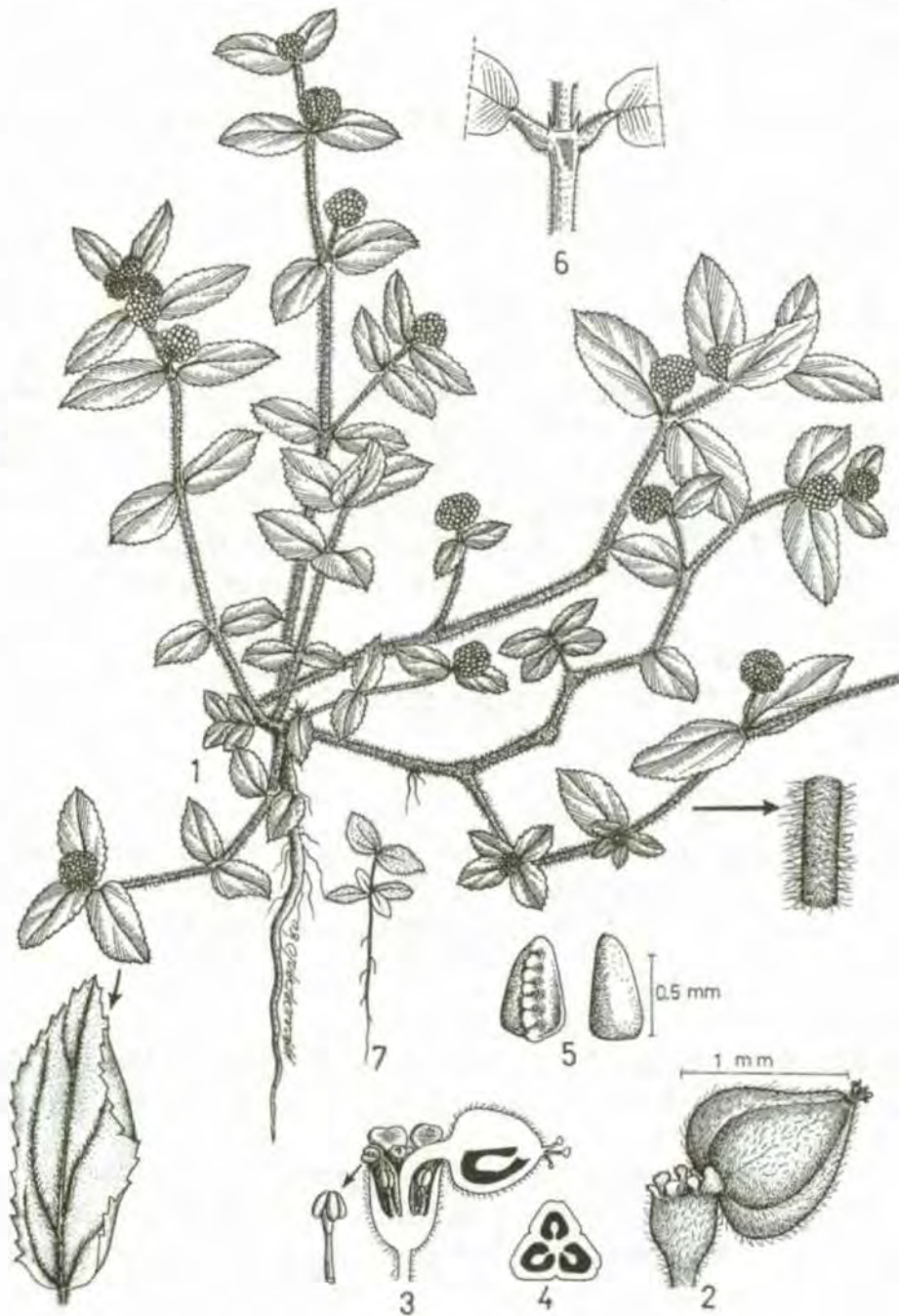


Figure 54. *Euphorbia hirta*: 1. habit; 2. fruit; 3. cyathium, vertical section; 4. ovary, cross section; 5. seed, 2 views; 6. portion of stem to show leaf bases and stipules; 7. seedling. (After Pancho 1983, with permission).



Figure 55. *Euphorbia thymifolia*: 1. habit; 2. cyathium; 3. staminate flower; 4. portion of stem, enlarged to show leaf and flowers; 5. seed, 2 views; 6. ovary, cross-section.

10. *Euphorbia prostrata* Ait., Hort. Kew. 2: 136. 1789; Merr., En. Philip. 2: 463, 1923; Airy-Shaw, Euph. Philip. 25, 1983. **Figure 56**

Annual herbs slender, prostrate or spreading, branched, nearly glabrous; stems usually shorter than 15 cm, pubescent along one side. Leaves small, short-petioled, elliptic to obovate, rounded; base inequilateral, margins sharply toothed, 5-8 mm long. Involucres axillary, pedicelled, intermixed with reduced leaves. Capsules glabrous except for hispid-ciliate keels of cocci.

Native of tropical America, now widely distributed in the tropics. Throughout the Philippines, in wastelands; infrequent; in Mt. Makiling, Luzon, a common weed in wastelands.

Exsicc. – *Estioko, Jr. CA 1597; Orlido CA 10342*, 10873; Aparte CA 3404* (CAHP).

13. PEDILANTHUS Poiteau, *nom. cons.*

Herbs or shrubs with fleshy branches and milky juice. Leaves alternate, shortly petioled, entire; stipules represented by small glands. Several staminate flowers and one pistillate flower in center enclosed within an involucre; involucre in terminal or axillary cymes, shoe-shaped, consisting of a tube and an appendix at base of tube; appendix gibbous, 2- to 3-lobed; glands 4; perianth absent in staminate flowers; stamen 1; filament jointed with pedicel; perianth of 3 minute scales or absent in pistillate flowers; ovaries 3-celled. Capsules splitting into 3, 2-valved cocci; seeds carunculate.

Species 30, in tropical America from Mexico to the Amazon and the West Indies; 1 in the Philippines.

1. *Pedilanthus tithymaloides* (L.) Poit., Ann. Mus. Paris 29: 390, 1812; Backer & Bakh. f., Fl. Jav. 1: 505, 1963. – *Euphorbia tithymaloides* L., Sp. Pl. 453, 1753.

Shrubs small, 1-2 m high. Leaves ovate or oblong, 4-10 x 2-4 cm, acute or acuminate at apex, cuneate at base. Involucre in terminal cymes, red or purple, 10-15 mm long; pedicels of staminate and pistillate flower hirsute; ovaries glabrous; styles 8 mm long, shortly 2-partite. Capsules 8 x 7-9 mm, slightly truncate at both ends; seeds ovate or oblong, 5 mm long.

Cultivated as ornamental in most tropical countries. In Mt. Makiling, Luzon, Philippines, cultivated as hedge.

Com. name – Slipper flower (Engl.).

Exsicc. – *Pancho CA 20087, 20206* (CAHP).

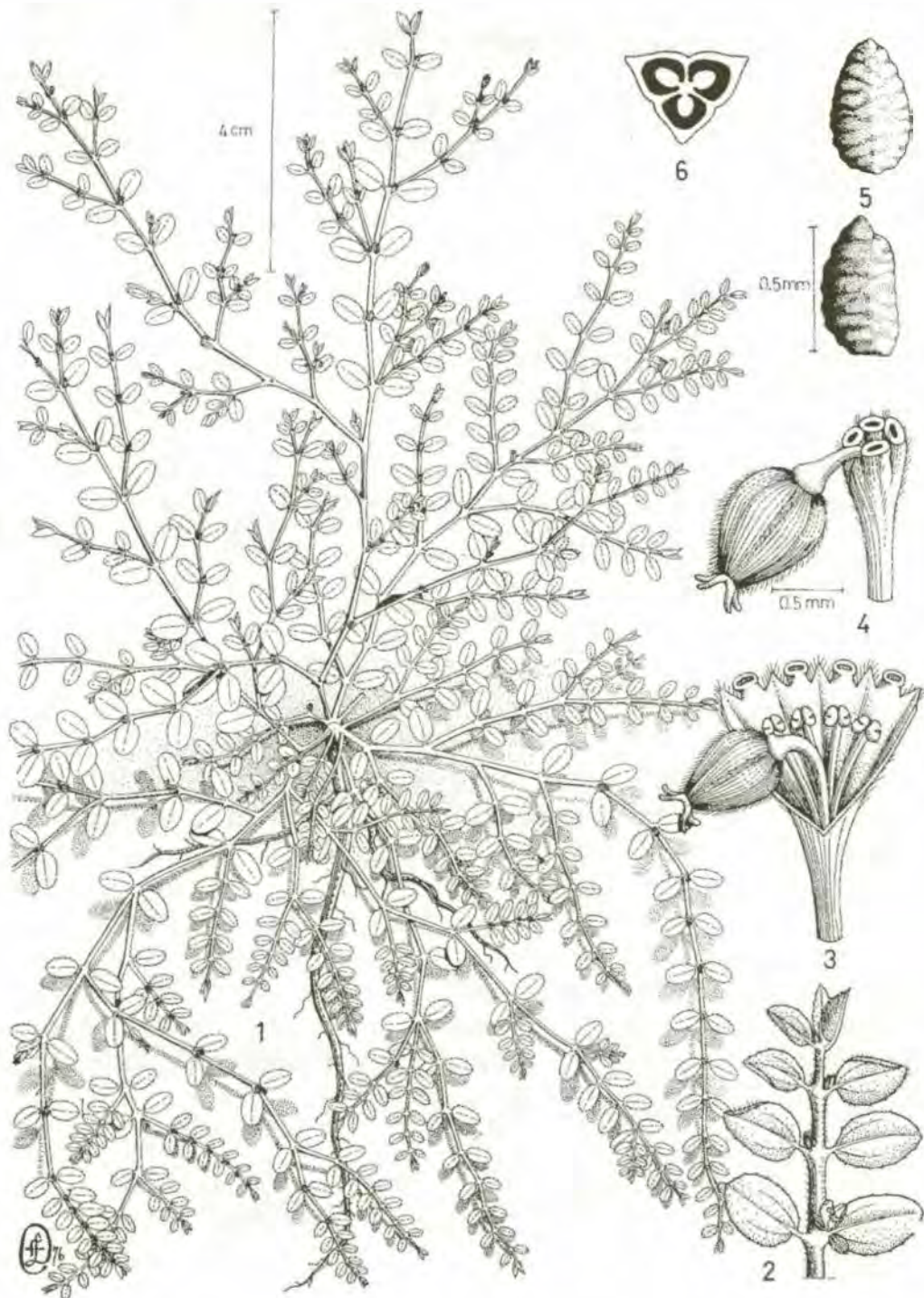


Figure 56. *Euphorbia prostrata*: 1. habit; 2. flowering twig tip; 3. cyathium, opened; 4. cyathium; 5. seed, 2 views; 6. ovary, cross section. (After Pancho & Obien 1983, with permission).

14. CROTON Linnaeus

Trees or shrubs. Leaves alternate, seldom opposite or whorled, usually biglandular at base. Inflorescences terminal, racemous; flowers solitary or clustered, usually bract-subtended, pistillate often toward base or below staminate; calyx 4- to 6-parted, imbricate or subvalvate; petals as many, alternating with calyx segments, often wanting in pistillate; disc glands opposite sepals; stamens indefinite, inserted on a central, hairy receptacle; filaments free, inflexed in bud; anthers adnate; pistillodes none; ovaries usually 2- to 4-celled. Capsules of 3, 2-valved cocci; seeds smooth.

Species 660, in the tropics of both hemispheres; 25 in the Philippines.

- 1. Leaves ovate; fruits 1.5 cm long, obscurely trigonous 1. *C. tiglium*
- 1. Leaves oblong; fruits one-half as long, trigonously lobed at apex
 - 2. Pistillate calyx glabrous; ovary densely covered with fimbriate scales 2. *C. leiophyllus*
 - 2. Pistillate calyx stellately pubescent; ovary thinly covered with stellate hairs 3. *C. consanguineus*

- 1. *Croton tiglium* L., Sp. Pl. 2: 1004, 1753; Merr., En. Philip. 2: 427, 1923; Airy-Shaw, Euph. Philip. 20, 1983. Figure 57

Shrubs erect or spreading. Leaves ovate, 7-15 x 4-7 cm, primarily 3-veined from base with 1 or 2 extra pairs of minor nerves from middle vein, entire or denticulate, glabrous with few stellate hairs beneath, slenderly acuminate, base truncately rounded; petioles 6 cm long. Inflorescences spicately racemose, flowers pedicelled; calyx glabrous; petals relatively narrow, hairy; ovaries densely yellowish-pubescent; stigmas forked. Capsules short-stalked, ellipsoid or obscurely trigonous, 2 cm long, yellowish brown when dry.

India to New Guinea. Introduced and usually found in wastelands throughout the Philippines; in Mt. Makiling, Luzon, often cultivated for its seeds often used as fish poison.

Com. name – *Tuba* (Bik., Ilk., P. Bis., S.-L. Bis., Sul., Tag.).

Exsicc – *Pancho* CA 20074, 20081; *Hernæz* CA 16123, 17739 (CAHP).

- 2. *Croton leiophyllus* Muell.-Arg., Linnaea 5: 103, 1865; Merr., En. Philip. 2: 426, 1923; Airy-Shaw, Euph. Philip. 19, 1983.

Shrubs or small trees. Leaves oblong, 10 cm long by nearly half as wide, midrib evident, 7-9 lateral nerves rather obscure, glabrous or with few stellate

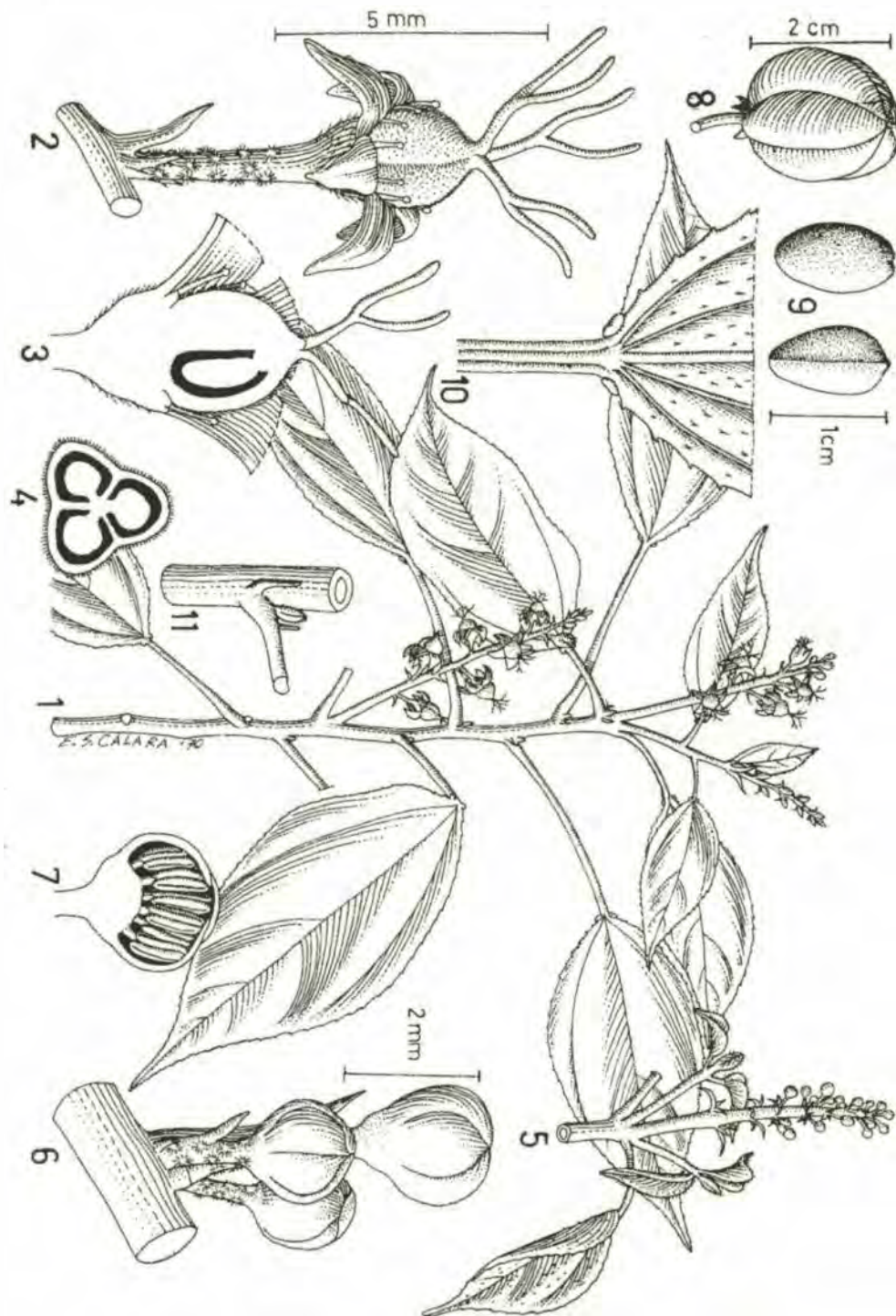


Figure 57. *Croton tiglium* ; 1. flowering branch; 2. pistillate flower; 3. ovary, vertical section; 4. ovary, cross section; 5. staminate branchlet; 6. staminate flowers; 7. staminate flower, vertical section; 8. capsule; 9. seed, 2 views.

hairs on lower side, entire or crenate, acute; base broadly obtuse; petioles 4 cm long. Inflorescences spicate, sprinkled with stellate hairs; flowers short-pedicelled, pistillate calyx glabrous; ovaries densely covered with pale yellowish fimbriate scales. Capsules trigonous, 8 mm across, short-stalked, subtended by persistent calyx.

Throughout the Philippines, in dry woods, in lowlands or in forested hills; in Mt. Makiling, Luzon, in open woods at low elevations.

Com. name – *Tagoan-uwak* (Tag.).

Exsicc. – *Elmer 8322, 854540* (US).

3. *Croton consaguineus* Muell.-Arg., *Linnaea* 14: 101, 1865; Merr., *Philip. J. Sc.* 1: Suppl.78, 1906; En. *Philip.* 2: 426, 1923; Airy-Shaw, *Euph. Philip.* 18, 1983.

Shrubs or small trees. Leaves oblong, often diverse in size, 15-20 x 8-10 cm, midrib prominent with 7 pairs of obscure lateral nerves, subentire or obscurely crenate, often with yellowish scales on lower side, abruptly acute, base obtusely rounded; petioles 6 cm long. Spikes lepidote, solitary or when few-clustered, lateral ones shorter; flowers short-pedicelled; pistillate calyx stellately pubescent; ovaries thinly covered with stellate hairs. Capsules strongly trigonous, 6 mm across, pedicelled stellately pubescent.

Luzon to the Visayan islands, Philippines, in thickets and forests at low altitudes; in Mt. Makiling, Luzon, at 30-250 m altitude.

Com. name – *Malatuba* (Bik., Tag.).

Exsicc. – *McGregor BS 27857, 1375864* (US)

15. DORYXYLON Zollinger

Shrubs or trees. Twigs stellately pubescent. Leaves alternate, broad, 3- to 5-nerved, entire or slightly toothed, similarly pubescent beneath. Flowers bisexual in axillary spike-like racemes, upper or staminate, subsessile, clustered, lower or pistillate, solitary, pedicelled; staminate calyx, globose, thin, splitting into valvate lobes; petals 4 or 5, short; stamens many on convex, eglandular receptacle; filaments free; rudimentary ovaries none; pistillate calyx 5- or 6-fid, lobes narrow; petals small or none; ovaries 3-celled; styles recurved; cells each with 1 ovule. Capsules of 2- or 3-celled coccus.

Species 3, Sumbawa and Malaya; 1 in the Philippines.

1. *Doryxylon spinosum* Zoll., Nat. Tijdschr. Nederl. Ind. 14: 152, 1857; Merr., Sp. Blanc. 221, 1918; En. Philip. 2: 427, 1923; Airy-Shaw, Euph. Philip. 21, 1983.

Trees stocky with thick bark. Leaves chiefly toward ends of twigs, ovately rotund to elliptic, 10-12 x 6-8 cm, 3- to 5-veined from base, cross bars distinct; upper side glabrous, densely white-stellate beneath, coarsely dentate or subentire, broadly obtuse with rounded base; petioles 3-5 cm long, pubescent. Flowers terminal, subsessile, more or less crowded, densely grayish to brown-stellate, subtended by linear, caducous bracts. Capsules 1 cm across, subtended by linear-lanceolate, persistent calyx, upon 5-8 mm stalks; sides trigonous, stellately white.

Sumbawa. In the Philippines, of local occurrence only in dry regions of Luzon; in Mt. Makiling, Luzon, in abandoned *kaingin* areas and often in second-growth forests.

Com. name – *Dilap* (Tag.).

Exsicc. – *Pancho CA 20095, 20326* (CAHP).

16. JATROPHA Linnaeus

Shrubs erect or herbs with watery juice. Leaves alternate, entire, lobed or partite; stipules present or absent. Flowers bisexual in corymbs, often petaliferous, central or basal ones usually pistillate; staminate with 5 imbricate sepals; petals 5, free or connate; stamens usually 8-10 or more; filaments connate or outer ones free; anthers erect; pistillodes absent; carpels connate in 2- to 4-celled ovaries; ovules solitary in each cell; styles connate below, bifid. Capsules tardily dehiscent, 2- to 4-celled, usually 3-celled; seeds ovoid or oblong.

Species 160, in tropics of both hemispheres; 5 in the Philippines.

1. Leaves peltate; stems tuberous at base 1. *J. podagrica*
1. Leaves not peltate; stems not as above
 2. Leaves not lobed; petals widely patent 2. *J. hastata*
 2. Leaves lobed; petals not as above
 3. Leaves 3- to 5-lobed, within shortly stalked glands along margins 3. *J. gossypifolia*
 3. Leaves about 10-lobed, subentire or lobulately toothed
 4. Leaves about 10-lobed; petioles subtended by tufts of ciliated stipules 4. *J. multifida*
 4. Leaves subentire or lobulately toothed; petioles not subtended by ciliated stipules 5. *J. curcas*

1. *Jatropha podagrica* Hook., Bot. Mag. t. 4376, 1848; Ingram, Baileya 6: 114, f. 34, 1957.

Shrubs erect, suffrutescent, tuberous at base. Leaves peltate, ovate, 15-25 cm across, 3- to 5-lobulate with as many veins, lobes blunt at apex, base truncate to broadly rounded, glabrous, glaucous beneath; petioles 20 cm long, striate, subtended by stipules divided into rigid, small segments. Inflorescences terminal, glabrate, stout stalks similar to petioles, bluntly bracteate, congested; staminate flowers numerous, erect with broadly rounded calyx teeth; pistillate, scattered in forks of branches, obscurely trigonous.

Native of Central America. Throughout the Philippines, cultivated for ornamental purposes.

Com. name – Gout plant (Engl.).

Exsicc. – Pancho CA 3205, 9117 (CAHP).

2. *Jatropha hastata* Jacq., Enum. Pl. Carib. 32, 1760; Backer & Bakh. f., Fl. Jav. 1: 494, 1963. – *J. panduraefolia* Andr., Bot. Rep. 4: t. 267, 1802.

Shrubs erect. Twigs thin, finely hairy at apices; branchlets often long, flexous. Leaves variable, often oblong or oblong-ovate, 6-15 x 4-10 cm, abruptly acute to acuminate, with 1-5 subulate, acute teeth at base on both sides, otherwise not incised, sometimes slightly constricted at base; petioles 1-7 cm long. Petals crimson, sometimes pinkish, widely spreading, cuneate-obovate, 1-1.3 cm long, white-hairy at base; calyx red; outer stamens much shorter than inner ones; filaments with free apices; stigmas long-branched. Fruits 1 cm long, shallowly lobed, with 3 cocci.

Native of Cuba. Introduced in the Philippines by Robert F. Chandler, Jr. in 1970; now widely cultivated as an ornamental throughout the country.

Com. name – Shanghai beauty (Engl.).

Exsicc. – Pancho CA 20060, 20328 (CAHP).

3. *Jatropha gossypifolia* L., Sp. Pl. 2: 1006 1753; Merr., En. Philip. 2: 449. 1923. **Figure 58**

Shrubs or suffrutescent herbs. Leaves 3- to 5-lobed, oblong lobes short-acute, shallowly cordate at base, glabrous, pale green beneath, ciliate and with shortly stalked glands along margins; petioles 5-10 cm long, glandularly hairy. Inflorescences terminal or from uppermost leaf axils, pubescent, few-branched, not exceeding foliage; bracts ciliate, glandular along edges; flowers few, terminally clustered; calyx similar to bracts; petals red. Fruits 1.5 cm long,

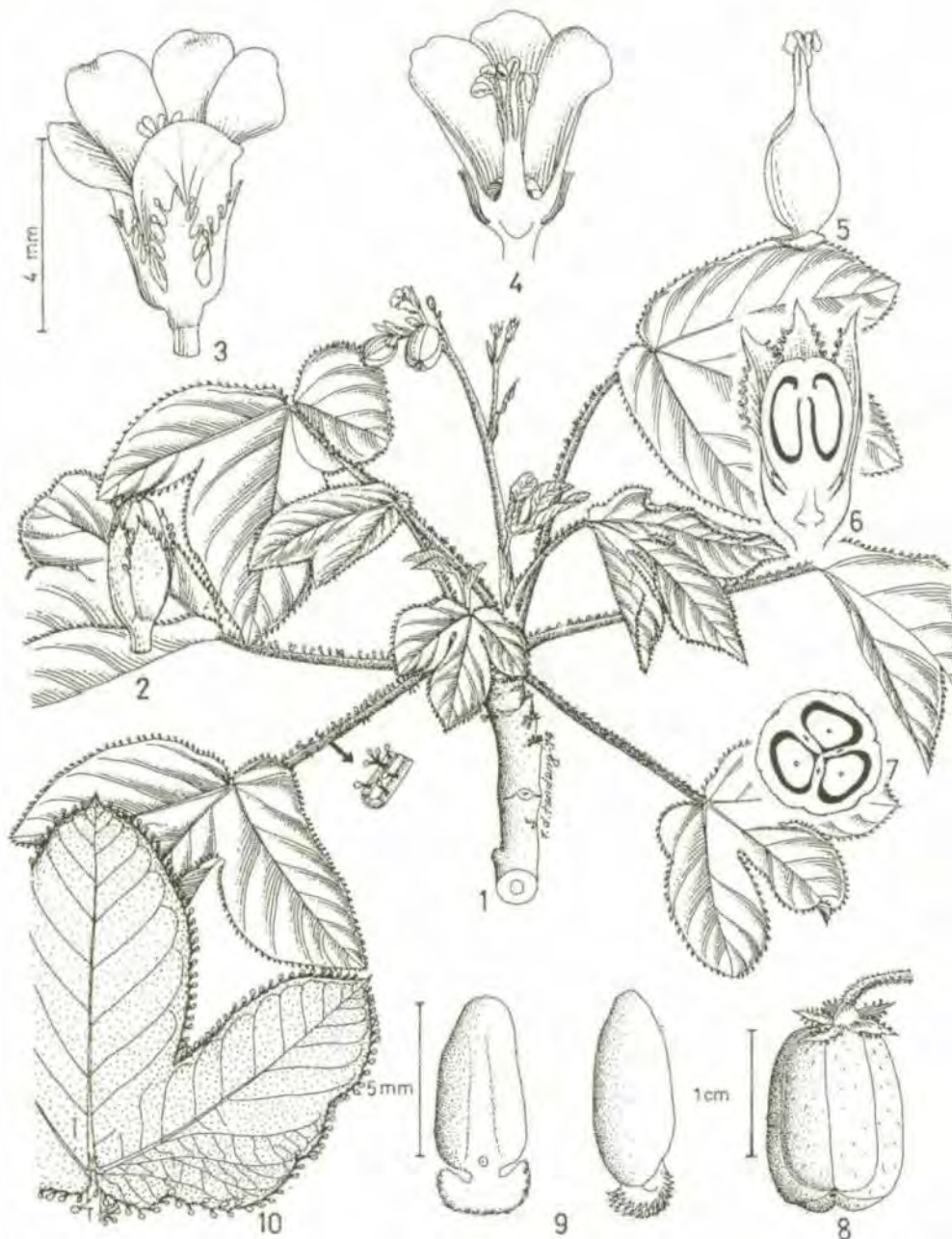


Figure 58. *Jatropha gossypifolia*: 1. flowering branch; 2. flower bud; 3. flower; 4. flower. opened to show stamens; 5. ovary; 6. ovary, vertical section; 7. ovary, cross section; 8. capsule; 9. seed, 2 views; 10. portion of leaf, enlarged. (After Pancho 1983, with permission).

glabrous, obscurely trigonous, short-stalked, subtended by persistent lobed calyx.

Native of tropical America. Throughout the Philippines, abundant in wastelands at low altitudes; in Mt. Makiling, Luzon, occasionally in wastelands at sea level.

Com. name – *Tubang-murado* (Tag.).

Exsicc. – *Pancho CA 20097**, *20477* (CAHP).

4. *Jatropha multifida* L., Sp. Pl. 2: 1006, 1753; Ingram, *Baileya* 5: 117, f.36, 1957. **Figure 59**

Shrubs, 2-3 m high. Leaves about 10-lobed, nerves prominent from base, glaucous beneath; petioles 10-20 cm long, subtended by tufts of ciliated stipules. Inflorescences solitary, terminal; peduncles 20 cm long, numerous branched at top, rather congested, glabrous, branches subtended by linearly pointed bracts; flowers pedicelled, scattered, erect, bright or scarlet red, few middle or basal ones pistillate; calyx lobes truncately round. Capsules smooth, obovoid, roundly 3-angled, 3 cm across, hard, nut-like.

Native of tropical America. Introduced in the Philippines and in cultivation only; in Mt. Makiling, Luzon, cultivated as an ornamental.

Com. name – *Mana* (Sp.).

Exsicc. – *Advincula CA 12510*; *Ballesteros CA 8015*; *Champhaka CA 8135*; *Novero CA 7066*; *Pancho CA 3203**; *Sulit CA 2014*, *Velasco CA 1627* (CAHP).

5. *Jatropha curcas* L., Sp. Pl. 2: 1006, 1753; Merr., En. *Philip.* 2: 449, 1923. **Figure 60**

Shrubs or small trees erect, few-branched. Leaves ovate, 8-12 cm across, coarsely and angularly 3- to 5-lobulate, lobes obtuse or short-acute, base subtruncate or shallowly cordate, pale green beneath, 5- to 7-veined from base; petioles 10-15 cm long. Inflorescences half as long as foliage, few-branched from middle, ultimate ones short, subtended by linear bracts; flowers yellowish green, glabrous, pedicelled, clustered. Capsules ellipsoid, 3 cm long, glabrous, fleshy at first, ultimately dry and dehiscent from apex to base.

Native of tropical America. Throughout the Philippines, spontaneous in thickets and frequently planted along fences.

Com. name – *Tubang-bakod* (Tag.).

Exsicc. – *Gates CA 1626*; *Orlido CA 10341**, *1352* (CAHP).



Figure 59. *Jatropha multifida*: 1. flowering branch; 2. flower buds; 3. flower; 4. seed, 2 views; 5. ovary, cross section; 6. ovary, vertical section. (After Pancho 1983, with permission).

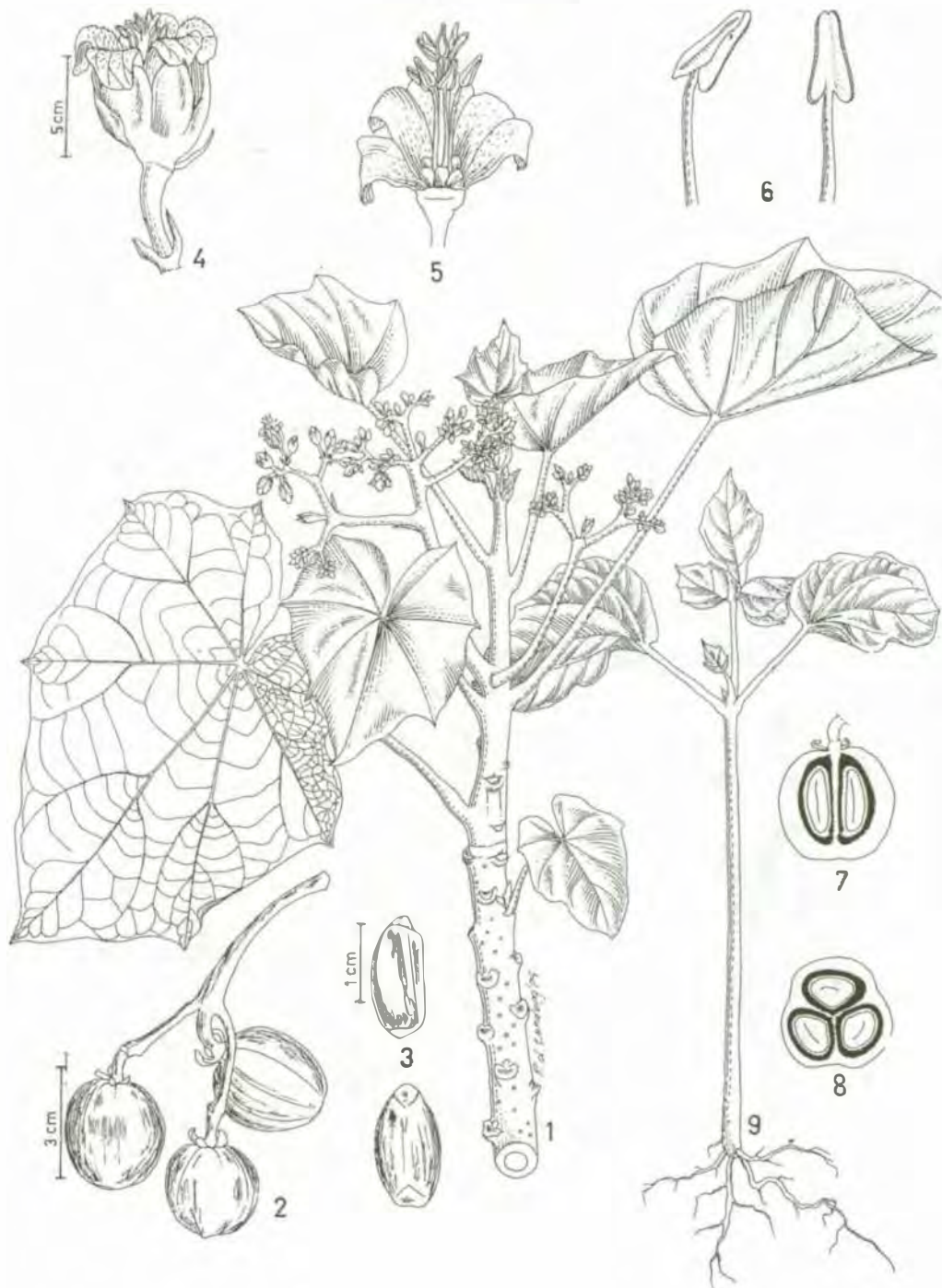


Figure 60. *Jatropha curcas*: 1. flowering branch; 2. fruit bunch; 3. seed, 2 views; 4. flower; 5. flower, opened to show stamens; 6. stamen, 2 views; 7. ovary, vertical section; 8. ovary, cross section; 9. seedling. (After Pancho 1983, with permission).

17. *REUTEALIS* Airy-Shaw

Trees. Leaves suborbicular to broadly ovate, 10-20 cm long, with 3-5 nerves from base besides several other pairs along midveins, occasionally sub-glaucous beneath, obtuse to abruptly acute, base broadly cordate; petioles as long as blades, bearing glands at upper distal side. Panicles terminal, branched from near base, densely canescent; flowers clustered, short-pedicelled, bract-subtended; petals narrowly elongated, glabrous on inner side only. Fruits upon stout stalks, subglobose, 5-7 cm across, 3-sided or angularly trigonous when dry, bluntly pointed at both ends, normally 3-seeded; seeds with crustaceous coats.

Monotypic. Cultivated in many Asian countries. In the Philippines, chiefly in dry regions of Luzon (Cavite and Laguna); in Mt. Makiling, Luzon, cultivated but often spontaneous.

1. *Reutealis trisperma* (Blco.) Airy-Shaw, Kew Bull. 20: 395, 1966. – *Aleurites trisperma* Blco., Fl. Filip. 755, 1837; Merr., Sp. Blanc. 228, 1918; Merr., En. Philip. 2: 448, 1923.

Characteristics. (Refer to the genus description).

Com. name – *Bagilumbang* (Tag.).

Exsicc. – *Escritor* CA 1553 (CAHP); *McGregor* BS 22912, 898230; *Villamil* BF 21700, 903107 (US).

18. *VERNICIA* Loureiro

Trees. Leaves ovate, trinerved besides few lateral pairs along midvein; cross bars prominent, glabrous, apiculate, base cordate; petioles with a large pair of disc-shaped glands. Panicles terminal, erect, exceeding foliage, glabrous; ellipsoid buds pedicelled, finally split and turned to one side; petals white, flushed with red, with yellow spots and lines toward base, 2 times as long as calyx, glabrous, narrowed toward base; stamens 8-10; glabrous; ovaries 3-sided, densely brown-tomentose; stigmas 3, linear, glabrous. Fruits subglobose or turbinate, normally 3-seeded, smooth, apiculate; seeds ovoidly compressed, verrucose.

Species 3, southeastern China, Indochina to Malaysia; 1 in the Philippines.

1. *Vernicia fordii* (Hemsl.) Airy-Shaw, Kew Bull. 20: 394, 1966. – *Aleurites fordii* Hemsl. in Hook., Ic. Pl. 29: tt. 2801, 2802, 1906. **Figure 61**

Leaves thinly appressed-pilose beneath, 8-20 x 5-20 cm. Glands on each petiole sessile, tuberculiform or cushion-shaped with vaulted apex. Corymbs appearing before young leaves; calyx finely hairy, 1 cm long, usually 2-fid; petals 1.5 cm broad; disc glands 3 mm across; ovaries 3- to 4-celled. Fruits shortly mucronate, not transversely ribbed, 4-5 cm across, glabrous.

Southeastern China, Indochina. Introduced in the Philippines and cultivated on the University campus, Los Baños, Laguna, Luzon.

Com. name – Tung-oil tree (Engl.).

Exsicc. – *Ardieta* CA 8389* (CAHP).

2. *Vernicia moluccana* (L.) Airy-Shaw, Kew Bull. 20: 395, 1966. – *Aleurites moluccana* (L.) Willd., Sp. Pl. 4: 590, 1805; Merr., En. Philip. 2:449, 1923; Airy-Shaw, Euph. Philip. 4, 1983. – *Jatropha moluccana* L., Sp. Pl. 2: 1006, 1753.

Trees erect, large. Branches stout, young portions yellowish brown-farinoso. Leaves ovately elongate, 20 x 10 cm, with 3 to 5 nerves from base, besides 4-7 extra nerves on each side of midvein, terminally clustered, entire or young ones lobulate, grayish to farinose, ultimately glabrous, acuminate, base truncately obtuse to rounded; petioles 10 cm long or more, with a pair of glands at upper distal side. Panicles terminal, shorter than foliage, farinose throughout; flowers slenderly pedicelled; petals ligulate, pale yellowish white, hairy at base inside. Fruits compressed-globose, 5-6 cm across, dull green or brownish, upon stout stalks, normally with 2 stone-like seeds; fleshy pericarp thick.

Tropical Asia to Polynesia. In the Philippines, at low and medium altitudes; in Mt. Makiling, Luzon, cultivated on the University campus, about 30 m altitude.

Com. name – *Lumbang* (Tag.).

Exsicc. – *Desamero* CA 10875; *Gates* CA 1552; *Gutierrez* CA 2366; *Orlido* CA 10874, 10876 (CAHP); *Elmer* 17679, 1237254 (US).

20. DIMORPHOCALYX Thwaites

Trees or shrubs. Leaves alternate, entire, rarely denticulate, pinnately nerved. Flowers few, mostly unisexual, racemose or cymose, axillary or terminal; calyx of staminate flowers cup-shaped, 5-lobed disc; shorter than 5 petals; stamens 10-20 on short, columnar receptacle; filaments stout, free,

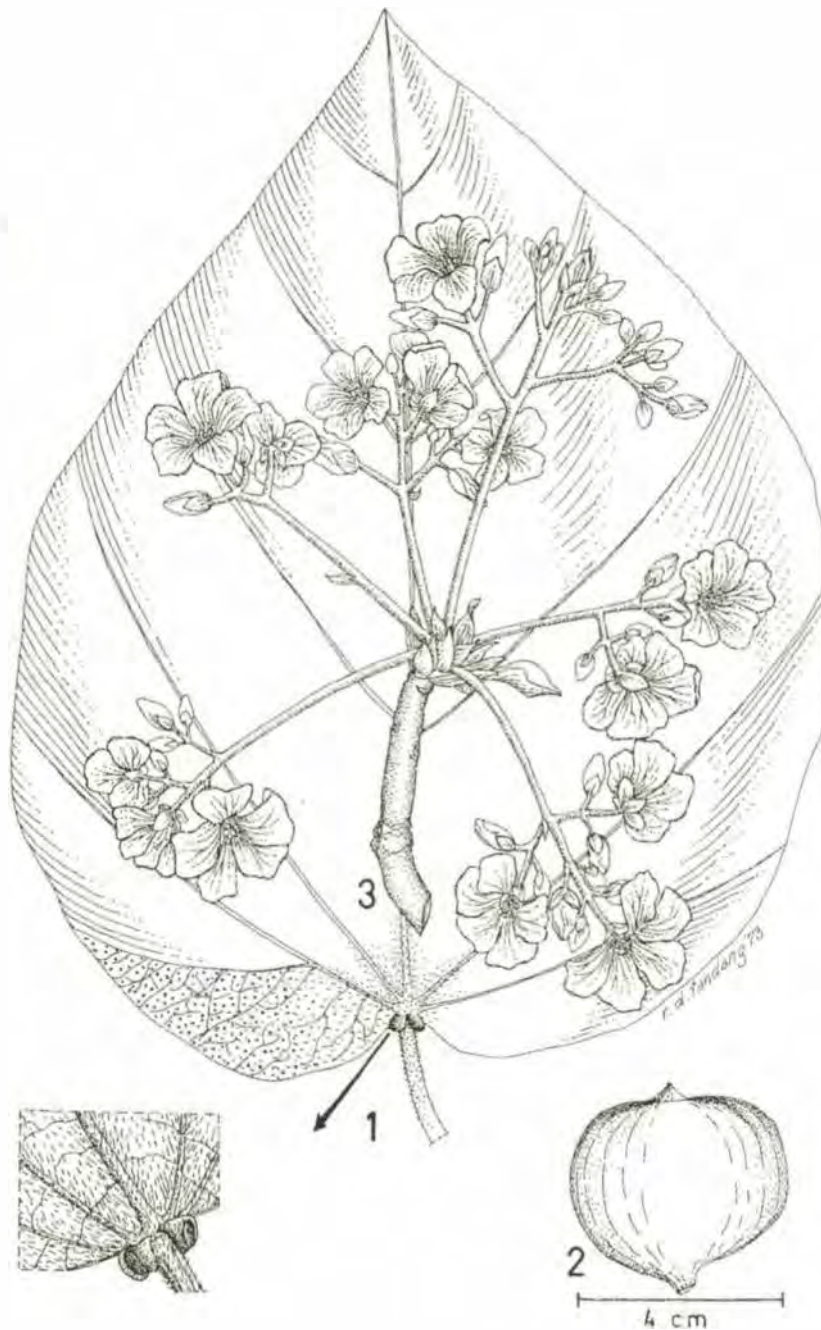


Figure 61. *Vernicia fordii*: 1. leaf; 2. fruit; 3. flowering branch. (After Pancho 1983, with permission).

or inner ones connate inside a fleshy 5-lobed disc; anthers dorsifixed, cells parallel or divergent; pistillodes absent; pistillate sepals 5, imbricate, greatly enlarged in fruit; petals 5; ovaries 3-celled; styles erect, bifid; ovules solitary in each cell. Capsules normally 3-celled, crustaceous, each cell of 2-valved cocci; seeds ovoid.

Species 10, Indo-Malaysian; 8 in the Philippines.

1. Inflorescences cymose; flowers long-pedicelled, 10 mm in length 1. *D. luzoniensis*
 1. Inflorescences spicate; flowers short-pedicelled, 3 mm in length 2. *D. denticulatus*

1. *Dimorphocalyx luzoniensis* Merr., Philip. J. Sc. 5(Bot): 192, 1910; Pax in Engl., Pfl. R. 52: 284, 1912; Airy-Shaw, Euph. Philip. 21, 1983.

Trees small. Leaves elliptically oblong, 13 cm long by half as wide, with 9-12 conspicuous nerves on each side, glabrous, obtuse to subacute, base broadly obtuse or rounded; petioles 1.5-3 cm long, canaliculated. Inflorescences cymose, glabrous or sparsely ciliate on bracts, much-shorter than foliage; staminate flowers terminal clustered; pedicels 5-8 mm long, bract-subtended; calyx lobed, about half as long as petals; stamens 15, united into a column, unequal; pistillate flowers with white perianth, 1.5 cm across, lobes broad, united below middle; ovaries glabrous, 2-sulcate, 3-ovulate; styles free, cleft in divergent arms. Capsules roundly trigonous, 1.5 cm thick, subtended by persistent, enlarged perianth.

Luzon to the Visayan islands, Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, at 100-250 m.

Com. name – *Kulispakatan* (Tag.).

Exsicc. – Gates & Mayer CA 1588 (CAHP); Andaya 09525 (PNH), 2376109 (US); Galutera 33359 (PNH), 2212414 (US); Amarillas BF 25118, 1292950; Forestry School collector BF 20121, 902475; Tamesis 711182, type! (US).

2. *Dimorphocalyx denticulatus* Merr., Philip. J. Sc. 4 (Bot): 278, 1909; Pax in Engl., Pfl. R. 52: 285, 1912; Airy-Shaw, Euph. Philip. 20, 1983.

Shrubs or small trees. Leaves lanceolately oblong, 4-14 cm, frequently smaller, glabrous, pale beneath, denticulate or subentire, narrowed toward both ends especially toward caudate apex, short-petioled. Staminate inflorescences axillary, spicately racemose or cymose, 1-2 cm long, bract-subtended, flowers short-pedicelled; calyx lobe elliptic, 1.5 mm long, imbricate, petals twice as long; stamens 15, unequal, united below; pistillate flowers solitary or fascicled,

stipitate, subtended by several imbricating bracts; calyx lobes elliptic, 3 x 6 mm, half as long as wide.

Endemic. Philippines: Mindanao (Zamboanga); in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 100-500 m.

Com. name – *Sukalpi* (Bik.).

Exsicc. – *Pancho CA 20093, 20337* (CAHP).

21. **CODIAEUM** A.M.L Jussieu, *nom. cons.*

Shrubs erect or small trees. Leaves alternate, entire or lobed, pinnately nerved, often variegated, frequently twisted and constricted, glabrous; stipulate. Flowers in unisexual, axillary or terminal, spicate racemes, rarely with few pistillate toward base of raceme; staminate flowers white, fascicled, pedicelled; sepals or calyx lobes 3-6, imbricate; petals small or minute, alternating with disc glands; stamens 15-30, free, crowded on long receptacle; calyx 5-lobed; ovaries 3-celled, each cell 1-ovuled; styles entire, slender, recurved. Capsules globose, trigonous, 3-celled, each cell composed of 2-valved parchment-like cocculus; seeds shiny.

Species 10, Malaysia, Australia and Polynesia; 8 in the Philippines.

1. Leaves elongate, slenderly cuneate, not variegated 1. *C. luzonicum*
 1. Leaves not elongate nor slenderly cuneate, variegated 2. *C. variegatum*

1. *Codiaeum luzonicum* Merr., Philip. J. Sc. 1: Suppl. 81, 1906; En. Philip. 2: 453. 1923; Airy-Shaw, Euph. Philip. 16, 1983.

Shrubs. Leaves terminally clustered, obovately oblong, 30 x 10 cm long, with 12-16 pairs of lateral nerves, glabrous, much paler beneath, entire, obtusely rounded, gradually tapering toward base; petioles 3 cm long. Inflorescences solitary or few-clustered, terminal, stout rachis striate, puberulous; staminate flowers usually fascicled, pedicelled, canescent with numerous stamens; pistillate flowers solitary, scattered below staminate on same stalk, pedicelled, densely pubescent except linear, stigmatic lobes. Capsules 1 cm across, trigonous, sparsely hairy, 3-celled.

Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, rare in low, forested areas.

Com. name – *Putak* (S.-L. Bis.).

Exsicc. – *Pancho CA 20035, 20094* (CAHP).

2. *Codiaeum variegatum* (L.) Bl., Bijdr. 606, 1826; Merr., En. Philip. 2: 454, 1923; Airy-Shaw, Euph. Philip. 17, 1983. – *Croton variegatum* L., Sp. Pl. 2: 1199, 1753.

Shrubs erect. Leaves diverse in size and shape, linear to oblong-ovate entire or lobed, constricted, flat to wrinkled or often twisted into terminal capsules, green or variously mottled with purple to yellowish white, obtuse to acute, base obtusely rounded or cuneate; petioles 1-3 cm long. Spicate racemes glabrous, axillary, solitary, lax, 15-25 cm long; pistillate flowers when upon staminate stalks usually clustered toward base, subsessile, bract-subtended, glabrous or occasionally strigose; staminate flowers whitish, pedicelled, 6 mm across; sepals becoming reflexed with numerous stamens. Capsules trigonous.

Native of the Moluccas. A valuable ornamental because of its variegated and variable foliage. Throughout the Philippines, cultivated or often spontaneous.

Com. name – *San Francisco* (Sp.).

Exsicc. – *Agne CA 1582; Barroga CA 4942; Gates & Quisumbing CA 1583; Lugod CA 4929, 4930; Orlido CA 5008* (CAHP).

22. TRIGONOSTEMON Blume, *nom. cons.*

Evergreen trees or shrubs. Leaves alternate, pinnately nerved. Flowers bisexual in axillary or terminal spikes, racemes or cymes; sepals 5, imbricate; petals 5, disc composed of 5 glands, often united in a lobed cup; stamens 3; anthers sessile or filaments united into a column with free spreading tips; anthers erect or horizontal, cells united by their bases; pistillodes absent; petals of pistillate flowers often wanting; disc usually entire; ovaries 3-celled; styles singly or doubly bifid, rarely entire; ovule solitary in each cell. Capsules 3-celled, 3-seeded, trigonous; seeds globose.

Species 20, chiefly Indo-Malesian; 16 in the Philippines.

1. Inflorescences paniculate; flowers deep yellow 1. *T. philippinensis*
 1. Inflorescences spicate; flowers deep red 2. *T. longipes*

1. *Trigonostemon philippinensis* Stapf, Leafl. Philip. Bot. 1: 206, 1907; Merr., En. Philip. 2: 452, 1923; Airy-Shaw, Euph. Philip. 47, 1983.

Trees small. Leaves oblong, 15 x 6 cm, often smaller, with 9 pairs of obscure nerves, pale beneath, glabrous, entire, acute, base broadly obtuse; petioles 2-5 cm long. Panicles terminal or from uppermost leaf axils, glabrous,

equaling or exceeding foliage, numerously branched toward ends; flowers golden yellow, 5 mm across; pedicels slender, subtended by ciliate bracts. Capsules flatly trigonous, 1 cm across, glabrous, subtended by persistent calyx.

Endemic. Luzon to the Visayan islands, Philippines, in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 100-500 m altitude.

Com. name – *Kalap* (Sul.).

Exsicc. – *Advincula* CA 10464; *Orlido* CA 10465; *Rivera* CA 8946 (CAHP); *Rañeses* 33511; *Rivera* 33483 (PNH); *Elmer* 18212, 1237642; *Foxworthy's collector* BS 17, 23, 1091596, 1091610; *Robinson* BS 9722, 629644; *Tamesis* BF 11920, 711183 (US).

2. *Trigonostemon longipes* (Merr.) Merr., *Philip. J. Sc.* 11 (Bot.): 191, 1916; *En. Philip.* 2: 452, 19213; *Airy-Shaw, Euph. Philip.* 47, 1983.
– *Dimorphocalyx longipes* Merr., *Philip. J. Sc.* 1: Suppl. 82, 1906.

Shrubs or small trees. Leaves oblong to broadly lanceolate, 15 x 6 cm, often smaller, 5-7 pairs of nerves strongly anastomosing, pale beneath, acute to slenderly acuminate, base broadly cuneate; petioles 2-5 cm long. Spicate racemes equaling foliage or much shorter, usually solitary in leaf axils, pedunculate portion long, glabrate; staminate flowers purplish, sessile in fascicles, minutely bracteate; stamens 5; pistillate flowers subtended by oblong, foliaceous, persistent bracts, solitary or few-clustered, subsessile. Capsules 5 mm long, subglobose, glabrous, subtended by subsistent calyx.

Endemic. Luzon to Mindoro, Philippines; in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-250 m altitude.

Com. name – *Kamausa* (Tag.).

Exsicc. – *Gates & Razon* CA 1587 (CAHP); *Elmer* 17583, 1237187; *Forestry School collector* BF 20122, 902476 (US).

23. ENDOSPERMUM Bentham, *nom. cons.*

Trees. Leaves alternate, coriaceous, long-stalked, round, cordate to peltate, entire, nether side usually felty. Flowers unisexual, apetalous, small, in axillary long-spicate racemes, staminate clustered, subsessile on rachis; calyx globose, short, unequally 4-lobed; stamens 6-10, on flat conical receptacle; filaments short; didymous anthers equally 4-locellate and 4-valved; pistillodes none or minute; pistillate flowers solitary in bracts; calyx 5-lobed; ovaries 2- or 3-celled; styles connate, forming flatly spreading, entire or 3-lobed disc; cells 1-ovuled. Fruits globose, indehiscent, 2- or 3-lobed with crustaceous endocarp; seeds globose.

Species 13; Assam, Burma, Thailand, Vietnam, Hainan, Hongkong, Swatou Island, Kwantong, Malesia to North Queensland, Solomon and Fiji; 2 in the Philippines.

1. *Endospermum peltatum* Merr., Publ. Gov. Lab. Philip. 35: 35, 1906; En. Philip. 2: 457, 1923; Schaeffer, Blumea 19: 188, 1971; Airy-Shaw, Euph. Philip. 24, 1983.

Trees large. Leaves broadly ovate to suborbicular, 10-18 cm wide, palmately 7- to 9-nerved, soft-pubescent on nether side, base deeply cordate or broadly rounded when peltate; petioles 10-15 cm long, biglandular at distal end. Inflorescences axillary, nearly as long as petioles, densely pubescent; staminate flowers densely clustered along short, paniculate branches, whitish; calyx subtruncate; stamens 10. Pistillate flowers in few-flowered, spicate racemes; ovaries 4-celled; styles connate. Fruits ovoid, 1 cm thick, glabrous, stipitate, crowned by stigma and subtended by calyx, fleshy, 1- to 4-seeded.

Endemic in the Philippines; in low forests in most parts of the country; in Mt. Makiling, Luzon, in light forest and forest borders from 30 m to about 250 m.

Com. names – *Gubas*, *Indang* (Tag.).

Exsicc. – *Sulit* 22900 (PNH), 2188197; *Villamil* BF 19794, 902328, 19962, 902830 (US).

24. EXCOECARIA Linnaeus

Shrubs or trees with milky sap. Leaves spirally arranged opposite, shallowly crenate-serrate-dentate, with a marginal gland on either side of petiole. Flowers bisexual or unisexual in racemes or spike or pistillate solitary, apetalous, without disc; bracts small, adnate to axis of inflorescence at base, lacinate at apex, basal portion with marginal gland on either side; calyx 3-lobed, lobes imbricate in bud, fimbriate; staminate flowers often fascicled; stamens 3, free, with 2-celled anthers; pistillate staminodes absent; ovary cells 3, 1-ovuled, stigmas entire, connate at base, spirally coiled at apex; schizocarps often 3-lobed.

Species 35, in the Old World tropics; 7 in the Philippines.

1. *Excoecaria cochinchinensis* Lour., Fl. Cochinch. 612, 1790; Backer & Bakh. f., Fl. Jav. 1: 499, 1963. – *E. bicolor* Hassk., Retzia 1: 158, 1855.

Shrubs erect, often much-branched. Leaves dark red beneath, dark green above, opposite or spirally arranged along thicker branches, lanceolate or ovate-lanceolate, 3-14 x 1.25-4.5 cm; petioles 0.30-0.75 cm long; racemes at first

terminal, then pushed aside by lateral shoot, staminate many-flowered; stigmas laterally compressed, slightly involute at apex; fruits 3-lobed.

Cochin-China. Introduced recently in the Philippines as an ornamental; in Mt. Makiling, Luzon, cultivated as an ornamental; poisonous.

Com. name – *Picara* (Tag.).

Exsicc. – *Pancho* CA 20039, 20329 (CAHP).

25. SAPIUM P. Browne

Trees or shrubs. Leaves spirally arranged, entire or toothed, pinnately nerved; petioles frequently biglandulose at apex. Flowers in terminal, simple or paniced spikes or racemes, bisexual, apetalous; staminate flowers several in each bract; calyx membranous, shortly 2- to 3-lobed; stamens 2-3; filaments free; pistillodes none; pistillate flowers solitary in each bract, usually basal; calyx 3-fid; ovaries 2- or 3-celled; styles free or connate at base, spreading or recurved, undivided; ovules solitary in each cell. Capsules crustaceous, fleshy or pulpy, rarely woody; seeds globose.

Species 100, in the tropics of both hemispheres; 5 in the Philippines.

1. Racemes terminal, 7-12 cm long; seeds covered with thick, waxy, white layer 1. *S. sebiferum*
1. Racemes axillary, 3-8 cm long; seeds otherwise 2. *S. luzonicum*

1. *Sapium sebiferum* (L.) Roxb., Fl. Ind. 3: 693, 1832; Keng, Taiwania 6: 64, 1955. – *Croton sebiferum* L., Sp. Pl. 2: 1004, 1753.

Trees. Leaves rhomboid-ovate, 5-9 cm long, shortly acuminate, base acute; petioles 2-5 cm long, with two prominent glands at base of blade. Racemes terminal, 7-12 cm long, staminate on top, subsequent ones with 1-4 pistillate flowers at base. Capsules subglobose, 1.5 cm across, 7 mm long, mucronate; seeds 6.5 mm long, covered with thick, waxy, white, outer layer.

Southern China to Taiwan and Java. Introduced recently in the Philippines; few plants are grown in home gardens in Los Baños, Laguna, Luzon, Philippines.

Com. name – Chinese tallow (Engl.).

Exsicc. – *Pancho* CA 20135, 20506 (CAHP).

2. *Sapium luzonicum* (Vid.) Merr., Philip. J. Sc. 16: 577, 1920; En. Philip. 2: 461, 1923; Airy-Shaw, Euph. Philip. 44, 1983. – *Myrica luzonica* Vid., Sinop. Atlas 40, t. 90, f. B, 1883.

Figure 62

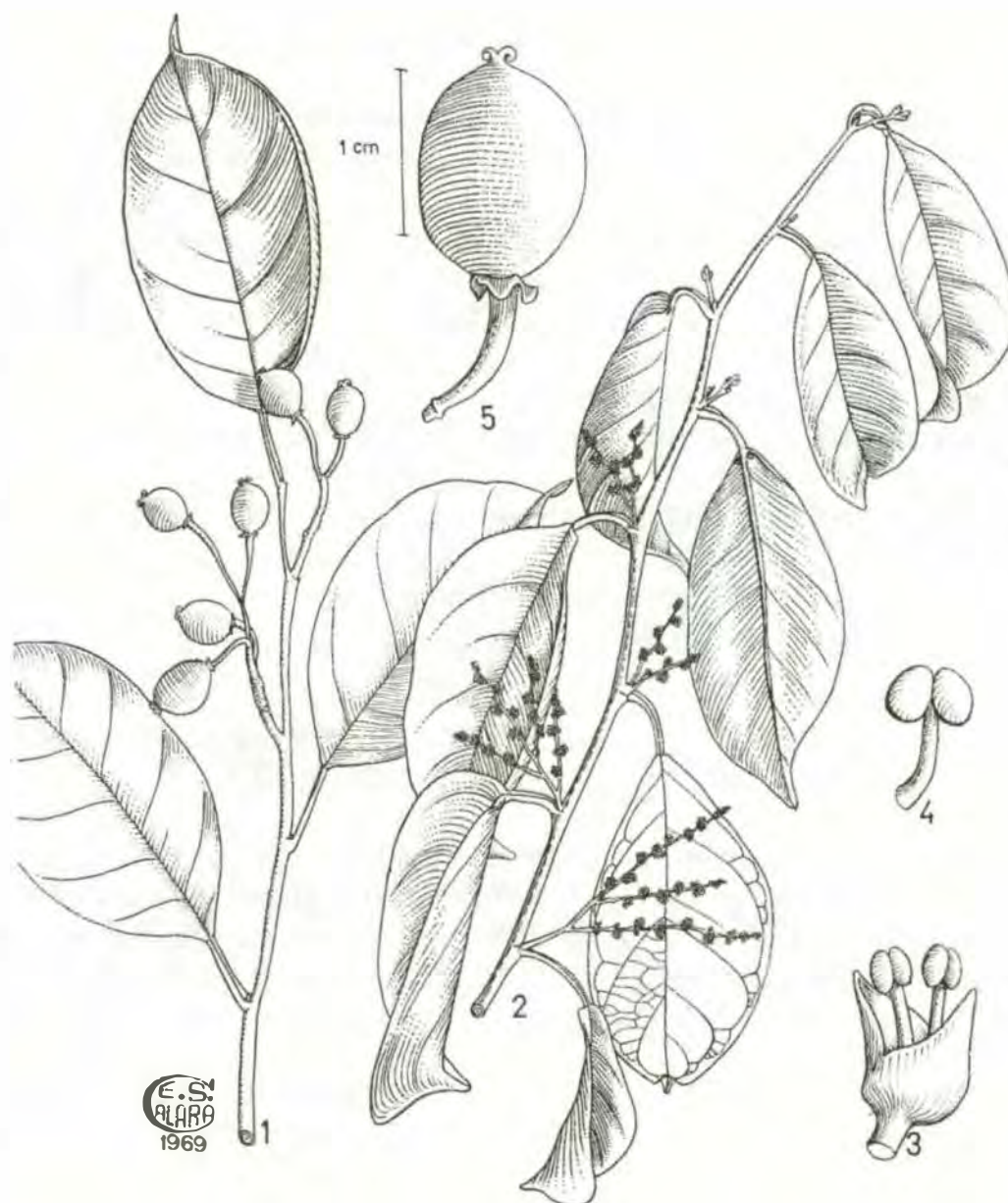


Figure 62. *Sapium luzonicum*: 1. fruiting branch; 2. flowering branch; 3. staminate flower; 4. stamen; 5. fruit.

Trees. Leaves ovately elliptic to oblong, 7-14 x 3-6 cm, midrib with 5-7 obscure nerves, glabrous, short-acuminate, base acute; petioles 1-3 cm long. Inflorescences axillary, in spicate or paniculate racemes, 3-8 cm long, glabrous; staminate flowers subsessile, fasciculate, subtended by ovate bracts; stamens 2; petals and disc absent; pistillate flowers scattered below, few, solitary, often pedicelled; ovaries ovoid, glabrous, 2-celled; styles in pairs, recurved. Fruits ovoid to obovoid, glabrous, 1-seeded, indehiscent, stalk 1.75 cm long.

Endemic. Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, at 30 to 300 m.

Com. name – *Balakat-gubat* (Tag.).

Exsicc. – *Cruz de la CA 3073; Gates & Lopez CA 1656; Peña CA 8156** (CAHP).

26. OMPHALEA Linnaeus, *nom. cons.*

Shrubs scandent, rarely trees. Leaves alternate; petioles with 2 glands at apex. Inflorescences paniculate, terminal in axils of leaf-like bracts, middle flowers pistillate, bisexual; disc wanting or rarely developed; filaments grown together into a short column; rudimentary ovaries none; ovaries 2- to 3-celled; styles columnar, fleshy-hairy, short, 2- or 3-lobed. Fruits thick, spherical, indehiscent.

Species 12, mainly in tropical America, a few in Madagascar and the Malay Peninsula; 3 in the Philippines.

1. *Omphalea bracteata* (Blco.) Merr., Sp. Blanc. 230, 1918; En. Philip. 2: 457, 1923; Airy-Shaw, Euph. Philip. 19, 1983. – *Tragia bracteata* Blco., Fl. Filip. ed. 2, 480, 1845.

Vines large, woody. Leaves lanceolately oblong, 12-22 x 3-7 cm, nerves 9 on each side of prominent midrib, glabrous, entire, abruptly acuminate, base acute to obtuse; petioles 2.5 cm long, biglandular at point of attachment. Inflorescences 40 cm long, obscurely ferruginous, branches stout, virgate; flowers numerous, apetalous, fasciculate; pedicels 6-7 mm long, thickened upwards; sepals 5, imbricate; anthers sessile. Fruits dehiscent, 3 cm long, roundly trigonous; seeds ovoid, 1.75 cm long.

Borneo and Celebes. Philippines: Luzon (Rizal, Laguna, Quezon, Camarines); in forests along streams; in Mt. Makiling, Luzon, along streams and ravines at low altitudes.

Com. name – *Kanawai* (Tag.).

Exsicc. – *Pancho CA 20264, 20491* (CAHP).

27. MANIHOT Miller

Trees or shrubs with milky sap. Leaves alternate, deeply 3- to 11-lobed, long-petiolate. Flowers apetalous, bisexual in racemes, cymes or panicles, 1-5 lowest flowers pistillate, long-pedicelled, higher ones staminate on shorter pedicels; calyx of staminate usually colored, campanulate, 5-lobed, lobes imbricate; stamens 10, inserted in 2 rows between disc-lobes or glands of disc; filaments free; pistillate calyx as for staminate, disc lobed or entire; ovaries 3-celled, each cell 1-ovuled. Capsules 3-celled, each portion of 2-valved cocci.

Species 128, tropical America but chiefly in Brazil; 3 in the Philippines.

1. Shrubs with fleshy roots; leaf segments sharply acuminate 1. *M. esculenta*
 1. Trees with woody roots; leaf segments obovate or broadly elliptic 2. *M. glaziovii*

1. *Manihot esculenta* Crantz, Inst. Rei Herb. 1: 167, 1766; Merr., Trans. Am. Phil. Soc., N.S., 240, 1935. – *M. utilisissima* Pohl, Pl. Bras. Ic. Descr. 1: 32, pl. 24, 1827. **Figure 63**

Shrubs erect, up to 3 m high. Roots stout, fleshy. Leaves palmately divided to base into 3-7 lanceolate, entire segments, segments sharply acuminate, pale or subglaucous beneath, glabrous; petioles smooth, terete, as long as blades with linearly elongate, caducous stipules. Inflorescences lax, equaling petioles, paniculate, axillary, glabrous; flowers upon long pedicels, bract-subtended, yellowish white, subcampanulate; anthers equaling perianth; pistils much-exserted. Capsules ovoid, 1.5 cm long, longitudinally 6-crested.

Native of tropical America. Throughout the Philippines, in cultivated settled areas.

Com. name – Cassava (Engl.). Kamoteng kahoy, balinghoy (Tag.).

Exsicc. – Azetuya CA 1643; Blancaver CA 4774; Reyes CA 10140*; Velasco CA 1642 (CAHP).

2. *Manihot glaziovii* Muell.-Arg. in Mart., Fl. Bras. 11: 446, 1874; Merr., En. Philip. 2: 450, 1923.

Trees usually erect, up to 12 m high. Stems covered with thin, somewhat papery bark which usually separates by rolling upon itself in transverse belts,



Figure 63. *Manihot esculenta*: 1. tuberous roots; 2. portion of fruiting twig; 3. seed, 2 views; 4. leaf; 5. branch tip. (After Pancho 1983, with permission).

twigs glaucous-green, smooth, striate. Leaves palmately 3- to 5-lobed, lobes obovate or broadly elliptic, 8-20 cm long, entire, acute, pinnately nerved, pale or glaucous beneath, peltate at cordate base, long-petioled. Panicles in upper leaf axils, equaling petioles or shorter, smooth, fleshy; flowers long-stalked, 1.25 cm long, pale or yellowish white. Fruits globose, 2.25 cm in diameter, rough but not hairy, thick exocarp opening by 3 longitudinal grooves; pedicels long, stout.

Native of Brazil. In Mt. Makiling, Luzon, Philippines, cultivated in some homes as an ornamental.

Com. name – Ceara rubber (Engl.).

Exsicc. – *Gates & Quisumbing CA 1641* (CAHP).

28. HURA Linnaeus

Trees with spiny trunks. Leaves alternate, long-petioled, terminally clustered, broad. Flowers bisexual, apetalous without disc. staminate conically elongate, terminally or nearly so, peduncled, solitary from each bract, numerous crowded upon a thick receptacle; calyx short, cup-shaped, truncate or slightly dentate; pistillate flowers in upper leaf axils or side by side with staminate spikes, pedicels thick; calyx broadly ellipsoid or campanulate, truncate, styles columnar, fleshy at apex, expanded into radiating segments. Capsules large, strongly compressed, sunken at apex, numerous sulcate, cocci attached to central column; seeds compressed.

Species 2 or 3, tropical America; 1 in the Philippines.

1. *Hura crepitans* L., Sp. Pl. 2: 1008, 1753; Gooding, *et al.*, Fl. Barb. 253, f. 15, 1965 **Figure 64**

Trees erect with milky, poisonous sap. Leaves ovately rotund, 10-15 cm long or shorter, abruptly acute to acuminate, base usually cordate; petioles 5-20 cm long, with a large gland at distal end; bud bracts glaucous-green, finely ciliate, ovate, less than 1 cm long. Staminate flowers yellowish white, crowded in elongate cones on 2-3 cm long stalks. pistillate flowers solitary or in pairs, ascending, shorter than and usually below staminate ones. Fruits numerous and prominently sulcate, broad, much-flattened.

Tropical America. In Mt. Makiling, Luzon, introduced in the University campus, Los Baños, Laguna.

Com. name – Sand box tree (Engl.).

Exsicc. – *Ballesteros CA 8014; Birco CA 3384**; *Espiritu CA 8197; Estioko CA 1624; Novero CA 8123; Velasco CA 1625* (CAHP).



Figure 64. *Hura crepitans*: 1. habit; 2. portion of flowering twig; 3. staminate inflorescence; 4. staminate flower; 5. capsule; 6. seed with attached cocci.

29. **OMALANTHUS*** Jussieu

Glabrous trees or shrubs with milky juice. Leaves alternate, broad, entire or nearly so, often hairy beneath, pinnately nerved, slenderly petioled, petioles bearing 2 sessile glands (sometimes subconnate) at or below apex; stipules large, caducous, usually colored. Flowers small, bisexual or unisexual, petalous in terminal racemes; staminate many in each bract; pistillate at base of raceme, few or solitary in each bract or solitary at ends of branches; disc absent; calyx of staminate flowers short, of 2 flatly compressed sepals; stamens 6-50, rarely fewer; filaments short; anther exerted; ovaries 2- or 3-celled; styles linear, divergent; ovules solitary in each cell. Capsules didymous, fleshy, indehiscent or tardily splitting into 2-valved cocci; seeds ovoid, with fleshy aril.

Species 30, Malaysia to Australia and Polynesia; 8 in the Philippines.

- 1. Monoecious; in valleys 1. *O. populneus*
- 1. Dioecious; alpine
 - 2. Leaves cordate, basal glands not prominent 2. *O. fastuosus*
 - 2. Leaves subtruncate or broadly cuneate, basal glands prominent
..... 3. *O. alpinus*

1. ***Omalanthus populneus*** (Geisel.) Pax in E. & P., Pfl. Fam. 3: 96, 1890; Merr., En. Philip. 2: 460, 1923 (*Homalanthus*); Airy-Shaw, Euph. Philip. 33, 1983 (*Homalanthus*). – *Stillignia populnea* Geisel., Croton. Monog. 80, 1807. **Figure 65**

Shrubs or small trees. Leaves ovate-triangular-rhomboid, 8 cm long or shorter, with 7 pairs of ascending nerves, glaucous-green beneath, sharply acute to acuminate, base broadly obtuse; petioles 5-10 cm long. Inflorescences bisexual, exceeding foliage, pistillate below staminate or upon much-shortened racemose spikes; staminate flowers yellowish green, pedicelled with membranous calyx, numerous clustered; pistillate upon 1-5 cm long, slender stalk, dark green. Capsules globose-ovoid, with persistent style; seeds triangular, 3-6 mm long.

India to Malesia, Australia and Polynesia. Typical of the *parang* or valley vegetation throughout the Philippines; in Mt. Makiling, Luzon, from 30 to 250 m.

Com. name – *Balanti* (Bis., Ilk., Tag.).

Exsicc. – *Bernardo* CA 2913; *Carag & Orlido* CA 10602; *Gates & Quisumbing* CA 1617; *Guantes* CA 10086*; *Navera* CA 1618; *Orlido* CA 10600; *Velasco* CA 1618-A (CAHP); *Elmer* 17562, 1237171 (US).

*This is the original spelling, not *Homalanthus*.

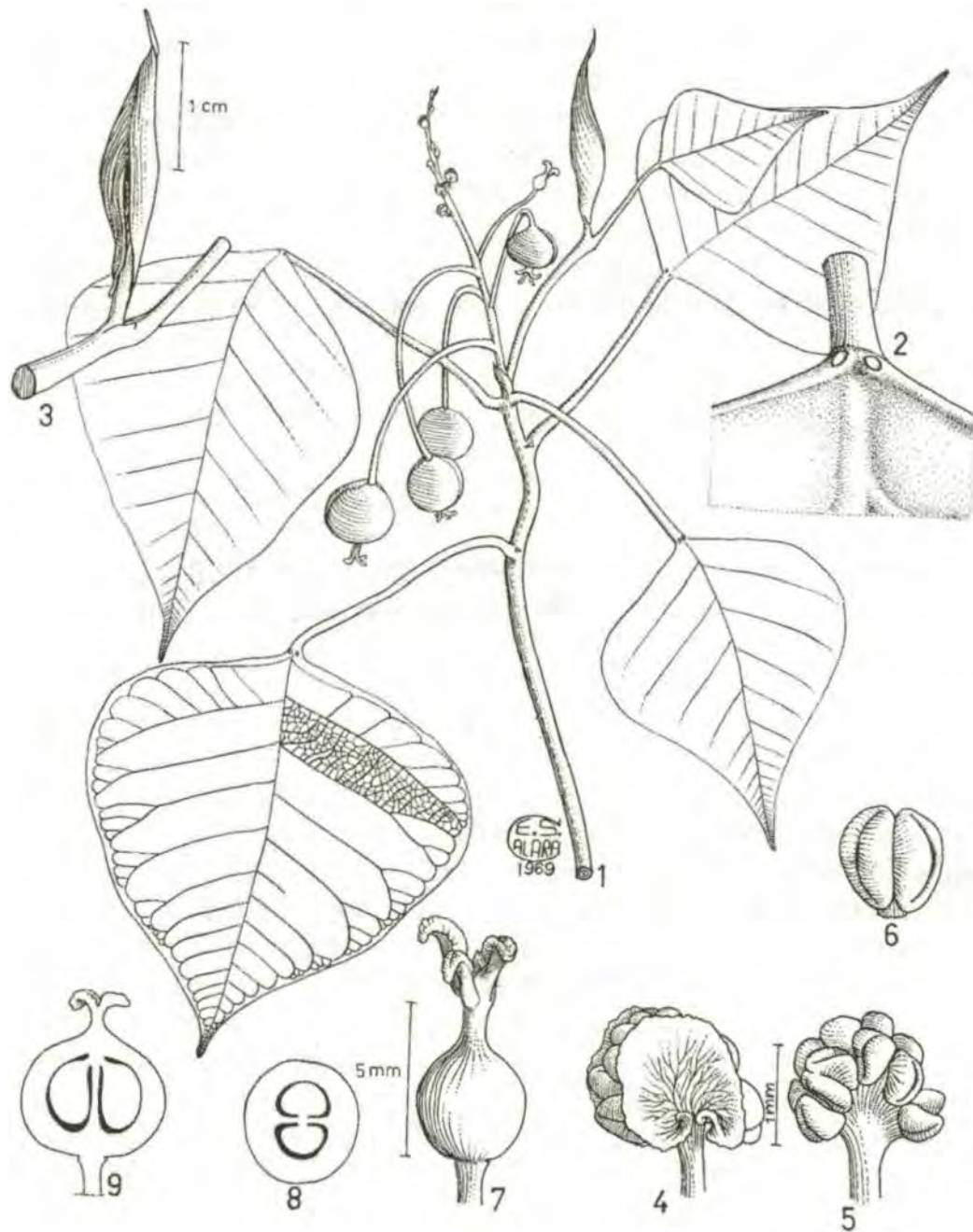


Figure 65. *Omalanthus populneus*: 1. flowering branch; 2. base of lamina with a pair of glands; 3. terminal bud; 4. staminate flower; 5. staminate flower, partly excised; 6. stamen; 7. ovary; 8. ovary, cross section; 9. ovary, vertical section.

2. *Omаланthus fastuosus* (Linden) F.-Vill., Nov. App. 196, 1880, Merr., En. Philip. 2: 459, 1923 (*Homalanthus*); Airy-Shaw, Euph. Philip. 32, 1983 (*Homalanthus*). – *Mappa fastuosa* Linden, Cat. 4, 1865.

Shrubs or small trees. Leaves ovate, 10-15 cm long, reddish midrib pronounced with 7-10 ascending nerves on each side, pale or subglaucous beneath, larger leaves peltate with a pair of glands at point of attachment to petiole, short-acute, base broadly rounded; petioles 5-10 cm long. Spikes terminal, equaling or exceeding foliage, staminate except pistillate basal portion; staminate flowers grouped, short-stalked, with membranous calyx; pistillate upon longer stalks, yellowish gray. Fruits obovoidly subdidymous, terminated by thick style arms.

Endemic. Throughout the Philippines, in thickets and old clearings at 500-2000 m; in Mt. Makiling, Luzon, in forest-borders up to the summit.

Com. name – *Botinag* (lg.)

Exsicc. – *Elmer 18087, 1237554, 17878, 1050186* (US).

3. *Omаланthus alpinus* Elm., Leafl. Philip. Bot. 1: 307, 1908; Merr., En. Philip. 2: 459, 1923 (*Homalanthus*); Airy-Shaw, Euph. Philip. 33, 1983 (*Homalanthus*).

Shrubs or small trees. Leaves ovate, larger lamina 8 cm long and nearly as wide across middle, 7-10 pairs of nerves often reddish tinged, glabrous, glaucous-green beneath, short-obtuse or sharply acute, base subtruncate or broadly cuneate; petioles 8 cm or more long. Inflorescences unisexual, terminal in upper leaf axils; staminate flowers numerous, crowded along elongate spikes which exceed foliage, glabrous, yellowish white, short-pedicelled; calyx membranous; pistillate upon short cyme not exceeding petiole. Fruits glaucous, 5-8 mm long, didymous, longitudinally ridged to top, 2-forked styles persistent.

Endemic. Luzon to the Visayan islands, Philippines, in thickets at 900-2400 m; in Mt. Makiling, Luzon, from the mossy forest to the summit.

Com. name – *Buta* (lg.).

Exsicc. – *Villamil CA 1613* (CAHP); *Villamil BF 20648, 1238369* (US).

30. HEVEA Aublet

Trees with abundant milky sap. Leaves long-petioled, trifoliolate; petioles glandular at apex; leaflets entire, penninerved. Flowers bisexual, subterminal, shorter than leaf petioles, cymosely paniculate, apetalous, central flowers

in each cyme usually pistillate, others staminate; calyx 5-lobed; stamens 5-10; filaments united; anthers 1- or 2-vericillate; disc glands 5, small, free or united; pistillate flowers with 3-celled ovaries; ovules solitary in each cell; stigmas thick, sessile or nearly so. Capsules large, exocarp somewhat fleshy, endocarp bony, separating into 2-valved cocci; seeds subglobose to oblong, smooth.

Species 7, northern South America; 1 in the Philippines.

1. *Hevea brasiliensis* (H.B.K.) Muell.-Arg., *Linnaea* 34: 204, 1865; Merr., *En. Philip.* 2: 450, 1923. – *Siphonia brasiliensis* H.B.K., *Nov. Gen. Sp. Pl.* 7: 141, 1818. **Figure 66**

Trees. Leaflets oblong or broadly lanceolate, as long as petioles, tapering at both ends, apex sharply pointed, glabrous, pinnately nerved, 5-7 cm wide across middle; petioles 15 cm long. Inflorescences glabrous or pedicels and perianth canescent; calyx short-campanulate; stamens several; anthers adnate to a column in 1 or 2 series, connective point prominent; ovaries ovoid, 3-celled. Fruits glabrous but somewhat rough, ovoid or ellipsoidly globose, 4 cm long, 3-celled, 3-seeded; seeds brown-mottled.

Native of Brazil. Introduced and naturalized in some parts of the Philippines particularly in southern Mindanao for the commercial rubber; in Mt. Makiling, Luzon, cultivated on the University campus and nurseries, Los Baños, Laguna.

Com. name – Para rubber (Engl.).

Exsicc. – *Estioko, Jr.* CA 1605; *Fortunado* CA 4553; *Guieb* CA 1608; *Novero* CA 7067; *Pancho* CA 3186* (CAHP).

31. ACALYPHA Linnaeus

Herbs, shrubs or small trees. Leaves alternate, stipulate, toothed or crenate, rarely entire, pinnately nerved or 3- to 5-plinerved. Flowers bisexual, rarely unisexual, minute, in axillary or terminal spikes, staminate with small bracts or ebracteolate; calyx thin, splitting into 4-valvate sepals; disc none; stamens 8 or more on convex receptacle; filaments free; pistillodes absent; pistillate at base of staminate spikes or often separate, usually subtended by large, accrescent, leaf-like bracts; sepals 3 or 4, very small; ovaries 3-celled; style filiform, often long-laciniate or fimbriate; ovules 1 in each cell. Capsules of 3 minute 2-valved cocci; seeds subglobose.

Species 400, in tropical and subtropical regions of both hemispheres; 12 in the Philippines.



Figure 66. *Hevea brasiliensis*: 1. flowering branch; 2. inflorescence tip; 3. base of petiolule showing glands; 4. portion of fruiting branch; 5. staminate flower, partly excised; 6. pistillate flower; 7. ovary, vertical section; 8. ovary, cross section; 9. seed.

1. Herbs
 2. Spikes 5-6 cm long; bracts distant, glabrous or nearly so 1. *A. indica*
 2. Spikes 1-2 cm long; bracts close, somewhat imbricate, densely pubescent 2. *A. lanceolata*
1. Shrubs or undershrubs
 3. Spikes stout, up to 40 cm in length, purple, dense, about 1 cm in diameter 3. *A. hispida*
 3. Spikes slender, 10-20 cm long, pale purple or greenish yellow, less than 5 mm in diameter
 4. Leaves broadly ovate, variously mottled with red and purple 4. *A. wilkesiana*
 4. Leaves oblong-ovate to ovate-orbicular, green
 5. Leaves ovate-orbicular; petioles as long as blades 5. *A. caturus*
 5. Leaves oblong-ovate; petioles half as long as blades 6. *A. amentacea*

1. *Acalypha indica* L., Sp. Pl. 2: 1003, 1753; Merr., En. Philip. 2: 446, 1923. **Figure 67**

Annual herbs erect, simple or branched, appressed-pubescent, 30-80 cm high. Leaves long-petioled, ovate, 3-6 cm long, shorter than petioles, crenate-serrate, acute or obtuse, base acute, entire. Inflorescences solitary, apical portion often strongly elongated into 5-8 mm long, thin stalk, often terminated by abnormal pistillate flower; bracts few to many, distant, green, glabrous or nearly so, 5-6 mm long, crenate, reniform when spread, each with 1 or more pistillate flowers. Capsules 2 mm long, slightly hispid.

Tropical Africa, through tropical Asia to Malesia. Throughout the Philippines, in wastelands; a common weed in shaded areas at low altitudes.

Com. name – *Maraotong* (Ilk.).

Exsicc. – *Gates CA 1539; Ocampo CA 13318** (CAHP).

2. *Acalypha lanceolata* Willd., Sp. Pl. 4: 524, 1805; Airy-Shaw, Euph. Born. 24, 1975. – *A. boehmerioides* Miq., Fl. Ind. Bat. Suppl. 459, 1861-62; Merr., En. Philip. 2: 445, 1923.

Annual herbs erect, simple, rarely branched, appressed-pubescent, 20-80 cm high. Leaves 2-7 cm long, long-petioled; ovate to oblong-ovate, acuminate; base acute, entire, margins dentate. Inflorescences 1-4 together, in transitional zone from staminate to pistillate, often bearing 1-3 abnormal pistillate flowers; bracts numerous, crowded, imbricate, densely pubescent,



Figure 67. *Acalypha indica*: 1. habit; 2. inflorescence stalk; 3. pistillate flower; 4. portion of terminal inflorescence, enlarged; 5. abnormal pistillate flower; 6. seed, 3 views.

toothed, reniform when spread, 4-5 mm long. Capsules much shorter than bracts, hirsute.

Tropical Asia. Throughout the Philippines, in wastelands; a weed in shaded areas.

Exsicc. – *Orlido CA 10345, 10871, 10872, 12952; Valencia CA 1540; Velasco CA 1534, 1535, 1541* (CAHP).

3. ***Acalypha hispida*** Burm. f., Fl. Ind. 303, t.61, f.1, 1768; Merr., En. Philip. 2: 445, 1923.

Shrubs erect, scandent. Leaves broadly ovate, 10-20 x 6-16 cm, 3-plinerved from base with several lateral pairs of nerves along midvein, glabrous or veins hairy beneath, margins coarsely toothed, acute to abruptly acuminate, base rounded or often slightly cordate; petioles 5-9 cm long. Spikes equaling or much exceeding foliage, pendulous; peduncles pubescent, shorter than petioles; flowers densely clustered, red, at least 1 cm thick, mainly pistillate; ovaries densely villous, sessile clustered; styles divided into many filiform, purplish branches.

Probably a native of New Britain. Cultivated for ornamental purposes; throughout the Philippines, in and about towns.

Com. name – *Perpon* (Tag.).

Exsicc. – *Champhaka CA 8062, Foxworthy CA 1537; Hernaez CA 12478; Mendoza CA 1538; Velasco CA 1536* (CAHP); *Robinson & Foxworthy BS 17280, 902284* (US).

4. ***Acalypha wilkesiana*** Muell.-Arg in DC., Prodr. 15: 817, 1866; Merr., En. Philip. 2: 446, 1923.

Shrubs erect up to 3 m high. Leaves ovate or ovate-rhomboid, 10-18 x 6-12 cm, glabrous, bronze-colored but variously mottled with red, purple and olive, prominently serrate-dentate, acute to acuminate, base obtuse to rounded; petioles 3 cm or more long, olivaceous-pubescent. Spikes pale purple, up to 5 mm in diameter, axillary, slender, erect or ascending, nearly equaling foliage, but mostly shorter, rachis pubescent; pistillate flowers bract-subtended; staminate in dense sessile clusters; ovaries canescent with filiform styles.

Native of Melanesia (Polynesia), now cultivated in most tropical countries; ornamental. Cultivated as an ornamental plant throughout the Philippines but nowhere spontaneous.

Com name – *Perpon-pula* (Tag.).

Exsicc. – *Curio CA 10133; Lugod CA 4926, 4927; Orlido CA 10346; Tsai CA 1545* (CAHP); *Robinson & Foxworthy BS 17281, 902283* (US).

5. *Acalypha caturus* Bl., Bijdr. 629, 1826; Muell.-Arg. in DC., Prodr. 15: 805, 1866; Merr., En. Philip. 2: 445, 1923; Airy-Shaw, Euph. Philip. 2, 1983. – *A. cardiophylla* Merr., Philip. J. Sc. 1: Suppl. 80, 1906.

Shrubs widely spreading. Leaves ovate or cordate, 10 cm long or more, mostly 3-nerved at base, larger veins hairy beneath, crenately toothed, abruptly terminated into an acute point, base broadly rounded or shallowly cordate; petioles ciliate, as long as blades. Spikes solitary, axillary, thread-like, finely pubescent, shorter or about as long as foliage, laxly spreading; staminate flowers usually in groups, puberulous, pistillate scattered and subtended by small bracts; ovaries pubescent; styles laciniately dissected.

Sumatra, Java, Borneo and Celebes. Throughout the Philippines, in thickets and forests along streams at low and medium altitudes; in Mt. Makiling, Luzon, often encountered along streams at low altitudes.

Com. name – *Migtanong-puso* (Bik.).

Exsicc. – *Pancho CA 20050, 20470* (CAHP).

6. *Acalypha amentacea* Roxb., Fl. Ind. ed. 2, 3: 676, 1832; Airy-Shaw, Euph. Philip. 2, 1983. – *A. stipulacea* Klotz., Nov. Act. Acad. Nat. Cur. 19: Suppl. 1, 416, 1843.

Shrubs or small trees erect, laxly branched. Leaves ovately elongate, often diverse in size, 8-16 cm long, mostly 3-veined from base, midvein with 3-5 lateral pairs of nerves, crenulate, slenderly acuminate, base broadly rounded; petioles 3-9 cm long; stipules setaceous, 1.5 cm long, glabrous or sparsely hairy, subpersistent. Spikes solitary, axillary, erect or ascending, usually shorter than foliage, slender; rachis finely canescent; staminate flowers densely clustered, pistillate scattered and upon other spikes, bract-subtended, bracts pectinately lobed, green; ovaries woolly-pubescent; styles dissected into slender arms.

Borneo to New Guinea. Throughout the Philippines, in thickets and old clearings at low and medium altitudes; in Mt. Makiling, Luzon, along streams and wooded ravines at low altitudes.

Com. name – *Bogus* (Mbo., P. Bis.).

Exsicc. – *Cassanova CA 1542; Champhaka CA 8064; Diloy CA 1549; Espiritu CA 8195; Gates CA 1546; Hernaez CA 12453; Jarmin CA 1551; Magnaye CA 1544; Stern CA 12105; Tsai CA 1543; Velasco CA 1548* (CAHP); *Elmer 17919, 1237431; Robinson BS 6012, 595595* (US).

32. *ALCHORNEA* Swartz

Trees or shrubs. Leaves spirally arranged, often subopposite or subverticillate, entire or toothed, simple, usually glandular at base and often 3- to 5-nerved from base, sometimes stipellate. Flowers unisexual or bisexual, small, clustered on terminal spikes or paniculate racemes, apetalous; bracts minute; disc usually absent; calyx of staminate flowers globose, splitting into 2- to 4-valvate segments; stamens 6-8 or indefinite; filaments free or connate at base; pistillodes none; sepals of pistillate flowers 3-6, imbricate; ovaries 2- to 3- or sometimes 4-celled; styles distinct, often long-linear, entire, bifid or sparingly lobed; cells 1-ovuled. Schizocarps flattened, 3-lobed, 3-celled; seeds subglobose.

Species 50, of wide tropical distribution; 5 in the Philippines.

1. Inflorescences racemosely paniculate, about equaling foliage; flowers subtended by minute bracts 1. *A. rugosa*
 1. Inflorescences spicate, shorter than foliage; flowers subtended by large bracts..... 1. *A. sicca*

1. *Alchornea rugosa* (Lour.) Muell.-Arg., *Linnaea* 34: 170, 1865; Merr., En. Philip. 2: 438, 1923; Airy-Shaw, *Euph. Philip.* 4, 1983. – *Cladodes rugosa* Lour., *Fl. Cochinch.* 574, 1790.

Trees small, up to 3 m high. Leaves obovately oblong, 13 x 5 cm long, with 7-10 pairs of ascendingly curved nerves, glabrous except stout midrib, narrowed base entire, otherwise denticulate, acute to acuminate, auriculately rounded at base; petioles short, finely pubescent. Inflorescences racemosely paniculate, about equaling foliage, glabrate or puberulent; staminate flowers in small sessile clusters, subtended by minute ciliated bracts, pistillate upon short spikes, scattered, pedicelled. Capsules glabrous, 5-8 mm across, trigonous, short-stalked.

Burma to southern China through Malaysia. In the Philippines, in the *parang* formation and in vacant lots of towns and barrios; in Mt. Makiling, Luzon, in abandoned *kaingin* and open woods.

Com. name – *Aguioi* (Tag.).

Exsicc. – *Pancho CA 20055, 20504* (CAHP).

2. *Alchornea sicca* (Blco.) Merr., *Philip. J. Sc.* 5 (Bot.): 192, 1910; Merr., En. Philip. 2: 439, 1923; Airy-Shaw, *Euph. Philip.* 4, 1983. – *Excoecaria sicca* Blco., *Fl. Filip.* 787, 1837.

Undershrubs erect, up to 2 m high. Leaves ovate, variable in size, glabrous, entire or obscurely crenate, gradually acute to acuminate, base broadly rounded or shallowly cordate; petioles 3 cm long, glabrous; stipules setiform. Spikes solitary or clustered, usually lateral, shorter than foliage, puberulent; staminate flowers crowded and evenly scattered throughout length of spikes, subtended by large, usually ciliate bracts; pistillate by small, glabrous bracts; young ovaries densely hairy; styles slenderly forked. Capsules subglobose, roundly 3-lobed at apex, glabrate, 5-8 mm thick, subsessile, crowned by styles.

Endemic. Luzon, Philippines; in thickets along small streams at low altitudes; in Mt. Makiling, Luzon, along streams at lower elevations.

Com. name – *Tayan* (Tag.).

Exsicc. – *Pancho CA 20088, 20182* (CAHP).

33. NEOTREWIA Pax & Hoffmann

Trees with spreading crown. Leaves opposite or nearly so, entire or crenate, diverse in size, glabrous. Staminate flowers axillary or terminally clustered, racemose, puberulent, ebracteolate; pistillate stoutly pedicelled, each subtended by elongated bracts; ovaries canescent. Fruits ovoidly globose, 1-celled, 1-seeded, indehiscent.

Monotypic. Celebes and the Philippines.

1. *Neotrewia cumingii* (Muell.-Arg.) Pax & Hoffm. *in Engl. Pfl. R.* 63: 212, f. 31, A-E, 1914; Merr., *En. Philip.* 2: 437, 1923; Airy-Shaw, *Euph. Philip.* 39, 1983. – *Mallotus cumingii* Muell.-Arg., *Linnaea* 34: 195, 1866

Trees burly. Leaves oblong to ovately lanceolate or oblanceolate, 15 x 5-6 cm, entire or coarsely crenate, midrib ridged beneath, 7-10 pairs of nerves prominently interarching at their ends, abruptly acute, base subcuneate to broadly obtuse; petioles 2-7 cm long. Staminate inflorescences shorter than leaves; flowers solitary or few-clustered, pedicellate; stamens numerous; pistillate flowers subtended by elongate bracts; ovaries with elongate neck numerously dissected at apex into linear stigmatic lobes. Fruits 1.5 cm in diameter.

Throughout the Philippines, in thickets and forests at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests up to 350 m.

Com. name – *Apanang* (Tag.).

Exsicc. – *Gruèzo WM24002* (CAHP).

34. RICINUS Linnaeus

Annual herbs or shrubs coarse, erect, branched. Leaves alternate, orbicular-ovate, peltate, palmately lobed. Flowers apetalous in axillary subpaniculate racemes, lower ones staminate in scattered fascicles, upper stamens numerous; filaments variously connate in branching clusters; calyx of pistillate flowers spathe-like, caducous; ovaries 3-celled; ovules solitary in each cell. Styles short or long, spreading, entire or 2-fid. Capsules of three, 2-valved, 1-seeded cocci.

Monotypic. Perhaps of African origin, now widely cultivated throughout the tropics.

1. *Ricinus communis* L., Sp. Pl. 2: 1007, 1753; Merr., En. Philip. 2: 447, 1923; Airy-Shaw, Euph. Philip. 44, 1983. **Figure 68**

Annual herbs or shrubs coarse, erect, branched, 1-4 m high, glabrous, younger parts glaucous, vegetative parts and inflorescences green or purplish. Leaves thin, 20-60 cm in diameter, lobes oblong, acuminate, serrate; petioles long, glandulate at apex. Racemes stout, erect; staminate flowers 1 cm in diameter. Capsules ovoid, 1-1.5 cm long, green or purplish, covered with soft, spine-like processes.

Throughout the Philippines, in open wastelands in and about towns. Cultivated for the oil.

Com. name – Castor oil plant (Engl.).

Exsicc. – *Bandong* CA 1655; *Bondoc* CA 8391; *Orlido* CA 10877*, 10878, 10879; *Orlido & Desamero* CA 10877 (CAHP).

35. HOMONOIA Loureiro

Shrubs or small trees. Leaves alternate, linear to oblong. Flowers unisexual, rarely bisexual, in many few-flowered axillary spikes, apetalous without disc; calyx of staminate flowers globose, splitting into 3 valvate segments; stamens numerous, crowded in dense globose heads of branched filaments; anthers divaricate; pistillodes none; sepals of pistillate 5-8, narrow unequal, imbricate, caducous; ovaries 3-celled; styles spreading, entire, papillose; cells 1-ovuled. Capsules small, of 3 smooth, 2-valved cocci; seeds ovoid.

Species 3, India to Taiwan southward through Malaysia; 2 in the Philippines.

1. *Homonoia riparia* Lour., Fl. Cochin. 637, 1790; Merr., En. Philip. 2: 448, 1923; Airy-Shaw, Euph. Philip. 33, 1983. **Figure 69**

Shrubs, up to 3 m high. Leaves linear, 15 x 2 cm, midrib sparsely hairy, glaucous-green beneath with small, orbicular scales, shiny above, entire, obtuse



Figure 68. *Ricinus communis*: 1. fruiting branch; 2. leaf base showing glands; 3. pistillate flower; 4. ovary, vertical section; 5. ovary, cross section; 6. staminate flowers; 7. stamen; 8. fruit clusters; 9. fruit; 10. seed; 11. seedling. (After Pancho 1983, with permission).



Figure 69. *Homonoia riparia*: 1. portion of staminate twig; 2. portion of pistillate twig; 3. ovary, vertical section; 4. ovary, cross section; 5. seed, 3 views; 6. dorsal (left) and ventral (right) sides of leaf, the latter with small stellate scales.

or mucronate, base auriculately rounded; petioles short, pubescent. Spikes much shorter than foliage, villous; staminate flowers glabrous, globose, sessile, scattered, subtended by small, acute bracts; pistillate subtended by larger acuminate bracts; ovaries woolly. Capsules globose, 5 mm in diameter, sessile, subtended by bracts, canescent, dehiscent.

India to Taiwan southward through Malesia. In most parts of the Philippines, along rivers; in Mt. Makiling, Luzon, along Molawin Creek.

Com. name - *Agoyoi* (Tag.).

Exsicc. – *Estioko* CA 1621; *Gates* CA 1622; *Jarmin* CA 1623*; *Magnaye* CA 1620; *Malabanan* CA 2818; (CAHP).

36. MELANOLEPIS Reichenbach f. & Zollinger

Shrubs or small trees. Leaves alternate, broad, palmately nerved. Flowers in panicles or racemes; staminate flowers 3-5 in a bract; calyx globose, splitting into 3 or 5 lobes; disc none; stamens 200-250, free on a convex, stellately pubescent receptacle; anthers oblong, emarginate, purple; pistillodes none, pistillate flowers solitary in a bract; sepals 5; disc annular, crenate; ovaries 2- rarely 3-celled; styles free. Capsules 2, rarely 3-lobed, splitting into 2- bivalved cocci; subglobose, foveolate.

Monotypic. Southeastern Asia to Melanesia.

1. *Melanolepis multiglandulosa* (Bl.) Reich. f. & Zoll., *Linnaea* 28: 324, 1856; Keng, *Taiwania* 6: 60, 1955; Airy-Shaw, *Euph. Philip.* 38, 1933.
– *Croton multiglandulosa* Reinw. ex Bl., *Cat. Gew. Buitenz.* 105, 1823.
– *Mallotus moluccanus* Muell.-Arg., *Linnaea* 34: 185, 1865.

Shrubs or small trees stellately pubescent and furfuraceous. Leaves orbicular-ovulate, 10-30 cm long, apex acuminate; base cordate, often deeply 3- to 5-lobed, angular-toothed or repand, glabrous above when adult, stellately pubescent beneath. Panicles terminal in upper leaf axils, 20 cm long, densely stellate-tomentose. Capsules 8-10 x 6-7 mm, similarly pubescent.

Throughout the Philippines, in open areas and thickets at low and medium altitudes; in Mt. Makiling, Luzon, in open areas at 30 to 350 m.

Com. name – *Alim* (P. Bis., Tag.).

Exsicc. – *Espirito* CA 6080; *Estioko, Jr.* CA 1646; *Gates* CA 1644; *Gates & Lagrimas* CA 1647; *Lugod* CA 4733; *Velasco* CA 1645 (CAHP); *Elmer* 17866, 1237389 (US).

37. **MALLOTUS** Loureiro

Trees or shrubs. Leaves alternate, rarely opposite, often peltate, entire or lobed, usually glandular beneath, 3- to 5-pinnerved; stipules caducous. Flowers in axillary racemes or branched panicles, unisexual or bisexual, apetalous; staminate numerous, clustered, minute; calyx globose or ovoid, 3 or 4 segments valvate; stamens 1 or more, central; filaments flexuous, bearing 3- or 4-locellate anthers; rudimentary pistils none; pistillate solitary or few to a bract, often large, usually toothed; calyx 2- to 4-lobed; ovaries 1- to 6-celled; styles entire, long or short; cells 1-ovulate. Capsules small, of 1- 5-bivalved cocci, smooth, tubercled or echinate; seeds globose or oblong.

Species more than 100, throughout the tropics of the Old World; 20 in the Philippines.

- 1. Capsules covered with reddish powder..... 1. *M. philippensis*
- 1. Capsules covered otherwise
 - 2. Capsules muricate..... 2. *M. resinus*
 - 2. Capsules otherwise
 - 3. Capsules shaggy; trigonous
 - 4. Capsules prominently trigonous..... 3 *M. mollissimus*
 - 4. Capsules flatly trigonous..... 4 *M. dispar*
 - 3. Capsules brown-felty; didymous..... 5. *M. repandus*

1. ***Mallotus philippensis*** (Lam.) Muell.-Arg., *Linnaea* 34: 196, 1865; Merr., *En. Philip* 2: 435, 1923. – *Croton philippense* Lam., *Encycl.* 2: 206, 1786.

Figure 70

Trees. Leaves alternate, biglandular at base, oblong, 15 cm long by one-third as wide or narrower, puberulent, resinous beneath, entire, trinerved but middle one with 3-5 pairs of ascendingly curved nerves; petioles 2-5 cm long, yellowish brown tomentose. Spikes mostly terminal, 5-8 cm long or longer, dark brown-tomentose or lepidote; staminate flowers few fascicled, short stalk; ovaries reddish, glandular toward apex, otherwise gray-tomentose. Fruits compressed-globose, 5-6 mm thick, 3-celled, 3-seeded, densely covered by reddish brown powder.

India to southern China and Taiwan, southward to New South Wales. Throughout the Philippines, in thickets and second-growth forests at low altitudes; in Mt. Makiling, Luzon, in open wooded areas at low altitudes.

Com. name - *Banato* (Ibn., Ig., Tag.).

Exsicc. – *Champaka* CA 8070; *Gates & Asuncion* CA 1634; *Hernaez* 12472*; *Orlido* CA 4872, 10467; *Sulit* CA 3432 (CAHP); *Rañeses* 33512 (PNH), 2212536; *Elmer* 17712, 1237277; *Robinson & Foxworthy* BS 27274, 902293 (US).

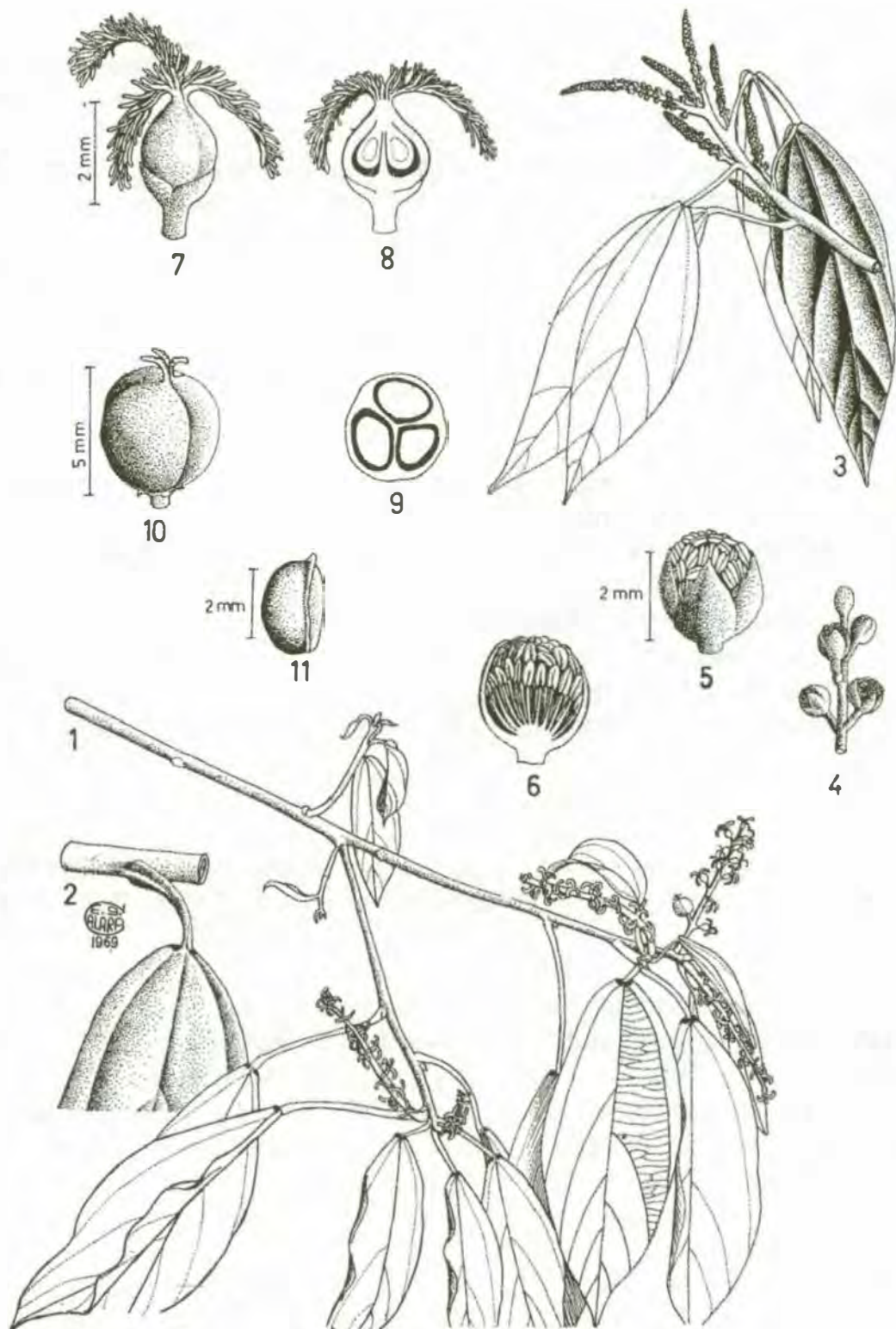


Figure 70. *Mallotus philippensis*: 1. pistillate branch with inflorescences; 2. leaf portion showing glands at base; 3. staminate branch with inflorescences; 4. portion of staminate inflorescence; 5. staminate flower; 6. staminate flower, vertical section; 7. ovary; 8. ovary, vertical section; 9. ovary, cross section; 10. fruit; 11. seed.

2. *Mallotus resinusus* (Blco.) Merr., Sp. Blanc. 222, 1918; En. Philip. 2: 436, 1923. - *Adelia resinosa* Blco., Fl. Filip. ed. 2, 562, 1845.

Shrubs or small trees. Leaves alternate or opposite, obovately oblong to broadly lanceolate, 12 x 5 cm long or smaller, pellucid-glandular on pale lower side, with about 10 pairs of nerves, entire or obscurely dentate, obtuse to acute, base subcuneate to auriculately rounded; petioles short. Staminate spikes axillary, sparingly branched, short or half as long as foliage, rachis short-pubescent; flowers glomerated, subtended by short, broad bracts; pistillate scattered; ovaries muricate, gland-dotted. Capsules compressed, 1 cm across, trigonously divided, muricate.

Throughout the Philippines, in second-growth forests at low altitudes; in Mt. Makiling, Luzon, in abandoned *kaingin* areas at low altitudes.

Com. name – *Gitisan* (Tag.).

Exsicc. – *Elmer* 8296, 854520, 17778, 1237325 (US).

3. *Mallotus mollissimus* (Geisel.) Airy-Shaw, Kew Bull. 26: 297, 1972. – *M. ricinoides* (Pers.) Muell.-Arg., Linnaea 34: 187, 1865; Merr., En. Philip. 2: 436, 1923. – *Croton ricinoides* Pers., Syn. 2: 586, 1807.

Shrubs or small trees. Leaves alternate or subopposite, ovate, often diverse in size, 10 cm long, stellately grayish white or brown-tomentose beneath, trinerved from base, middle one with 5-7 lateral pairs of ascending nerves, entire or often trilobed, slenderly acuminate, base truncate or broadly rounded; petioles lepidote. Panicles terminal, exceeding foliage; staminate flowers sessile or grouped, pistillate mostly clustered toward ends of spikes; ovaries shaggy, short stalked. Capsules prominently trigonous, 2-3 cm across, densely shaggy, grayish brown, forming large or thick clusters.

Tenasserim, through Malesia and northeastern Australia. In the Philippines, abundant in dry woods or *parang* vegetation, ascending to 2000 m; in Mt. Makiling, Luzon, often encountered in pasturelands and in open, wooded areas.

Com. name – *Hinlaumo* (P. Bis.).

Exsicc. – *Diloy* CA 1637; *Gates & Tañedo* CA 1635; *Hernaez* CA 12452; *Ordoño* CA 1639; *Valencia* CA 1636, 1638; *Velasco* CA 1640 (CAHP); *Rudulfa* 9534 (PNH), 2376112 (US); *Gabot* 33450 (PNH), 2212485 (US); *Elmer* 17894, 123714, 17612, 1237207 (US).

4. *Mallotus dispar* (Bl.) Muell.-Arg., Linnaea 34: 191, 1865 (excl. var. *psiloneurus*); Airy-Shaw, Euph. Philip. 36, 1983. - *M. leucocalyx* Muell.-Arg. in DC., Prodr. 15: 970, 1866. Merr., En. Philip. 2: 434, 1923.

Shrubs. Leaves in unequal, opposite pairs, often alternate, elliptic to subrotund, 15-20 cm long by half as wide, pale green, often ciliate beneath, 3-veined from base, middle one with 5-8 lateral pairs of nerves, broadly obtuse to rounded base entire, otherwise dentate; petioles 1-5 cm long, tomentose; bud bracts 1 cm long, setaceous, lanose. Spikes solitary, axillary, yellowish brown-tomentose; staminate flowers solitary or few-clustered, short-pedicelled, subtended by stipular-like bracts; stamens numerous, glabrous; pistillate flowers with shaggy ovaries. Capsules flatly trigonous, 3 cells almost free, grayish green, shaggy.

Malay Peninsula and Celebes. Throughout the Philippines, in thickets and second-growth forests at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests up to 350 m.

Com. name – *Tutula* (Tagb.).

Exsicc. – *Mabesa* BF 23814, 1375859; *McGregor* BS 22916, 898323 (US).

5. ***Mallotus repandus*** (Willd.) Muell.-Arg., *Linnaea* 34: 197, 1865; Merr., *En. Philip.* 2: 435, 1923; Airy-Shaw, *Euph. Philip.* 37, 1983. – *Croton repandus* Willd., *Neue Schrift. Naturf. Freunde* 4: 206, 1803.

Shrubs erect or scandent. Leaves ovate-deltoid-rhomboid, 8 cm long to nearly as wide below middle, trinerved, middle with 3 extra pairs of lateral nerves, stellately pubescent beneath, entire or repand, acute to acuminate, truncately rounded at base; petioles 2-4 cm long, stellately pubescent. Staminate panicles terminal or in uppermost leaf axils, equaling foliage, brown-tomentose; flowers scattered, pedicellate, globose in bud state; pistillate similar, but upon distinct inflorescences. Capsules 3-celled, frequently didymous, rarely by abortion, 1-seeded, brown-felty, 1 cm across.

India to southern China and Taiwan, southward through Malaysia, Java to New Caledonia and northeastern Australia; in Mt. Makiling, Luzon, Philippines, in thickets and secondary forests at low and medium altitudes.

Com. name – *Panualan* (Tag.).

Exsicc. – *Mabesa* BF 26761, 1294044; *Serviñas* BS 16873, 56870 (US).

38. CLAOXYLON A. Jussieu

Shrubs or trees. Leaves alternate, oblong, entire or sinuately toothed, pinnately nerved or rarely triplinerved, usually long-petioled, stipulate. Flowers unisexual, small, in axillary or lateral spikes or racemes; calyx of staminate flowers subglobose, splitting into 3 or 4 valvate segments; petals and disc wanting; stamens many, rarely few, inserted on and around a central receptacle,

often intermixed with glands or ciliate-scales; filaments free; anthers erect; disc of pistillate flowers sometimes of 3 petal-like scales alternating with carpels; ovaries 3-celled; ovules solitary in each cell; styles entire, fringed, spreading. Capsules of three, 2-valved cocci, indehiscent; seeds subglobose, arillate or not.

Species 60, tropics of the Old World; 13 in the Philippines.

1. *Claoxylon albicans* (Blco.) Merr., Sp. Blanc. 220, 1918, En. Philip. 2: 49, 1923; Airy-Shaw, Euph. Philip. 12, 1983 – *Prockia albicans* Blco., Fl. Filip. 430, 1837. – *Claoxylon elongatum* Merr., Philip. J. Sc. 1: Suppl. 204, 1906; En Philip. 2: 430, 1923.

Shrubs. Leaves ovately elongate or oblong, 15-20 x 3-5 cm, pale green beneath, with 7 pairs of ascendingly curved nerves, soft-canescenscent on both sides or glabrous, acute to acuminate, broadly obtuse to subcuneate base entire; petioles 1.5-3 cm long. Staminate flowers upon slender pedicels, globose, splitting into 3-5 segments; pistillate flowers pedicelled. Capsules trigonous, 5-8 mm thick, hairs short or felty.

Endemic. Luzon, Philippines; in thickets and second-growth forests at low altitudes; in Mt. Makiling, Luzon, in *parang* vegetation.

Com. name – *Busilak* (Tag.).

Exsicc. – *Orlido CA 10460*; *Velasco CA 1574, 1576, 1577* (CAHP).

39. MACARANGA Thouars

Trees or shrubs. Leaves alternate or opposite, entire, toothed or 3-lobed, pinninerved or 3- to 7-veined from base, peltate or not, often glandular-dotted unisexual or bisexual without disc, in axillary, terminal, simple or paniced spikes or racemes, apetalous; staminate clustered, globose or oblongish, parallel and adnate to or often widely separated by thick connective; pistillate solitary, bract-subtended; calyx spathaceous or valvately 3- to 6-lobed; ovaries 2- to 4-celled; styles free or connate below, spreading or recurved, entire or plumosely papillate; ovule solitary in each cell. Capsules mainly 2- 3-celled, 2-valved, smooth, tubercled, echinate or spinose; seeds ovoid, somewhat bony.

Species 240, tropics of the Old World; 22 in the Philippines.

1. Leaves 30-80 cm or more; inflorescences pinkish or reddish..... 1. *M. grandifolia*
1. Leaves 15-25 cm or less; inflorescences yellowish or greenish white
 2. Leaves not peltate.....2 *M. sinensis*
 2. Leaves peltate

3. Twigs and leaves pubescent; capsules armed.....3. *M. tanarius*
 3. Twigs and leaves glabrous (or short-pubescent on young tips); capsules unarmed..... 4. *M. bicolor*

1. *Macaranga grandifolia* (Blco.) Merr., Philip. J. Sc. 7: 394, 1912. – *Croton grandifolius* Blco., Fl. Filip. 753, 1837. – *M. mappa* F.-Vill., Novis. App. 195, 1880 non Muell.-Arg. In DC., Prodr. 15(2): 1000, 1866; Carauta, Atas Soc. Biol. Rio de Jan. 16(1): 27, 1972. non *Ricinus mappa* L., Sp. Pl. ed. 2, 1430, 1763. – *M. porteana* E. Andre In Rev. Hort. 60: 176, f. 36, 1888. **Figure 71**

Trees small. Leaves peltate, ovately orbicular, 30-90 cm long or larger, midrib with 8-15 ascending, prominent pairs of nerves, soft-pubescent and glandular beneath, entire, abruptly pointed, base broadly rounded; petioles stout, triangular, nearly equaling lamina in length; stipules 6-10 cm long, oblong, pubescent on outside. Staminate panicles pink, subtended by large, deciduous, similarly colored bracts, branches with smaller bracts ascending and clustered about twigs, glabrate; flowers clustered and covered by bracts. Capsules pedicelled, densely clustered, glabrous, 7-10 cm long, didymous, each valve with 2 spine-like processes at apex.

Endemic. Throughout the Philippines, in second-growth forests at low altitudes; in Mt. Makiling, Luzon, at 30 to 350 m.

Com. name – *Takip-asin* (Tag.).

Exsicc. – *Ballesteros CA 8016; Champaka CA 8069; Espiritu CA 8198**; *Gates CA 1630; Lugod CA 4661, 7065* (CAHP).

2. *Macaranga sinensis* (Baill.) Muell-Arg. in DC., Prodr. 15: 1001, 1866; Keng, Taiwania 6: 57, 1955; Airy-Shaw, Euph. Philip. 35, 1983. – *Adenoceras sinensis* Baill., Etud. Gen. Euphorb. 430, 1858. *nom. nud.*

Trees small. Leaves alternate, ovate, occasionally a trifle peltate, 15 x 9 cm, ridged midvein with 7-9 pairs of lateral nerves, usually with glands at basal upper side, pale and glandular beneath, sides repandly crenate, gradually acute to caudate, base broadly cuneate or subtruncate; petioles 3-8 cm long; bud bracts 2 cm long, glabrous. Staminate flowers paniculate, axillary, glabrous, yellowish white, scattered in dense glomerules, pistillate pedicelled, not clustered, subtended by spatulate bracts, somewhat glutinous. Capsules less than 5 mm wide, didymous, mostly 2-seeded, glabrous.

Philippines, Luzon to Botel Tobago. In primary forests at 400-1300 m altitudes; in Mt. Makiling, Luzon, in second-growth forests to exposed ridges in the cloud-belt forest.

Com. name – *Binungang pula* (Tag.).

Exsicc. – *Pancho CA 20075, 20270* (CAHP)

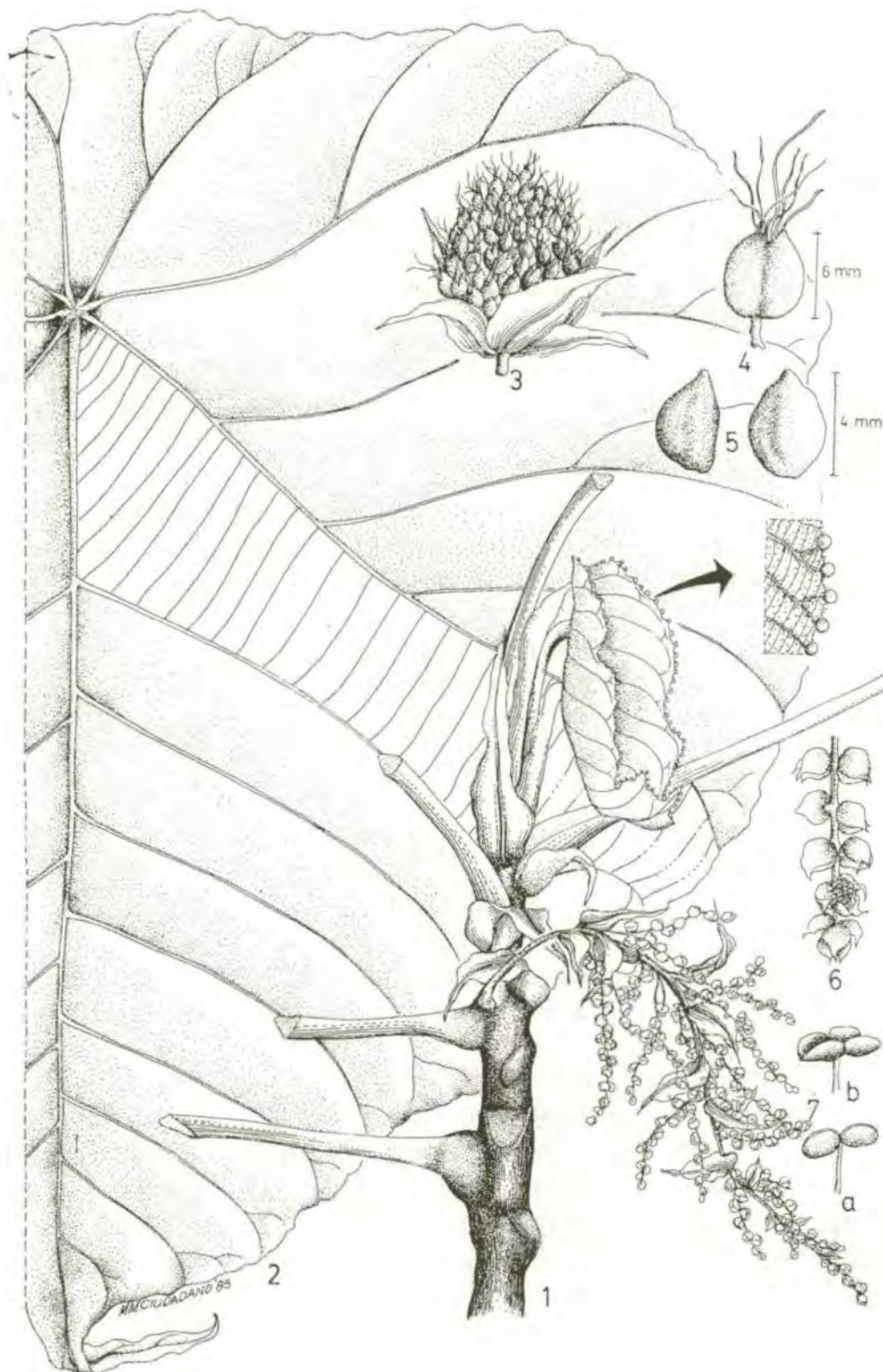


Figure 71. *Macaranga grandifolia*: 1. portion of flowering twig; 2. portion of a leaf; 3. pistillate inflorescence; 4. pistillate flower; 5. seed, 2 views; 6. portion of staminate inflorescence; 7. anther, (a) close, (b) open.

3. *Macaranga tanarius* (L.) Muell.-Arg. in DC., Prodr. 15: 997, 1866; Merr., En. Philip. 2: 443, 1923; Airy-Shaw, Euph. Philip. 35, 1983. – *Ricinus tanarius* L. in Stickm. Herb. Amb. 14, 1754. – *Mappa tanarius* Bl., Bijdr. 624, 1826. Figure 72

Trees small. Leaves alternate, peltate, ovate to ovately rotund, 15-20 cm long, radiately 7- to 9-nerved from base of petiole, glabrous to soft-pubescent beneath, gradually acute to acuminate, base broadly rounded; petioles 10-15 cm long; bud or stipular bracts 2 cm long, acuminate, median dorsal side cinereous. Staminate inflorescences paniculate, axillary; peduncles glabrate, otherwise puberulent or soft-pubescent; flowers grouped, subtended by large, membranous, lacinate bracts; pistillate few, mainly clustered toward ends of stalks; ovaries covered with yellowish powder; stigmas numerously forked. Capsules 1.25 cm across, subsessile, roundly trigonous with several terminal arms or appendages.

Andaman Islands and Malay Peninsula, Java to southern China and Taiwan, southward to northeastern Australia. Throughout the Philippines in the *parang* vegetation; in Mt. Makiling, Luzon, in open wooded areas at low altitudes.

Com. name – *Binunga* (Kuy., P. Bis., Tag.).

Exsicc. – Gates & Santos CA 1632; Orlido CA 10254, 10636; Raymundo CA 1633 (CAHP); Elmer 18265, 1237684, 17715, 1237280 (US).

4. *Macaranga bicolor* Muell.-Arg., Linnaea 34: 199, 1865; Merr., En. Philip. 2: 440, 1923; Airy-Shaw, Euph. Philip. 34, 1983.

Shrubs or small trees, branches angular, puberulent or glabrous. Leaves alternate, peltate, ovate, 15-20 x 10-15 cm long, with 7-9 radiating veins, subglabrous beneath, acute, base broadly rounded; petioles 15 cm long. Staminate flowers in panicles in lower leaf axils or axils of leaf scars; flowers glomerated in axils of pectinately lobed bracts, yellowish green or whitish; pistillate flowers upon short, spicate racemes, flowers with stout pedicels, minutely bract-subtended, more or less wavy. Fruits compressed, rugulose, 1.25 cm across, subtended by subsistent calyx.

Throughout the Philippines, in second-growth forests at low altitudes; in Mt. Makiling, Luzon, in open forested areas at low altitudes.

Com. name – *Hamindang* (Bik., Sul., Tag.).

Exsicc. – Ballesteros CA 8027; Novero CA 7075; Velasco CA 1639 (CAHP); Elmer 1757, 1237178 (US).

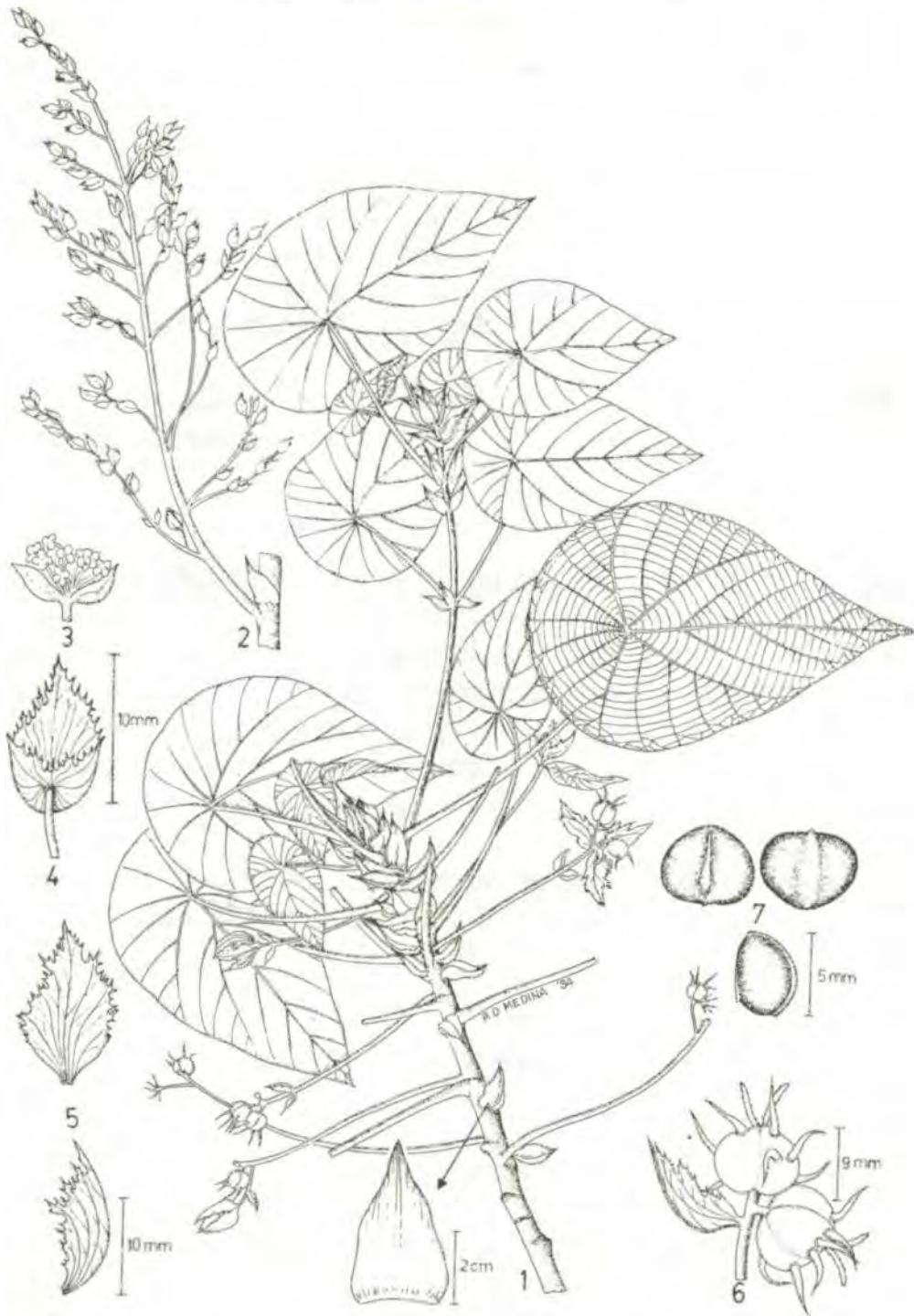


Figure 72. *Macaranga tanarius*: 1. portion of fruiting twig; 2. staminate inflorescence; 3. staminate flower; 4, 5. bracts; 6. capsules; 7. seed, 3 views.

40. CLEIDION Blume

Trees. Leaves alternate, usually sinuately toothed, pinnately nerved, glabrous; stipules fugacious. Inflorescences branched, axillary; flowers small, bisexual; staminate flowers bunched under each bract; calyx globose, ultimately separating into 3 or 4 valvate segments; stamens more than 20 in globose mass on conical receptacle; filaments free; anthers dorsifixed, 4-celled or cells transversely didymous on margins of broad connective; rudimentary ovaries none; pistillate flowers stalked, solitary; sepals 3-5, imbricate; ovaries 2- to 3-celled; styles as many, parted, arms filiform. Capsules 1- to 3-celled, cells 1-ovuled; seeds subglobose.

Species 13, throughout the tropics; 3 in the Philippines.

1. *Cleidion spiciflorum* (Burm. f.) Merr., Int. Rumph. 322, 1917, *in nota*, Sp. Blanc. 225, 1918, En. Philip. 2: 439, 1923; Airy-Shaw, Euph. Philip. 13, 1983. – *Acalypha spiciflora* Burm. f., Fl. Ind. 203, t. 61, f. 2, 1768. – *Cleidion javanicum* Bl., Bijdr. 613, 1826.

Shrubs or trees. Leaves oblong, 12 x 5 cm, midrib with 5-8 ascendingly curved nerves on each side; margins coarsely dentate, glabrous, acute, broadly obtuse at base; petioles slender. Staminate spikes solitary or few in leaf axils, equaling or exceeding foliage, glabrate to pubescent; flowers solitary or few-clustered, subtended by small bracts, globose in bud, short-stalked; stamens 20 in globose mass; pistillate flowers axillary, glabrous, pedicels 3-5 cm long. Fruits didymous or by abortion 1-seeded, subglobose, 3 cm wide, rarely tridymous, with persistent styles.

India and Sri Lanka through Malaysia, Java to New Guinea. Northern Luzon to Palawan and Mindanao, Philippines; in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 30 to 300 m.

Com. name – *Paitan* (Bis., Ilk.).

Exsicc. – *Cruz CA 1581; Valencia CA 1579, 1580* (CAHP).

74. RUTACEAE

Trees or shrubs, rarely herbs, often spiny. Leaves with few or numerous pellucid oil glands, alternate or opposite, simple or compound; estipulate. Inflorescences racemose, cymose or paniculate; flowers solitary or in fascicles, axillary or terminal, regular, perfect; calyx 4- to 5-lobed; petals as many or more, hypogynous, free, valvate or imbricate; stamens 4 or 5 or twice as many or in some up to 60; filaments free or connate into a tube, inserted around axils; anthers 2-celled, opening inwards; ovaries of 4 or 5, free or connate carpels or simple and many-celled; styles free or variously united; stigmas terminal, entire or lobed; ovules 1 or 2 to many in each cell. Fruits capsule-like cocci.

Genera 150, species 1600, in most tropical and temperate countries; 20 genera and 83 species in the Philippines.

- 1. Leaves opposite
 - 2. Stamens twice as many as petals 1. *Melicope*
 - 2. Stamens as many as petals 2. *Euodia*
- 1. Leaves alternate
 - 3. Scandent shrubs
 - 4. Leaves trifoliolate 3. *Toddalia*
 - 4. Leaves unifoliolate 4. *Paramignya*
 - 3. Erect shrubs or trees
 - 5. Unarmed
 - 6. Leaves unifoliolate 5. *Lunasia*
 - 6. Leaflets 3 or more
 - 7. Leaflets up to 7, equilateral 6. *Murraya*
 - 7. Leaflets more numerous, inequilateral
 - 8. Leaflets sessile; filaments dilated toward base 7. *Clausena*
 - 8. Leaflets stalked; filaments linearly subulate toward base 8. *Micromelum*
 - 5. Armed
 - 9. Leaves unifoliolate
 - 10. Foliage constricted; berries exceeding 2 cm in diameter 9. *Citrus*
 - 10. Foliage not constricted, berries less than 2 cm in diameter.... 10. *Atalantia*
 - 9. Foliage trifoliolate or unequally pinnate
 - 11. Calyx 3-lobed; petals 3; stamens twice as many; ovules solitary in each cell 11. *Triphasia*
 - 11. Calyx 3- to 8-lobed; petals 3-5; stamens 3-5; ovules 2 in each cell 12. *Zanthoxylum*

1. MELICOPE Forster

Shrubs unarmed. Leaves opposite, rarely alternate; leaflets 1-3, entire or dentate; petioles winged or not. Flowers small, whitish, in cymes or panicles, unisexual by abortion; sepals 4; petals as many, sessile, expanding, valvate or imbricate; stamens 8, those opposite petals shorter from base of entire or lobulate disc; filaments thread-like, bearing linear to oblong anthers; ovaries 4-lobed with usually 4 styles which are more or less jointed; stigmas lobulate, capitate. Fruits of 4, free, spreading coriaceous carpels dehiscent along inner axils, usually 1-seeded; seeds oblong, black, shiny.

Species 15, Indo-Malaysia and Australia; 7 in the Philippines.

1. *Melicope triphylla* (Lam.) Merr., Philip. J. Sc. 7 (Bot.): 375, 1912; En. Philip. 2: 331, 1923. – *Fagara triphylla* Lam., Encycl. 2: 447, 1788, *excl. syn.*, Rumph.

Laxly branched shrubs or small trees. Leaves opposite; petioles 3-5 cm long; leaflets oblong or obovately oblong or smaller ones subelliptic, 12 x 4 cm, midrib prominent with obscure lateral nerves, sharply acute to acuminate, base broadly obtuse or cuneate; petiolules 5 mm long. Inflorescences thyrsoid or paniculate, glabrate, 5-9 cm long, axillary; flowers whitish; pedicels slender; calyx small, with obtusely rounded lobe; petals 4 mm long. Fruits with 1-4 coriaceous and glabrous cocci; seeds solitary in each cell, subglobose, 3-4 mm in diameter, shining steel-blue or nearly black.

Luzon and the Visayas, Philippines; widely scattered in thickets; in Mt. Makiling, Luzon, in open, wooded areas, ravines, and altitudes up to 300 m.

Com. name – *Matang-araw* (Tag.).

Exsicc. – *Gates CA 1477; Pancho CA 9176, 10045; Ramilo CA 1478; Velasco CA 1476 (CAHP); McGregor BS 22796, 898319; Villamil BF 20597, 900225(US).*

2. EUODIA* J.R. & G. Forster

Unarmed shrubs or small trees, often aromatic. Leaves opposite, simple, trifoliolate or imparipinnate, entire. Flowers unisexual, small, 4- or 5-merous, whitish, in paniced axillary cymes; sepals 4 or 5, imbricate; petals as many, valvate to imbricate; stamens 4 or 5, inserted at base of disc; filaments subulate; anthers oblong; ovaries either 4, 1-celled or 1, 4-celled; ovules 2 in each cell, collateral or superposed; styles basilar; stigmas 4-lobed. Fruits 4, 2-valved, coriaceous, 1- to 2-seeded cocci or carpels; endocarp horny; seeds oblong, bony, shiny.

Species 45, Old World tropics; 24 in the Philippines.

1. Medium-sized trees; leaflets with 15-20 nerves
 2. Flowers pink 1. *E. villamilii*
 2. Flowers white 2. *E. confusa*
1. Shrubs or tree-like
 3. Leaflets gradually acuminate 3. *E. ternata*
 3. Leaflets broadly obtuse to rounded
 4. Leaflets up to 8 cm long; inflorescences glabrate 4. *E. retusa*
 4. Leaflets twice as long; inflorescences densely pubescent 5. *E. semecarpifolia*

*This is the correct spelling, not *Evodia*.

1. *Euodia villamilii* Merr., Philip. J. Sc. 9(Bot.): 296, 1914; En. Philip. 2: 330, 1923 (*Evodia*). Figure 73

Trees erect, up to 20 m high. Leaves trifoliolate; petioles 5-8 cm long; leaflets oblong or subelliptic to obovately oblong, 15-20 x 6-10 cm, stout midrib with 20 pairs of nerves, subacuminate, base narrowed or cuneate, sessile or with short petiolules. Inflorescences broader than long, cymose, axillary, 5-8 cm long, pubescent, numerous-flowered; flowers pink; pedicels 5 mm long, pubescent; sepals 4, rounded, 1.5 mm across; petals as many, ovately elliptic, 3 x 5 mm, puberulent on ventral side; stamens 4; filaments glabrous, narrowed, inflexed at apices; anthers versatile, oblong; ovaries deeply 4-lobed, villous; styles glabrous, 6 mm long. Fruit cartilaginous; seeds jet-black, ellipsoid.

Endemic. Philippines: (Laguna, Luzon and Lanao, Mindanao); in primary forests at 300-1000 m; in Mt. Makiling, Luzon, in the Mudspring area at 300 m altitude.

Com. name – *Kamal* (Tag.).

Exsicc. – *Gates* CA 1473; *Lugod* CA 8348, 3849*, 8717 (CAHP); *Elmer* 18307, 894637; *Foxworthy* 12, 1091584; *Villamil* BF 20880, 900228 (US).

2. *Euodia confusa* Merr., Philip. J. Sc. 20: 391, 1922; En. Philip. 2: 328, 1923 (*Evodia*).

Trees, up to 20 m high. Leaves trifoliolate; petioles 5-8 cm long; leaflets obovately oblong, terminal ones larger, 20 x 10 cm, stout midrib raised beneath with 12-15 pairs of nerves, obtusely rounded or abruptly pointed, cuneate at base; petiolules short. Panicles axillary, sometimes terminal; peduncles as long as petioles; flowers densely clustered from ends of branchlets, white; pedicels slender, 3 mm long, cinereous; calyx broadly toothed, glabrate; petals oblong, glabrous. Fruits of 2-4 carpels, pilose, dehiscent, 1- to 2-seeded; seeds globose, black, 1 mm across.

India, Taiwan, Java, Celebes and the Andaman Islands. Throughout the Philippines, widely scattered in dry woods or forests at higher latitudes; in Mt. Makiling, Luzon, in forest-borders 30 to 500 m.

Com. name – *Bugawak* (Tag.).

Exsicc. – *Amarillas* BF 25686, 1293601; *Villamil* BF 20407, 900230 (US).

3. *Euodia ternata* (Blco.) Merr., Philip. J. Sc. 9 (Bot.): 297, 1914; En. Philip. 2: 330, 1923 (*Evodia*). – *Orixia ternata* Blco., Fl. Filip. 62, 1837.

Shrubs or small trees. Leaves trifoliolate; petioles 5-8 cm long; leaflets elliptic to oblong or obovately so, 10-18 x 5-9 cm, midrib with 12-15 pairs of nerves, acuminate, base acute; petiolules 3-8 mm long. Panicles axillary, slightly pubescent, 8 cm long, becoming nearly twice as long in fruiting state; flowers whitish, short-pedicelled; sepals 4, puberulent, suborbicular, 1 mm long;



Figure 73. *Euodia villamilii*. 1. flowering twig; 2. flower; 3. flower, stamens and petals removed; 4. ovary, vertical section.

petals oblong, glabrous, twice as long as calyx; stamens as many, rudimentary ovaries villous. Carpels subellipsoid, 5 mm long; seeds shining black.

Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-450 m.

Com. name – *Gilo* (Kuy.).

Exsicc. – *Elmer 17645a, 1237227; Navarro 2376108* (US).

4. *Euodia retusa* Merr., Philip. J. Sc. 1: Suppl. 68, 1906; En. Philip. 2: 329, 1923 (*Evodia*).

Shrubs. Leaves trifoliolate; petioles 2-4 cm long; leaflets obovately oblong, lateral ones a trifle inequilateral, prominent midrib with 5-8 pairs of ascendingly curved nerves, obtusely rounded or usually retuse at tip, subcuneate at base; petiolules short. Inflorescences glabrate, pyramidal, 3-5 cm long, rigidly branched from near base, axillary; flowers whitish, subsessile or short-pedicelled, bracteate; calyx thick, acutely pointed; petals 4, oblong. Fruits glabrous, somewhat compressed, connate at base, opening along inner edge; seeds lucid, solitary in each cell.

Endemic. Philippines: Luzon to Mindoro; in forests at 1200-1800 m; in Mt. Makiling, Luzon, in the cloud-belt forest.

Com. name – *Ubug* (Tag.).

Exsicc. – *Pancho CA 20042* (CAHP).

5. *Euodia semecarpifolia* Merr., Publ. Gov. Lab. Philip. 35: 23, 1906; En. Philip. 2: 329, 1923 (*Evodia*).

Shrubs or small trees. Leaves trifoliolate, 3-8 cm long, pubescent when young; leaflets obovate to obovately oblong, 12-18 x 5-8 cm, midrib with 9-12 pairs of nerves, obtuse to acute, base cuneate; petiolules 3-4 mm long. Inflorescences axillary, 3-5 cm long; calyx cinereous, with 4 acute lobes; petals as many, ovately elliptic, 2 mm long or twice as long as calyx, yellowish white, glabrous; stamens 4, glabrous, included. Filaments 1 mm long; anthers short; ovaries pubescent, 4-celled. Cocci slightly hairy, compressed.

Northern to southern Luzon, Philippines; in forests at 1200-2000 m; in Mt. Makiling, Luzon, in the mossy forest to the summit.

Com. name – *Luas* (Tag.).

Exsicc. – *Elmer 18273, 894638* (US).

3. **TODDALIA** A.L. Jussieu, *nom. cons.*

Shrubs scandent or sarmentose, prickly. Leaves alternate, uni- to trifoliolate; leaflets sessile. Flowers small, in axillary or terminal cymes or panicles, unisexual; calyx short, 2- to 5-lobed or parted; petals as many, imbricate or valvate; stamens 2, 4 or 5, when 8 alternate ones imperfect, sometimes wanting or at least imperfect; in pistillate ones, usually inserted at base of disc; ovaries ovoid, oblong or globose, 2- to 7- celled rarely, 1-celled, rudimentary in staminate flowers; styles short or none; stigmas capitate; ovules 2 in each cell. Fruits globose or lobed, coriaceous or fleshy, 2- to 7- celled, cells rarely 2-seeded; seeds angled, reniform.

Species 5, chiefly in tropical Africa, Asia and Australia; 1 in the Philippines.

1. *Toddalia asiatica* (L.) Lam., Tabl. Encycl. 2: 116, 1793; Merr., En.Philip. 2: 333, 1923; Li, Woody Fl. Taiwan 383, f. 139, 1963. – *Paullinia asiatica* L., Sp. Pl. 365, 1753.

Climbers large with sharp, recurved prickles; all parts pungent. Leaves trifoliolate; leaflets ovately elliptic, 3-8 x 0.5-2.5 cm, many-nerved, narrowed or subacute at apex, tip usually notched, rounded at base; Cymes terminal or in upper leaf axils, as long as foliage, glabrate; flowers 5 mm across, greenish white; calyx glandular; petals 5, imbricate; stamens not exceeding petals; ovaries 5-celled, each cell with 2 superposed ovules; styles short; stigmas 5-lobulate. Fruits globose, 3- to 5-grooved with as many cells, orange-red; seed solitary in each cell.

India to southern China, Taiwan and Malaysia. Throughout the Philippines, in woods at low and middle elevations; in Mt. Makiling, Luzon, in second-growth forests.

Com. name – *Dauag* (Tag.).

Exsicc. – *Pancho CA 20395* (CAHP).

4. **PARAMIGNYA** Wight

Shrubs usually climbing, rarely erect, unarmed or with axillary spines. Leaves simple, joints often obscure, entire, subcoriaceous, persistent. Flowers axillary, solitary or fascicled; calyx cupular or small, 4- or 5-lobed; petals 4 or 5, free, imbricate or rarely valvate; stamens 8-10, inserted on columnar disc; filaments free, linear, equal or subequal; anthers linearly oblong; ovaries 3- to 5-celled; styles elongate, deciduous; ovules 2 in each cell. Berries ovoid or subglobose, 1- to 5-seeded with thick rind, often contracted at base; seeds large, oblong, compressed.

Species 8, Indo-Malaysia; 2 in the Philippines.

1. *Paramignya longipedunculata* Merr., Publ. Gov. Lab. Philip. 35: 24, 1905; En. Philip. 2: 339, 1923.

Shrubs scandent with few, short, axillary spines, branches densely pubescent. Leaves ovately elliptic, 7-10 x 5-7 cm, pubescent ventrally, obscurely crenate toward acute apex, rounded at base; petioles 8-10 mm long. Flowers axillary, solitary or few-fascicled, white, 2 cm long; pedicels equally long, densely pubescent; calyx circular, similarly pubescent, 7 mm across, 5-lobed; petals as many, linear to oblong, obtuse; stamens 10; filaments 12 mm long, pubescent; anthers nearly half as long; ovaries 5-celled; styles much shorter, pubescent.

Endemic. Philippines (Central Luzon to Mindoro); in forested ravines and second-growth forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly at low elevations.

Com. name – *Tahid-labuyo* (Tag.).

Exsicc. – *Villamil CA 1485* (CAHP).

5. LUNASIA Blanco

Shrubs or small trees dioecious. Twigs triangular, usually covered with small grayish white scales. Leaves alternate, long-stalked, unifoliolate, oblanceolate-oblong, attenuate toward base, subentire or crenulate, pinnately nerved, pellucid-dotted. Flowers small, greenish yellow, in small sessile clusters or elongate and short-branched, staminate in capitate coils; stamens 3, free, pistillate in short spikes, trimerous; sepals few, more or less united, persistent; petals relatively small. Fruits normally tricapsular, capsules more or less united toward base, somewhat compressed, truncate across apex, usually with external point, transversely or diagonally veined, lepidote to pubescent, dehiscent along inner and upper sutures; seeds encased by horny endocarp.

Species 7, Malaysia and New Guinea; 1 in the Philippines.

1. *Lunasia amara* Blco., Fl. Filip. 783, 1837; Hartley, J. Arn. Arb. 48: 460, 1967.

var. *amara*

Figure 74

Shrubs or small trees. Leaves obovately oblong, 20-30 x 7-12 cm, numerous nerves parallel on each side of ridged midrib, bluntly obtuse, gradually narrowed toward base; petioles 4-7 cm long. Staminate inflorescences sometimes shorter than foliage, axillary, lepidote, short-branched, small flowers clustered in globose heads; pistillate flowers on spikes shorter or often longer than petioles, axillary, scale-covered. Fruits capsular, upon short stalks, each of 3 valves 1 cm long, nearly as wide across

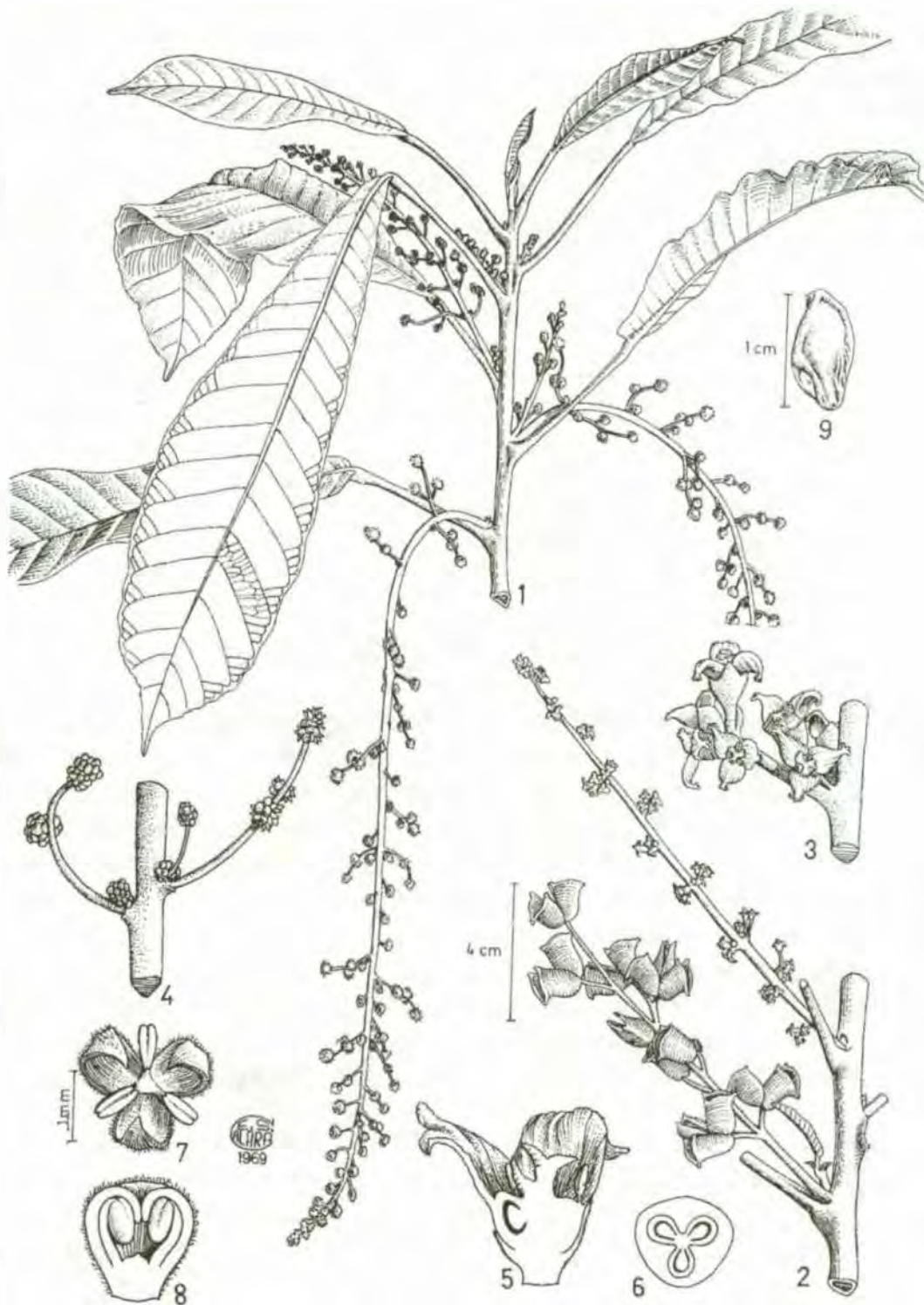


Figure 74. *Lunasia amara*: 1. flowering branch; 2. fruiting branch; 3. portion of flowering branch, enlarged; 4. portion of staminate inflorescence, enlarged; 5. ovary, vertical section; 6. ovary, cross section; 7. staminate flower; 8. staminate bud, vertical section; 9. seed.

truncate top, pointed at outer upper edge, valves more or less united at base, transversely ribbed (rib sometimes obscured by trichomes) on lateral surfaces, otherwise smooth, olivaceous-scurfy, ventrally and apically dehiscent.

Java, Lesser Sunda Islands, Borneo, Sulawesi, Moluccas, Western New Guinea, Papua to Australia; on well-drained rainforests, gallery forests, dry to moist thickets and garden regrowth at low and medium elevations. All over the Philippines, in woods or dry forests; in Mt. Makiling, Luzon, in the *parang* vegetation.

Com. name – *Lunas* (Tag.).

Exsicc. – *Avenido* CA 8722; *Gates* CA 1474; *Hermoso* CA 1475; *Orlido* CA 10907, 10908* (CAHP); *Forestry Guard* 4311 (A); *Elmer* 8115 (K, NY), 8119 (K); *Agna* 35334; *Orden* 33478; *Tamesis* FB 11908 (L).

6. **MURRAYA** J.G. Koenig ex Linnaeus, *nom. cons.*

Shrubs or small trees. Leaves imparipinnate, alternate; leaflets alternate, base obliquely cuneate; petiolules short. Flowers in terminal corymbs or axillary, then solitary or in cymes, bisexual, 5-merous; calyx 5-fid; petals 5, imbricate, free; stamens 10, inserted around elongate disc; filaments linear to subulate, ovary alternating ones shorter; anthers short, small; ovaries linear, 2- to 5-celled, upon elongate disc, narrowed into long deciduous style; stigmas capitate; ovules solitary or when 2, superimposed. Berries 1- or 2-celled, oblong or ovoid, 1- or 2-seeded.

Species 5, tropical Asia; 2 in the Philippines.

1. ***Murraya paniculata*** (L.) Jack, *Mal. Misc.* 1: 31, 1820; Li, *Woody Fl. Taiwan* 377, f. 136, 1963. – *Chalcas paniculata* L., *Mant.* 1: 68, 1767. – *Murraya exotica* L., *Mant.* 2: 563, 1771.

Shrubs. Leaves 3-15 cm long, glabrous; leaflets 3- to 7-, rarely 1-jugate, oblong to ovate or subelliptic, 2-7 x 5 cm or longer, blunt-acuminate, subacuminate at base. Cymes terminal or in upper leaf axils, short, few-flowered; flowers whitish, 1.5-2 cm long, fragrant; sepals acute; petals lanceolately oblong; ovaries 2-celled; styles slender; stigmas capitate. Fruits ovoid, 1.25 cm long, fleshy, red, normally 2-seeded.

India to southern China, Malesia and Australia. In most parts of the Philippines at low and medium altitudes; frequently cultivated.

Com. name – *Kamuning* (Bik., Bis., Pamp., Tag.).

Exsicc. – *Carurucan* CA 1484; *Halos* CA 1481, 1482; *Leon* CA 3376-A; *Novero* CA 1483 (CAHP); *Elmer* 18166, 1237613 (US).

7. **CLAUSENA** Burman f.

Shrubs or trees unarmed. Leaves imparipinnate, aromatic when crushed, usually deciduous; leaflets membranous. Flowers small, in terminal or axillary cymes, panicles or lax racemes; calyx 4- or 5-lobed; petals as many, free, membranous, margins imbricate; stamens 8-10, inserted around an elongate disc, alternate ones shorter; filaments dilated toward base, subulate at tip; anthers short; ovaries stipitate, 4- or 5-celled, rarely 2- or 3-celled; styles distinct, deciduous; stigmas obtuse, entire or 2- to 5-lobed; ovules 2, collateral or superimposed in each cell. Fruits ovoid to globose, small, 2- to 5-celled, fleshy; seeds oblong.

Species 20, mostly in tropical Asia; a few in Africa and Australia; 6 in the Philippines.

1. *Clausena anisum-olens* (Blco.) Merr., Publ. Gov. Lab. Philip. 17: 21, 1904; En. Philip. 2: 337, 1923. – *Cookia anisum-olens* Blco. Fl. Filip. 359, 1837.

Figure 75

Shrubs or small trees. Leaves 20-30 cm long; leaflets 7-10, pale beneath, 5-11 cm, pronounced midrib with 7-10 pairs of nerves, acuminate, base inequilateral and short-acute, very aromatic when crushed. Inflorescences 15-20 cm long, terminal in upper leaf axils, narrowly pyramidal or subcorymbose; flowers greenish white, fragrant, 8 mm in diameter, 5-merous. Fruits globose, up to 8 mm in diameter, whitish when mature, coarsely punctate, upon short, thick calyx base; seeds 2 in each fruit, plano-convex.

Throughout the Philippines, in forests at low and medium altitudes, up to 1500 m; occasionally cultivated; in Mt. Makiling, Luzon, cultivated on the University campus, Los Baños, Laguna, Luzon.

Com. name – *Kayumanis* (Tag.).

Exsicc. – *Pancho CA 3060** (CAHP); *Ramos BS 13667, 901986; Elmer 18231, 1050087, 17945, 1050321; Villamil BF 21377, 900227* (US).

8. **MICROMELUM** Blume, *nom. cons.*

Trees or shrubs unarmed. Leaves imparipinnate, alternate; leaflets 4-12, oblique toward base; petiolules short. Flowers in large terminal or subterminal panicles; calyx cupular, 2- to 5-toothed; petals 5, free, coriaceous, valvate or sub-imbricate; stamens 10, inserted around disc; filaments linearly subulate, alternate ones shorter; ovaries 5, rarely 2- to 6-celled; styles solitary, constricted at base, deciduous; stigmas obtuse or capitate; ovules 2 in each cell, superimposed. Berries small, oblong to subglobose, 1- to 2-seeded, skins leathery, punctate with spirally twisted septa; seeds oblong to subglobose.

Species 6, Indo-Malesia to Polynesia; 3 in the Philippines.



Figure 75. *Clausena anisum-olens*: 1. flowering branch; 2. portion of fruiting branch; 3. flower; 4. flower, vertical section; 5. ovary, cross section; 6. fruit, cross section; 7. fruit.

1. *Micromelum minutum* (Forst. f.) Wight & Arn., Prodr. 468, 488, 1834; Merr., En. Philip. 2: 335, 1923. – *Limonia minuta* Forst. f., Prodr. 33, 1786. – *Micromelum compressum* (Blco.) Merr., Sp. Blanc. 200, 1918.

Shrubs or small trees. Young branches densely covered with appressed, short, gray hairs. Leaflets 7-15, accrescent toward top of rachis, ovate at base on one side, broadly rounded on other, long-acuminate, entire or undulate to shallowly dentate-crenate, shortly pubescent above, thinly hairy beneath. Corymbs densely appressed-short-hairy, 3-15 cm long; pedicels 4-6 mm; calyx hairy, 0.75 cm long; petals pale green or yellowish white, 3-5 mm long; styles 2-3 mm long. Berries ovoid, 6-8 mm long, red.

A very variable species.

India to southern China through Malesia to tropical Australia and Polynesia. Throughout the Philippines, in secondary forests at low and medium altitudes.

Com. name – *Tulibas tilos* (Tag.).

Exsicc. – Gates CA 1480; Lugod CA 8334; Macalinao CA 9178; Orildo CA 10463; Siapno CA 1479; Stern CA 12111-A (CAHP); Elmer 8291, 854516, 18375, 894806; Gabot 2212471-A; Steiner 2376511 (US).

9. CITRUS Linnaeus

Shrubs or trees, usually spiny. Leaves simple, alternate, blades in most forms constricted or with winged petioles, aromatic when crushed. Flowers axillary, solitary or fascicled, or in short racemes or corymbs, mostly fragrant; calyx cupular or urceolate, 3- to 5-toothed; petals 4-8, thick, imbricate, linear to oblong, mostly white; stamens 10-60, inserted around a disc; filaments free or subconnate, bearing oblong anthers; ovaries many-celled; styles stout, deciduous; stigmas capitate; ovules 4-8 in each cell, 2-seriate. Fruits or berries usually large, ellipsoid or globose or nearly so, rarely 2 cm in diameter, fleshy, 5- to many-celled, cell partitions membranous, cell cavities filled with juicy, fusiform sacs covered with leathery pericarp; seeds horizontal or pendulous.

A polymorphic genus with an uncertain number of species (16-150), southern and southeastern Asia and Malaysia; several species in cultivation throughout the tropics and in subtropical regions. Seven species and several cultivars were introduced to the Philippines.

1. Leaves not constricted; petioles not or narrowly winged; fruits ellipsoid 1. *C. medica*
1. Leaves constricted or with winged petioles; fruits globose
2. Flowers in axillary racemes
3. Basal leaf portion narrowly winged; fruits small..... 2. *C. aurantifolia*
3. Basal leaf portion broadly winged; fruits very large..... 3. *C. maxima*
2. Flowers solitary or fascicled in leaf axils

- 4. Basal leaf portion broadly winged 4. *C. hystrix*
- 4. Basal leaf portion narrowly winged
 - 5. Fruits 2-3 cm in diameter 5. *C. madurensis*
 - 5. Fruits much larger
 - 6. Fruits tight-skinned 6. *C. aurantium*
 - 6. Fruits loose-skinned 7. *C. reticulata*

1. ***Citrus medica*** L., Sp. Pl. 2: 782, 1753; Swingle in Webber & Batchelor, *Citrus Ind.* 1: 396, 1943; D.T. Jones, PROSEA 2: 131, *fig.s.n.*, 1991.

Shrubs. Branchlets glabrous, usually with a single thorn. Leaves oblong to elliptic, 10 x 5 cm, midrib stout, with obscure lateral nerves, entire or obscurely crenate, rounded, obtuse at base; petioles occasionally decurrent or narrowly winged. Flowers upon strong, axillary racemes, glabrous; pedicels 5-8 mm long, thick; calyx persistent, leathery, broader than long, coarsely punctate, subtruncate; petals ligulate, ultimately recurved; stamens 20-40; ovaries surrounded by large disc; styles bearing large, subglobose stigmas. Fruits ellipsoid with blunt point, lemon-yellow, up to 10 cm long and half as thick, partitions and vesicles whitish, acidic.

China and British India southward; cultivated in many subtropical countries. In the Philippines, occasionally cultivated.

Com. name – *Bulid* (Bik., Tag.).

Exsicc. – *Pancho CA 20497* (CAHP).

2. ***Citrus aurantifolia*** (Christm. & Panzer) Swingle, J. Wash. Ac. Sc. 3: 465, 1913; Swingle in Webber & Batchelor, *Citrus Ind.* 1: 401, 1943; R. Sethpakdee, PROSEA 2: 126, *fig. s.n.*, 1991. – *Limonia aurantifolia* Christm. & Panzer, Pfl. Syst. 1: 618, 1777. – *Citrus notissima* Blco., Fl. Filip. 607, 1837.

Shrubs or small trees, branchlets with slender, solitary, axillary, sharp spines, 1 cm or less long. Leaves oblong or ovately elliptic, usually crenulate above middle, 4-6 cm long, acute or obtuse, base cuneate, narrowly winged; petioles 1.25 cm long. Racemes short, axillary, few-flowered, glabrous; flowers 1 cm long, fragrant; calyx 5 mm wide, lobes short; petals 4, white, oblong, 10-12 mm in length, glandular-punctate; stamens 10-25, free or nearly so. Fruits subglobose, yellow, 3-5 cm in diameter, 10- or more-celled, thin-skinned; pulp sharply acidic.

East India Archipelago; widely grown in all tropical and subtropical countries. Cultivated throughout the Philippines.

Com. names – *Dayap* (Tag.), Common lime (Engl.).

Exsicc. – *Rosario CA 9215* (CAHP).

3. *Citrus maxima* (Burm.) Merr., Int. Rumph. 296, 1917. – *Aurantium maximum* Burm., Auctuarium Herb. Am. 16, 1755; C. Niyomdham, PROSEA 2: 128, fig. s.n., 1991. – *C. grandis* (L.) Osbeck, Dagbok Ostind. Resa 98, 1757; Swingle in Webber & Batchelor, *Citrus* Ind. 1: 417, 1943. – *C. aurantium* L. var. *grandis* L., Sp. Pl. 2: 783, 1753.

Trees small to medium-sized. Branchlets compressed, somewhat pubescent with solitary spines. Leaves oblong to subelliptic, entire or nearly so, 8-12 cm, constricted below middle, attenuate, obtuse apex retuse; petioles broadly winged. Racemes axillary, short; flowers crowded, white, fragrant; calyx 1 cm across, shallow, broadly 4-lobed; petals 4, oblong, 2 cm long; stamens 16-24. Fruits large, greenish to yellow, globose or ovoid, 15 cm in diameter or larger, rind thick, meat and leathery dissepiments pale white, pink or deep red, sour or sweetish.

Southeastern Asia, East Indian Archipelago; cultivated in all tropical and subtropical countries. Grown throughout the Philippines.

Com. names – *Suha* (Tag.), Pomelo (Engl.).

Exsicc. – *Hernaez CA 12415* (CAHP).

4. *Citrus hystrix* DC., Cat. Hort. Monsp. 97, 1813; Swingle in Webber & Batchelor, *Citrus* Ind. 1: 442, 1943; E.W.M. Verheij & B.C. Stone, PROSEA 2: 120. fig. s.n., 1991.

Trees small. Leaves oblong, 10-15 x 3.5 cm, constricted at about middle, lower half broadly winged, entire or obscurely crenate toward subacute apex, subcuneate toward base; petioles 5-8 mm long, spinulose in axils. Flowers axillary, fascicled, upon short green spikes, glabrous; pedicels slender, 5 mm long, creamy white; calyx small, cupular, 4-lobed, greenish; petals 4-5, oblongish, 8 mm long, spreading, free; stamens numerous, a trifle shorter than petals, free and glabrous filaments whitish; ovaries obovoid; styles short, columnar, whitish; capitate stigmas large, brownish. Fruits flatly globose, up to 10 cm across, slightly raised at apex, very irregularly bumpy; rind lemon-yellow, thick. Seeds ovoid-oblong, 1-1.5 x 0.5 cm. Cotyledons and plumule white, sour.

Throughout the East Indian Archipelago and neighboring countries. Throughout the Philippines; in Mt. Makiling, Luzon, indigenous in the lower forested regions.

Com. name – *Kabuyao* (Tag.).

Exsicc. – *Curran CA 1472*; *Rivera CA 10464*; *Rosario CA 10217* (CAHP); *Curran BF 13153*; *Elmer 17651*. 1237230 (US).

5. *Citrus madurensis* Lour., Fl. Cochinch. 467, 1790; Tanaka, Tech. Paper No. 10, Hort. Inst. Tokyo Agric. Univ. 140, 1954. – *C. microcarpa* Bunge, Mem. Ac. Imp. Sc. St. Petersburg. 2: 84, 1833. – x *Citrofortunella microcarpa* (Bunge) Wijnands, Baileya 22(3): 134-136, 1984; R.C. Sotto, PROSEA 2: 117, fig. s.n., 1991. – *C. mitis* Blco., Fl. Filip. 610, 1837. – x *Citrofortunella mitis* (Blco.) J. Ingram & H.E. Moore, 1975. **Figure 76**

Trees small, erect. Branches spiny. Leaves elliptic or oblong-elliptic, 4-8 cm long, margins slightly crenulate, apex retuse, base acute; petioles 1 cm long, very narrowly or scarcely winged. Flowers axillary, solitary, rarely in pairs, short-pedicelled; calyx 5-lobed; petals elliptic to oblong, 12 mm in length, white; stamens usually 20; filaments more or less united into a tube. Fruits globose, 2-2.5 cm in diameter, yellow, 6- or 7-celled with thin skin. Seeds 0-11, small, obovoid, plump, usually polyembryonic.

China, Japan, India, Indochina, Malesia to Polynesia, and the West Indies. Widely cultivated in the Philippines.

Com. names – *Kalamunding*, *Kalamansi* (Tag.).

Exsicc. – *Pancho CA 20068, 20219** (CAHP).

6. *Citrus aurantium* L., Sp. Pl. 2: 782, 1753; Swingle in Webber & Batchelor, *Citrus* Ind. 1: 402, 1943; E.W.M. Verheij & R.E. Coronel (eds.), PROSEA 2: 325, 1991.

Trees small, shoots beset with spinescent thorns. Leaves oblong to subelliptic, 10 x 4 cm, entire or minutely crenate toward top, pronounced midrib with obscure nerves, obtuse to subacuminate, base obtusely rounded; petioles narrowly winged. Flowers bisexual, solitary or few-clustered in upper leaf axils, glabrous; pedicels 8 mm long, twice as long in fruiting state; calyx rim-like, entire to bluntly toothed, persistent, coarsely punctate; petals strap-shaped, white. Fruits glabrous, not mamillate, 5-9 cm in diameter, skin orange-red; partitions and vesicles yellowish, usually sweet but occasionally sour.

Southeastern Asia; widely cultivated in all subtropical countries. In the Philippines, sparingly cultivated; usually sour and green.

Com. names – *Dalandan* (Tag.), Sour orange (Engl.).

Exsicc. – *Pancho CA 20069, 20322* (CAHP).

7. *Citrus reticulata* Blco., Fl. Filip. 610, 1837; Swingle in Webber & Batchelor, *Citrus Ind.* 1: 413, 1943; S. Ashari, PROSEA 2: 135, fig. s.n., 1991.
– *C. nobilis* (non Lour.) Andr., Bot. Rep. 10: pl. 608, 1809.

Shrubs to small trees. Branchlets angular, beset with small axillary spines. Leaves oblong to broadly lanceolate, 4-10 cm long, midrib prominent, usually entire, subacute, base short-pedicelled, mostly solitary, axillary; calyx shallow, broadly toothed; petal oblong, white, glandular. Fruits compressed-globose, 4-7 cm in diameter, 10-celled, green or orange-red, skin loosely attached; juice and vesicles pale yellow, sweet.

Southeastern Asia, Philippines and other tropical and subtropical countries; cultivated.

Com. names – *Naranghita* (Tag.); Mandarin (Engl.).

Exsicc. – *Lugod CA 8361* (CAHP).

10. ATALANTIA Correa, *nom. cons.*

Shrubs or small trees, usually spinescent. Leaves simple, coriaceous, entire or crenulate. Flowers in racemes or corymbs, rarely solitary or fascicle, axillary, rarely terminal; calyx 3- to 5-lobed, sometimes irregularly split; petals 3-5, imbricate, free or united with stamens into a tube; stamens 6-8, rarely twice as many, inserted around annular disc; filaments free or irregularly connate, subequal, bearing short anthers; ovaries 2- or 4-, seldom 3- or 5-celled; styles deciduous; stigmas capitate; ovules usually solitary, when 2, collateral in each cell. Berries large, 1- to 5-celled, with thick rind; seeds oblong, 1-5 in each fruit.

Species 15, Indo-Malaysian; 5 in the Philippines.

1. *Atalantia citroides* Pierre ex Guill., in Lecomte, Not. Syst. 1: 178, 1910; Swingle in Webber & Batchelor, *Citrus Ind.* 1: 330, 1943. **Figure 77**

Trees, up to 7 m high. Branchlets with few straight spines in axils of leaves. Leaves ovate, 5-9 x 2-4 cm, coriaceous, entire, attenuate and emarginate at apex, base attenuate; petioles 1 cm long. Flowers axillary; pedicels glabrous, 1 cm long, bracteate at base; calyx cupular, 3- or 4-lobed, obtuse at apex; petals connate two-third of their length; anthers ovate, apiculate; disc annular at base of ovary ovoid-elongate, terminating into cylindrical style; stigmas capitate; locules 3-5; ovules 1-2, collateral. Fruits 2 cm across, pulp of succulent vesicles; seeds ellipsoid, 1 cm long.

Indochina. In the Philippines, introduced in the University of the Philippines at Los Baños campus, Laguna, Luzon.

Com. name – *Malarayap intsik* (Tag.).

Exsicc. – *Camacho CA 3146*; *Champaka CA 8099*; *Espiritu CA 7047*; *Hernaez CA 12411**; *Orlido CA 5013*; *Quibin CA 10157* (CAHP).



Figure 77. *Atalantia citroides*: 1. flowering and fruiting twig; 2. flower; 3. flower bud; 4. staminal tube, opened; 5. staminal tube, with pistil; 6. fruit; 7. fruit, cross section.

11. **TRIPHASIA** Loureiro

Shrubs erect, branched, spiny; twigs entire, glabrous. Leaves alternate, palmately trifoliolate, short-petioled; lateral leaflets smaller, more or less crenate, ovate to oblong, larger ones 2-4 cm long, obtuse, frequently retuse, base rounded. Flowers axillary, solitary or in few-flowered cymes, sweetly scented, whitish; calyx 3-lobed; petals 3, free, imbricate; stamens twice as many petals, inserted around fleshy disc; filaments free, subequal, dilated at base; anthers linear; ovaries ovoid, 3-celled, narrowed into slender deciduous styles; stigmas obtuse to capitate or 3-lobulate; ovules axillary in each cell. Berries fleshy, red when mature, small, ovoid, 1- to 3-celled, 1-seeded in each cell; seeds oblong, immersed in mucilaginous meat.

Species 3, in southeastern Asia and the East Indies; 1 in the Philippines.

1. *Triphasia trifolia* (Burm. f.) P. Wils., *Torreyia* 9: 33, 1909; Merr., *En. Philip.* 2: 338, 1923. – *Limonia trifolia* Burm. f., *Fl. Ind.* 103, 1768. **Figure 78**

Shrubs spiny. Young branchlets densely pubescent to glabrescent, thorns 0.5-1.75 cm long. Leaflets emarginate, mostly crenate, shiny green on upper surface; petiolules short-hairy, 1-3 mm long. Pedicels densely short-hairy, 2-3 mm long; calyx 2-2.5 mm wide, segments broadly ovate-triangular; petals gland-dotted near apex, 9-15 mm long; filaments 5-6 mm long; styles 3-4 mm long. Berries 12-16 mm long; seeds usually flattened, 8-10 mm long.

Probably a native of southeastern Asia, now pantropic; cultivated. Throughout the Philippines, spontaneous in dry and warm thickets or woods; cultivated in the University nursery, Los Baños, Laguna, Luzon.

Com. name – *Limoncito* (Sp.)

Exsicc. – *Champaka* CA 8100; *Martinez* CA 3213*; *Orlido* CA 10253; *Tasico* CA 4584; *Velasco* Ca 1497 (CAHP).

12. **ZANTHOXYLUM** Linnaeus

Shrubs or trees, often armed with stout prickles. Leaves alternate, trifoliolate, unequally pinnate; leaflets opposite or alternate, entire or crenate, often oblique, punctate. Flowers small, axillary or terminal, peduncled, in broad or narrow paniculate cymes, white, pink or yellowish green, often unisexual; calyx 3- to 8-fid, rarely wanting; petals 3-5, rarely absent, imbricate or valvate; disc small or obscure; stamens 3-5, rarely hypogynous or reduced to scales in pistillate; ovaries rudimentary in staminate flowers; styles sublateral, free or connate above; stigmas capitate; ovules 2 in each cell. Fruits of 1-5, coriaceous, 1-seeded carpels dehiscent ventrally, horny endocarp separating or not; seeds subglobose to ellipsoid, usually compressed, bluish black, shiny.

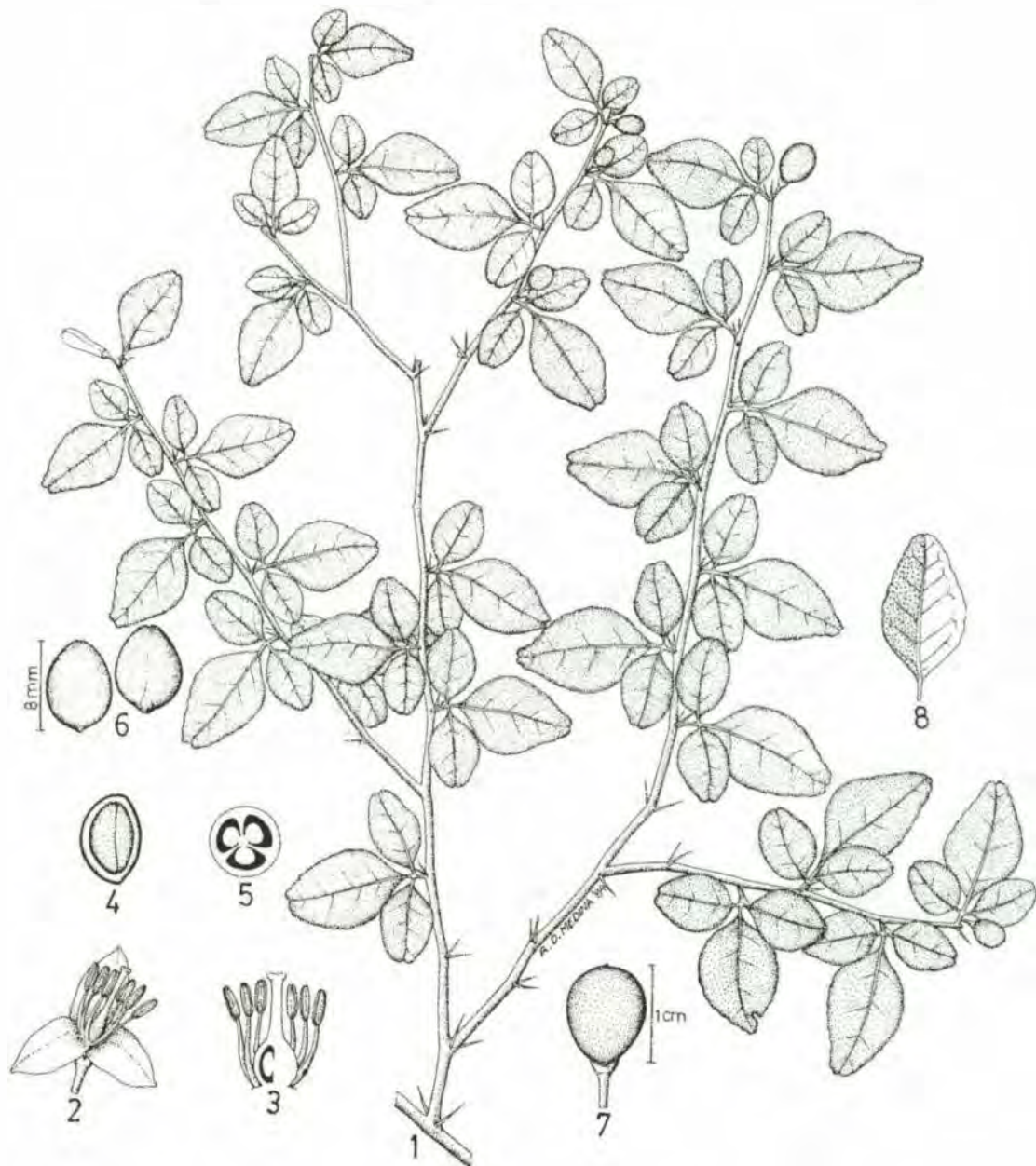


Figure 78. *Triphasia trifolia*: 1. fruiting twig; 2. flower; 3. stamens and vertical section of pistil; 4. 2-celled ovary; 5. ovary, cross section; 6. seed, 2 views; 7. fruit; 8. terminal leaflet.

Species 200, mainly pantropical, few in temperate eastern Asia and North America; 6 in the Philippines.

1. Inflorescences terminal; leaflets gradually acuminate... ..1. *Z. rhetsa*
 1. Inflorescences axillary; leaflets abruptly short-acute.....2. *Z. integrifoliolum*

1. ***Zanthoxylum rhetsa*** (Roxb.) DC., Prodr. 1: 728, 1824; Merr., En. Philip. 2: 327, 1923. – *Fagara rhetsa* Roxb., Hort. Beng. 11, 1814, *nom. nud.*; Fl. Ind. 1: 438, 1820; – *Zanthoxylum limonella* (Dennst.) Alston, Fl. Ceyl. (Suppl.) 6: 37, 1931; Hartley, J. Arn. Arb. 47: 197, 1966.

Trees small or medium-sized, prickly when young, old spines with solid, conic base. Leaves terminally crowded, equally or unequally pinnate, 30 cm long; petioles unarmed; leaflets 8-20 pairs, entire or obscurely crenate, 5-12 cm long, midrib with 10 pairs of obscure nerves, acuminate to subcaudate, oblique at obtusely rounded base; petiolules 5-8 mm long. Cymose panicles terminal, broader than long, profuse, glabrous, sometimes 40 cm across; flowers numerous, 4-merous; pedicels subtended by minute, acutely pointed bracts, yellowish white; sepals 4, one-third as long as corolla; ovaries glabrous. Fruits solitary, 5 mm wide, finely tubercled; seeds subglobose.

India, Sri Lanka, Thailand, South Vietnam, Malay Peninsula, Java, Celebes, Moluccas and southern Papua. In the Philippines: (northern Luzon to Palawan and Mindanao), in forests at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests up to 400 m.

Com. name – *Kayutana* (Tag.).

Exsicc. – *Pancho* CA 20323, 20399 (CAHP).

2. ***Zanthoxylum integrifoliolum*** (Merr.) Merr., En. Philip. 2: 327, 1923; Hartley, J. Arn. Arb. 47: 205, 1966. – *Fagara integrifoliola* Merr., Philip. J. Sc. 1: Suppl. 68, 1906.

Trees, up to 15 m high. Branches spiny. Leaves 50 cm long, 8- to 9-jugate; petioles occasionally spinescent; leaflets obovately oblong to subelliptic, 10-15 x 4-6 cm, raised midrib with 10 pairs of obscure nerves, abruptly short-acute, strongly inequilateral at base; petiolules 6-10 mm long. Corymbose panicles in upper leaf axils, ultimately glabrous, lower branches 10-15 cm long; flowers white, fragrant, subsessile, subtended by small bracts; sepals 4, rotund; petals 4, elliptic; stamens 4; ovaries glabrous. Fruits ovoid, glabrate but pitted; seeds ovoidly compressed.

Endemic. Philippines: (northern Luzon to Mindoro, Sibuyan and Samar), in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 30 to 350 m.

Com. name – *Salai* (P. Bis., S.-L. Bis.).

Exsicc. – *Pancho* CA 20332 (CAHP).

75. SIMAROUBACEAE

Trees or shrubs, sometimes climbing, almost always with bitter bark. Leaves alternate, pinnate or simple, often with glands beneath. Inflorescences axillary or subterminal, cymose or racemosely paniculate, seldom spicate; flowers regular, usually declinous and small; calyx 3- to 5-lobed; petals as many, rarely none, hypogynous, valvate or imbricate-like calyx segments. Disc simple or lobed, occasionally absent; stamens as many or twice the number of petals, free; anthers deeply lobed; styles 2-5, free or united; stigmas capitate; ovules solitary in each cell. Fruits drupaceous or samaroid, capsular, of 2-6 distinct carpels; seeds usually solitary.

Genera 30, species 200; in tropical and subtropical regions of both hemispheres; 9 genera and 15 species in the Philippines.

1. Cultivated shrubs; leaf stalks winged 1. *Quassia*
 1. Endemic trees; leaf stalks not winged 2. *Ailanthus*

1 QUASSIA Linnaeus

Shrubs or small trees erect, unarmed, very bitter. Leaves exstipulate; petioles and rachis broadly winged, leaflets opposite. Flowers in terminal, erect or suberect, simple or sparingly branched racemes, solitary, bisexual; calyx 5-partite, persistent; petals 5, much exceeding calyx, tapering from base to apex, torus much raised, obcordate, with a broad obcordate apex; stamens 10, epipetalous ones slightly shorter than episepalous ones; filaments with an oval, pubescent basal scale. anthers medifixed, ovaries 5, on top of torus, glabrous, 1-ovuled; styles solitary. Drupelets 1-5, spreading.

Species 25, in the tropics and subtropics of both hemispheres; 1 in the Philippines.

1. *Quassia amara* L., Sp. Pl. ed. 2, 553, 1762; Nooteboom, Fl. Mal. I, 6: 199, 1962. **Figure 79**

Shrubs, 2-4 m high. Leaves alternate, trifoliolate at end with minor pair of opposite leaflets below; petiole slender rachis winged, glabrate, 20 cm long; leaflets 5, submembranous, much paler beneath, sessile and articulated, entire, oblong to subelliptic or terminal ones broader above middle, 6-10 cm long, apex acuminate, base subcuneate. Racemes 8-20 cm long, glabrous, terminal; flowers large, bright red; pedicels 1 cm long; calyx small, 5-parted; petals 5, elongate, 2.5 cm long; stamens 10, inserted at base of columnar torus; ovaries 5-lobed. Drupes 5 or fewer, spreading.

Native of tropical America. Introduced recently in the Philippines; cultivated for the peculiar foliage and showy flowers.

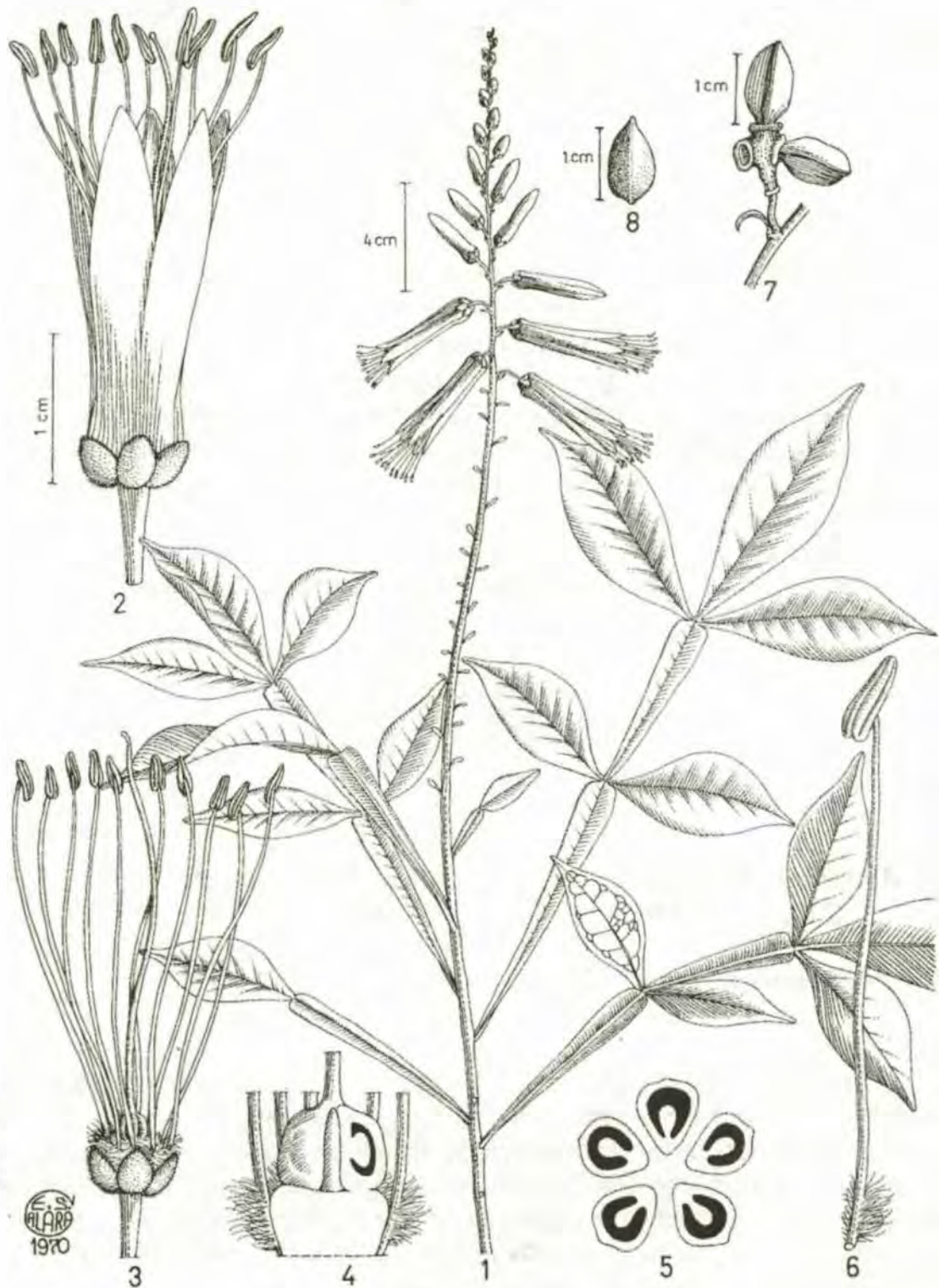


Figure 79. *Quassia amara*: 1. flowering branch; 2. flower; 3. flower, petals removed; 4. ovary, vertical section; 5. ovary, cross section; 6. stamen; 7. fruits; 8. seed.

Com. name – *Coralis* (Sp.).

Exsicc. – *Champaka* CA 8140; *Estioko*, Jr. CA 1491, 1493; *Pancho* CA 888; *Velasco* CA 1490, 1492* (CAHP).

2. **AILANTHUS** Desfontaines, *nom. cons.*

Trees dioecious, large or medium-sized. Leaves imparipinnate or paripinnate, approximating ends of branches. Flowers small, polygamous; bracteoles in terminal or axillary panicles; calyx small, 5-cleft; petals 5, spreading, valvate, edges bend inwardly; disc 10-lobed; flowers with 10 stamens, pistillate without stamens; filaments short or filiform, without scales; ovaries 2- to 5-parted; styles connate; ovules solitary in each cell. Samaras 1-5, more or less distinct, flat, membranous, linearly oblong; seeds solitary, centrally placed.

Species 5, southeastern Asia, Malaysia to the Solomon Islands, Queensland and northern New South Wales; 2 in the Philippines.

1. Corolla canescent; fruits 10-12 cm long 1. *A. integrifolia*
 1. Corolla glabrous; fruits half as long 2. *A. triphysa*

1. *Ailanthus integrifolia* Lam., *Encycl.* 3: 417, 1792; *Nooteboom*, *Fl. Mal.* I, 6: 218, *f. 17a, 18a*, 1962. – *A. blancoi* Merr., *Sp. Blanc.* 205, 1918.

ssp. *integrifolia*

Trees, up to 60 m high. Leaves 50-80 cm long, 15-pinnate; leaflets falcate, oblong or ovately lanceolate, 9-12 x 5 cm, midrib with 5-7 pairs of obscure nerves, subglaucous beneath, gradually acuminate, base inequilateral, obtuse; petiolules 1.25 cm long. Panicles exceed by leaves, in upper leaf axils, sparsely hairy except petals; calyx broadly toothed; corolla elongate, densely canescent outside. Fruit or samaras usually in pairs with rigid wings, 10-12 x 3.5 cm, obtuse; base truncately so; seeds reticulate in middle.

Throughout Malesia except the Lesser Sunda Islands to Bismarck Archipelago and Solomon Islands. In the Philippines (Luzon: Laguna), in forests at low altitudes.

Com. name – *Malasapsap* (Tag.).

Exsicc. – *Pancho* CA 20129 (CAHP).

2. *Ailanthus triphysa* (Dennst.) Alston, Handb. Fl. Ceyl. 6: Suppl. 41, 1931; Nooteboom, Fl. Mal. I, 6: 219, f. 17b-c, 18c, 1962. – *Adenanthera triphysa* Dennst., Schluss. Hort. Mal. 32, 1818. – *Ailanthus philippinensis* Merr., Publ. Gov. Lab. Philip. 35: 25, 1906.

Trees, up to 50 m high or more. Leaves 50-70 cm long, 12- to 15-pinnate; leaflets falcate, oblong to broadly lanceolate, 9-15 x 2.5-4 cm, opposite or subopposite, prominent midrib with 12-15 pairs of nerves, much paler beneath, acuminate, upper side of base rounded, lower acute; petiolules 1 cm long. Panicles axillary, mostly shorter than foliage, finely ferruginous-pubescent, becoming much-elongated in fruiting state; fertile flowers yellow, odorless, 4-5 cm long, upon nearly as long pedicels; calyx minute slightly pubescent with acute lobe; petals glabrous, lanceolate, 1.5 x 4.5 mm; stamens included; filaments 3 mm long; anthers short; ovaries glabrous, 3 carpels free, compressed, oblong; styles united; stigmas 3-lobed. Samaras usually in pairs, flat, glabrous, 5 cm long, one-half as wide, with thin wings, obtuse, base truncately so; seeds globose and centrally placed.

Southeastern Asia through Borneo, Celebes, Java to Queensland and north of New South Wales. In the Philippines (Luzon: Laguna, Camarines, and Quezon Provinces to Palawan), in forests at low altitudes.

Com. name – *Malakamias* (Tag.).

Exsicc. – *Florentino* CA 1489; *Gates & Villamil* CA 1488 (CAHP); *Villamil* BF 20972, 903608, 20973, 903607 (US).

76. BURSERACEAE

Trees or shrubs dioecious, rarely monoecious, resiniferous. Leaves spirally arranged, rarely in pseudowhorls, imparipinnate, sometimes unifoliolate, with or without stipules. Inflorescences solitary or terminal, paniculate or racemous; flowers regular, small, perfect or polygamous; calyx 3- to 6-lobed, sometimes merely toothed; petals 3-6, free, rarely connate, imbricate or valvate; disc annular or cup-shaped; stamens 3-12, equal or unequal, inserted at base of margin of disc, free, sometimes united at base; anthers dorsifixed, rarely adnate; ovaries free, 1- to 5-celled; styles simple; stigmas entire or drupaceous, indehiscent, rarerly capsule-like and dehiscent, with 2-5 pyrenes; seeds solitary, pendulous.

Genera 16, species 550, in the tropics of both hemispheres; 4 genera and 56 species in the Philippines.

1. Branchlets without vascular strands in pith; leaves membranous and crenate-dentate; calyx 5-parted; petals 5 1. *Garuga*
 1. Branchlets with vascular strands in pith; leaflets not lobulate at base; calyx 3-parted; petals 3..... 2. *Canarium*

1. GARUGA Roxburgh

Trees or shrubs. Branchlets without vascular strands in pith. Leaves mostly stipulate; leaflets crenate-serrate; stipels often present. Flowers in much-branched panicles, polygamous; calyx campanulate, 5-parted, valvate, short-pedicelled with ample disc within; petals 5, inserted in calyx tube, valvate; stamens 10, inserted in calyx tube on disc margin, filaments hairy at base; ovaries sessile, 4- or 5-celled; styles erect; stigmas capitate, obscurely lobed; ovules 2 in each cell. Drupes globose, fleshy, containing 1- to 5-seeded pyrenes.

Species 4, southeastern Asia, eastern Malesia to northern Australia and Melanesia; 1 in the Philippines.

1. *Garuga floribunda* Decne., Nouv. Ann. Mus. Hist. Nat. Paris 3: 477, 1834; Leenh., Fl. Mal. I, 5: 215, f. 5, 6, 1956. – *G. abilo* (Blco.) Merr., Publ. Gov. Lab. Philip. 35:73, 1905. – *Guiacum abilo* Blco., Fl. Filip. 364, 1838. – *Garuga littoralis* Merr., Philip. J. Sc. 10 (Bot.): 27, 1915. – *G. clarkii* Merr., Philip. J. Sc. 10 (Bot.): 29, 1915. **Figure 80**

Trees buttressed medium-sized. Leaves imparipinnate, 20-30 cm long, rachis finely pubescent; leaflets narrowly oblong to broadly lanceolate, smaller ones ovate, 10 x 3 cm, midrib with 5-8 pairs of obscure nerves, pubescent beneath, crenately dentate, acute to slenderly acuminate, broadly rounded at slightly oblique base; petiolules 5 mm long. Inflorescences terminally clustered, paniculate, up to 20 cm long, pubescent; flowers short-pedicelled, numerous; calyx acutely lobed; petals inserted upon calyx cup; stamens all fertile; filaments hairy along inner side. Infrutescences usually below foliage; drupes fleshy, subglobose, 1.25 cm in diameter, glabrous, 3- or 4-seeded.

Malesia, northern Australia to Melanesia. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, 30 to 350 m.

Com. name – *Bogo* (C. Bis., Mag., P. Bis.).

Exsicc. – *Guzman CA 10357A**; *Pancho CA 20136, 20252* (CAHP).



Figure 80. *Garuga floribunda*: 1. flowering twig; 2. flower, partly excised; 3. fruit; 4. fruit, cross section; 5. fruit bunch.

2. CANARIUM Linnaeus

Trees large or shrubs with fragrant, sticky resin. Leaves alternate, imparipinnate, usually crowded toward ends of branchlets, usually with a pair of stipules near or on petioles. Flowers small, in terminal or axillary panicles some much-elongated, perfect or polygamous; calyx short, 3-lobed; petals 3, free; stamens at least twice as many, inserted on margin or side of disc; ovaries 2- to 3-celled; ovules 2 in each cell; styles various or nearly trigonous, 1- to 3-seeded, usually only 1 maturing; seeds stone-like, surrounded by purplish blue, leathery exocarp.

Species 75, in tropics of the Old World; 30 in the Philippines.

1. Stipules subulate; scars semicircular, minute
 2. Petioles stout, acute-angled; stipules inserted on petioles up to 5 cm from base; fruits prickly-hairy 1. *C. hirsutum*
 2. Petioles slender, not acute-angled; stipules inserted on petioles up to 2 cm from base; fruits not prickly-hairy 2. *C. asperum*
1. Stipules not subulate; scars mostly linear
 3. Stipules persistent, inserted about 0.5 cm from base of petioles, very stiff; fruits ovoid to ellipsoid, 3.5-6 x 2-2.75 cm, acute, triangular in cross-section 3. *C. ovatum*
 3. Stipules caducous, inserted on petioles some distance from base; fruits shortly bluntly triangular in cross-section, 2.5-3.75 x 1.5-2 cm
..... 4. *C. luzonicum*

1. *Canarium hirsutum* Willd., Sp. Pl. 4: 760, 1805; Leenh., Fl. Mal. I, 5: 287, f. 46, 1956. – *C. multipinnatum* Llanos, Frag. Fl. Filip. 107, 1851. – *C. ahernianum* Merr., Philip. J. Sc. 1: Suppl. 70, 1906.

Trees, up to 45 m high. Leaves 50 cm long, pubescence variable; leaflets 9-12 in opposite pairs, gradually reduced toward base, elongate to oblong, midrib raised beneath with 12-16 pairs of ascending nerves, bluntly acute, broadly rounded at base; petiolules 5 mm long. Inflorescences terminally clustered in uppermost leaf axils, racemosely paniculate, 20 cm long or longer, branches glabrate; flowers pubescent, fascicled; pedicels 3-5 mm long; calyx broadly 3-lobed; petals 3, grayish tomentose outside, three times as long as calyx; ovaries brown-ciliate; stigmas glabrous. Fruits upon stout stalks, ovately ellipsoid, 2 cm thick, triangular when dry, covered with irritating brown hairs when young.

Malesia, Caroline and Solomon Islands. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Malapili* (Tag.).

Exsicc. – *Gates & Lopez CA 1497; Gates & Adduru CA 150; Lugod CA 6012; Gates & Villamil CA 1494; Guzman CA 10356, 10360 (CAHP); McGregor BS 22933, 898256 (US).*

2. *Canarium asperum* Benth. in Hook., Lond. J. Bot. 2: 215, 1843; Leenh., Fl. Mal. I, 5: 293, 1956. – *C. villosum* Benth. & Hook. f. ex F.-Vill., Nov. App. 40, 1880. – *C. calophyllum* Perk., Fragm. Fl. Philip. 1: 91, 1904.

var. *asperum*

Trees, up to 35 m high. Young branches covered with soft-brown pubescence. Leaves 20-50 cm long; petioles with linear, adnate stipules; leaflets ovate to oblong-ovate, 6-15 x 3-5 cm, entire, prominent midrib with 10-15 pairs of ascending curved nerves, abruptly acuminate, rounded or subcordate and oblique at base; petiolules 1 cm long. Inflorescences axillary, spicate to narrowly paniculate, 10-30 cm in length or longer, usually short-branched toward base, finely pubescent; flowers subsessile, few-clustered, greenish white or purple, 4-5 mm long; calyx obscurely toothed; petals twice as long, nearly glabrous. Fruits ellipsoid, 1 x 0.8 cm, terete when dry, upon 3-mm long, thickened stalks.

Solomon Islands and Malesia. In most parts of the Philippines, at low and medium altitudes; in Mt. Makiling, Luzon, at 50-350 m.

Com. name – *Pagsahingin bulog* (Tag.).

Exsicc. – *Cardona CA 1495; Guzman CA 10355; Stern CA 12109 (CAHP); Robinson & Foxworthy BS 17266, 902286; Elmer 17586, 105008, 18312, 897733; Mt. Makiling Forestry School BF 20138, 902486; Foxworthy's collector 1091591; Villamil BF 19745, 902824; US Ecol. Exp. Capt. Wilkes 15522 (US).*

var. *clementis* (Merr.) Leenh., Fl. Mal. I, 5: 295, 1956. – *C. clementis* Merr., Philip. J. Sc. 3 (Bot.): 142, 1908.

Differs from var. *asperum* in having compoundly spicate inflorescences and glomerulate flowers.

Endemic. Philippines: Luzon, Leyte to Mindanao; in forests at low and medium altitudes.

Com. name – *Pagsahingin* (Tag.).

Exsicc. – *Gates CA 1502; Pancho & Paysan CA 2792; Pinga CA 3172; Guzman CA 10359 (CAHP).*

3. *Canarium ovatum* Engl. in DC., Mon. Phan. 4: 110, 1833; Leenh., Fl. Mal. I, 5: 271, f. 22f, 1956. – *C. pachyphyllum* Perk., Fragm. Fl. Philip. 1: 94, 1904. – *C. melioides* Elm., Leafl. Philip. Bot. 3: 1079, 1911.

Trees, up to 25 m high. Branchlets glabrous, lenticellate. Stipules persistent, inserted on petioles up to 6 mm from base, deltoid to lingulate, 5-20 x 3-10 mm, acute, glabrescent. Leaves 2- to 4-jugate, glabrous; leaflets ovate to elliptic, 4-24 x 2-12 cm, coriaceous, base oblique, rounded to subcordate, entire, apex abruptly acuminate, nerves 8-12 pairs, straight to faintly curved, gradually arching from margin. Inflorescences axillary at ends of branches, narrowly paniculate to nearly racemose, 3-12 cm long, glabrescent, bracts concave; stamens 6, glabrous, adnate to disc. Fruits ovoid to ellipsoid, acute, triangular in cross-section, sides slightly furrowed, ribs rounded except acute base and apex.

Malesia, Micronesia and Melanesia. Throughout the Philippines, in primary forests; often cultivated; in Mt. Makiling, Luzon, planted as an avenue tree on the University campus.

Com. name – *Pili* (Tag.).

Exsicc. – *Novero CA 1493; Guzman CA 10358, 10361; Jovellanos CA 1499; Jarmin CA 1500* (CAHP).

4. *Canarium luzonicum* (Bl.) A. Gray, Wilkes Exp. Bot. 374, 1854; Leenh., Fl. Mal. I, 5:270, 1956. – *Pimela luzonica* Bl., Mus. Bot. 1: 220, 1850.

Figure 81

Trees large. Leaves 3- to 5-jugate; stipules caducous to subpersistent, inserted on base of petioles, pubescent; leaflets ovately oblong, 10-14 x 3-7 cm, midrib pronounced, with 10-15 pairs of prominent and divaricate nerves, acuminate, broadly rounded or subtruncate at base; petiolules 1-2 cm long. Inflorescences terminal or in upper leaf axils. 10-15 cm long, staminate paniculately branched, brown-pubescent; flowers subsessile clustered, subglobose; pistillate in racemose spikes, few, scattered; stout pedicels and subentire calyx 1.5 cm long, covered in early state with fine brown indumentum. Fruits shortly ovoid to ellipsoid, 3.5-3.75 x 1.5-2 cm, round to bluntly triangular in cross-section.

Endemic. Throughout the Philippines, in forests at low and medium altitudes.

Com. name – *Piling liitan* (Tag.).

Exsicc. – *Gates & Villamil CA 1496; Guzman CA 10361** (CAHP); *Forest Guard BF 20931, 1237869; Elmer 17803, 1050075; Rosenbluth & Tamesis BF 12676; Foxworthy's collector 1091602* (US).



Figure 81. *Canarium luzonicum*: 1. fruiting branch; 2. staminate inflorescence; 3. portion of pistillate inflorescence; 4. branch tip with foliaceous stipules; 5. pistillate flower, front view; 6. staminate flower, partly excised; 7. pistillate flower, vertical section; 8. fruit, cross section; 9. pyrene.

77. MELIACEAE

Trees or shrubs, rarely herbs. Leaves alternate, pinnate, seldom simple or bipinnate; estipulate; leaflets opposite or alternate. Flowers regular, mostly bisexual in axillary or terminal cymose panicles or in spikes or fascicles; calyx 3- to 6-lobed, rarely entire or free; petals 3 to 6, free or connate; anthers introrse, 2-celled, sessile inserted upon margin of filamentous tube or adnate to its inner side; disc tubular, annular or none; ovaries usually free, 1- to 5-celled; styles simple with capitate or disciform stigmas; ovules 1-2 in each cell, rarely many. Fruits capsules, drupes or berries, dehiscent or indehiscent; seeds various.

Genera 45, species 700, in tropics of both hemispheres; 19 genera and 135 species in the Philippines.

- 1. Leaves trifoliolate 1. *Sandoricum*
- 1. Leaves decomposed or pinnate
 - 2. Leaves decomposed 2. *Melia*
 - 2. Leaves pinnate
 - 3. Fruits dry and capsular; seeds winged or crested
 - 4. Stamens united into a tube 3. *Swietenia*
 - 4. Stamens free
 - 5. Seeds winged at distal end only 4. *Cedrela*
 - 5. Seeds winged at both ends 5. *Toona*
 - 3. Fruits drupaceous or when capsular, coriaceous; seeds not winged.
 - 6. Flowers subglobose, appearing as if closed
 - 7. Foliage and inflorescences not lepidote 6. *Aphanamixis*
 - 7. Foliage and inflorescences lepidote or finely pubescent 7. *Aglaia*
 - 6. Flowers tubular, not as above
 - 8. Styles short; mature fruits whitish, meat soft and juicy 8. *Lansium*
 - 8. Styles long; fruits not whitish, meat relatively hard and dry
 - 9. Disc annular; anthers linear, included or somewhat exerted.. 9. *Chisocheton*
 - 9. Disc tubular; anthers short, wholly or partly included 10. *Dysoxylum*

1. SANDORICUM Cavanilles

Trees. Leaves trifoliolate; leaflets entire, laterals short, terminal long-petiolulate. Panicles axillary; flowers 5-merous, yellowish white; calyx cup-shaped, short lobes imbricate in bud, basal portion adnate to ovary; petals imbricate, spreading; staminal tube cylindrical, nearly as long as petals,

toothed at apex; anthers 8-10, included; disc cup-shaped, lacinate; ovaries 5-celled, basal part adnate, each cell with 2 collateral pendulous ovules; styles columnar, equaling stamens; stigmas 5. Fruit compressed-globose, fleshy, indehiscent, 3- to 5-celled; seeds many, surrounded by papery aril.

Species 7, Indo-Malaysian; 2 in the Philippines.

1. *Sandoricum koetjape* (Burm. f.) Merr., Philip. J. Sc. 7 (Bot.): 237, 1912; En. Philip. 2: 361, 1923. – *Melia koetjape* Burm. f., Fl. Ind. 101, 1768.

Figure 82

Trees rather stocky with spreading crown, lactiferous. Twigs velvety. Leaves variable, relatively long-peduncled, tawny-pubescent except glabrate, darker green upper surface; leaflets ovately oblong or subelliptic, 10-25 x 5-8 cm, entire, acute or abruptly acuminate, base rounded or obtuse. Panicles soft-tomentose, narrow, axillary, usually shorter than foliage; flowers yellowish white, spreading, subsessilely clustered; calyx short; petals canescent, much longer; staminal tube 10-dentate; styles articulate at base, clavate above, ending in thickened ring, bearing 5 obtuse stigmatic lobes. Fruits globose, 5-8 cm in diameter, yellow, velvety when ripe, seeds surrounded by a tough membrane.

Thailand to Indochina through Malesia, often cultivated. Introduced in the Philippines, now occasionally found in semi-wild state.

Com. name – *Santol* (Tag.).

Exsicc. – *Estioko, Jr. CA 1520; Gates & Quisumbing CA 1521**; *Rodriguez CA 2821; Estrada CA 8887; Pancho & Guantes CA 16208* (CAHP).

2. MELIA Linnaeus

Trees or shrubs. Leaves imperfectly 2- to 3-pinnate, imparipinnate or by abortion of terminal leaflet paripinnate; leaflets 6-16, entire or toothed to pinnatifid, often membranous, glabrous, rarely pubescent. Flowers in axillary panicles; calyx short, 5- or 6-lobed, imbricate in bud; petals as many, free, ligulate, imbricate in bud; staminal tube cylindrical, dilated at base and apex, 10- to 12-striate, as many lobes at apex; anthers 10-12, included or partly exerted from near apex; disc annular; ovaries 3- to 6-celled; styles slender, equaling tube, terminated by capitate stigma; ovules 2, superimposed. Fruits dry or somewhat fleshy drupes, large stone 5-celled, each cell with a single pendulous seed.

Species 15, paleotropical and subtropical; 2 in the Philippines.



Figure 82. *Sandoricum koetjape*: 1. flowering twig; 2. fruit; 3. fruit, cross section; 4. stamen, opened, with pistil; 5. stamen, less pistil; 6. flower; 7. flower, opened.

1. Leaflets prominently toothed; flowers violet or pale lilac 1. *M. azedarach*
 1. Leaflets entire or obscurely crenate; flowers whitish 2. *M. dubia*

1. *Melia azedarach* L., Sp. Pl. 384, 1753; Li, Woody Fl. Taiwan 399, f. 147, 1963; Smith, Ann. Mo. Bot. Gard. 52: 56, f. 1, 1965. **Figure 83**

Shrubs or small trees. Leaves doubly imparipinnate, 25-80 cm long; leaflets opposite to alternate, ovately oblong, 4-7 x 1.5-3.5 cm, acuminate, distinctly crenate-serrate, except obtusely rounded base. Panicles axillary or lateral, occasionally terminal, shorter than foliage, glabrate; flowers 5-merous, faintly fragrant, violet or pale lilac; calyx deeply lobed; petals oblong, 1 cm in length, spreading or recurved; staminal tube darker lilac or purplish, 7 mm long, columnar. Drupes subglobose, 1 cm in diameter, stone covered by thin, fleshy exocarp.

Native of tropical Asia, now cultivated in most warm countries as an ornamental shrub. In Mt. Makiling, Luzon, cultivated on the University campus.

Com. name – *Paraiso* (Sp.).

Exsicc. – *Pancho CA 20086, 20209** (CAHP).

2. *Melia dubia* Cav., Diss. 7: 364, 1789; Adelb., Blumea 1: 315, 1947-48.
 – *M. candollei* Juss., Mem. Mus. Paris 19: 258, 1830.

Shrubs or small trees, branchlets slightly farinose or tomentose. Leaves long-petioled, up to 50 cm long, bipinnate; leaflets ovate to ovately lanceolate, 4-8 x 2-4 cm, crenulate-serrulate toward top. Panicles mainly in upper leaf axils, exceeded by foliage, numerous, flowered, puberulent in early state; flowers whitish, somewhat fragrant, 8 mm long; petals pubescent; calyx 5-lobed; staminal tube erect, at first light yellow with darker top, later sordidly purple, finely toothed; anthers small, inserted on inner side near top. Drupe ellipsoid, 1.5 cm long.

Tropical Africa, India to southern China through Malesia to tropical Australia. Throughout the Philippines, in second-growth forests and thickets at low and medium altitudes; in Mt. Makiling, Luzon, mostly in second-growth forests.

Com. name – *Bagalunga* (Bis.).

Exsicc. – *Lugod CA 8386, 8387* (CAHP).

3. SWIETENIA Jacquin

Trees usually tall. Leaves paripinnate; leaflets opposite, smooth and shiny, obliquely ovate to oblong. Panicles axillary; flowers small, pale or yellowish white; calyx with 4 or 5 broadly rounded segments; petals as many, free,

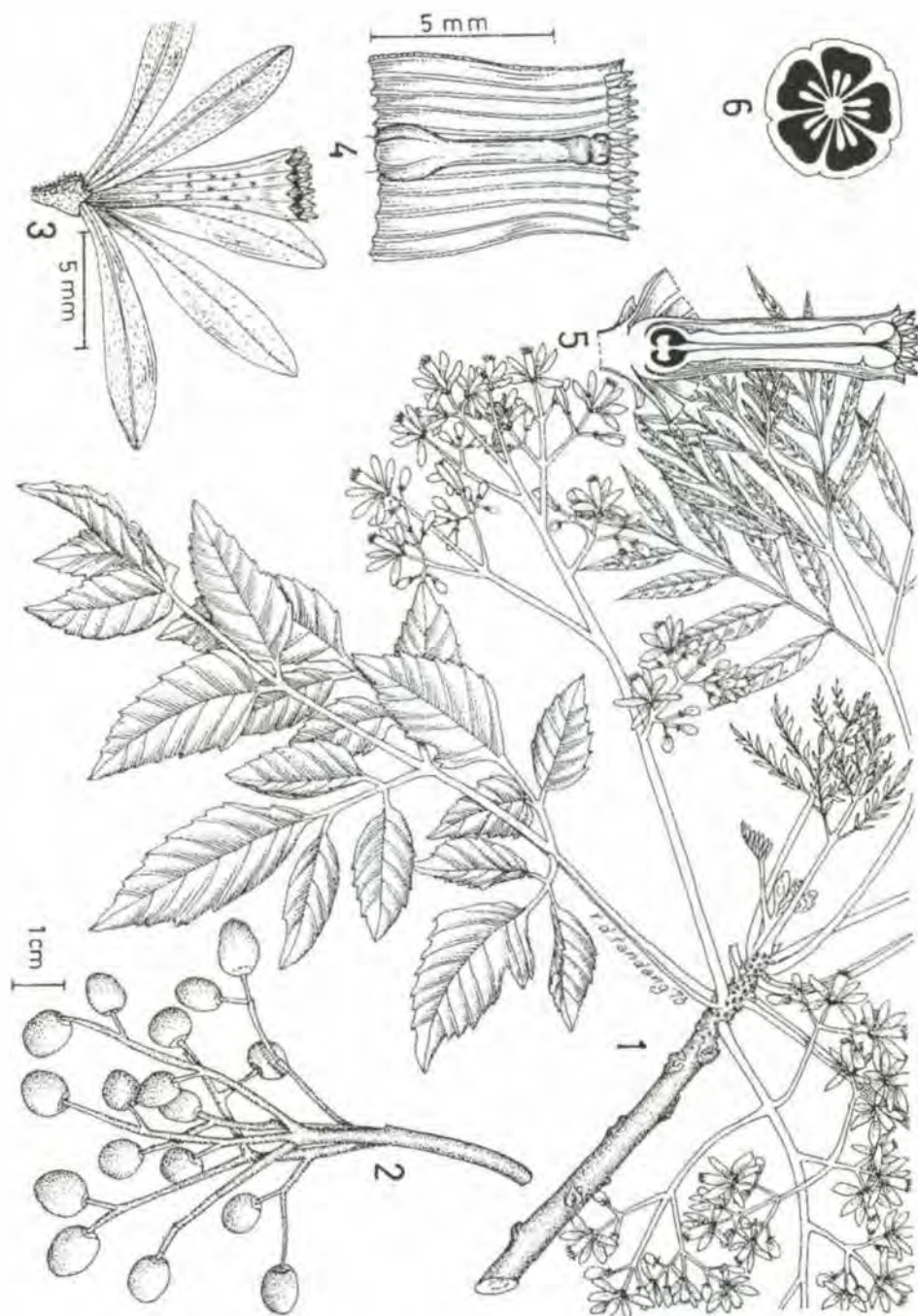


Figure 83. *Melia azedarach*: 1. flowering branch; 2. fruiting twig; 3. flower; 4. pistil and expanded androecium; 5. ovary, vertical section; 6. ovary, cross section. (After Pancho 1983, with permission).

imbricate in bud, blunt, narrowed toward base; staminal tube cylindrical, terminated by 10 lobes; anthers short, inserted upon short filaments between lobes; ovaries free, 5-celled, inserted upon a beaker-like disc; cells many-ovuled; styles columnar, bearing rugose disc-like stigmas. Capsules ovoid (-oblong), large, 5-celled, septifragally 5-valvate from base with a thick 5-angular, basally 5-winged central column; valves thick, woody; seeds compressed, numerous, flat, pendent, with elongate, thin wing, arranged in 2 series, imbricately covered by next outer ones.

Species 3, Central and South America, 2 in the Philippines.

1. Leaflets with distinctly recurved margins at base, 5-8 cm long.....
 1. *S. mahogani*
1. Leaflets not with recurved margins at base, twice as long as 5-8 cm
 2. *S. macrophylla*

1. ***Swietenia mahogani*** (L.) Jacq., Enum. Pl. Carib. 20, 1760; Backer & Bakh. f., Fl. Jav. 2: 118, 1963. – *Cedrela mahogani* L., Syst. ed. 10, 2: 940, 1759.

Trees erect. Leaves 15 cm long; leaflets at base with distinctly recurved margins, ovate-oblong, falcate, entire, 6 x 3 cm, midrib pronounced with 5-10 pairs of nerves, sharply acute, base half-acute and half-broadly rounded; petiolules 5-8 mm long. Panicles axillary, 2-10 cm or half as long as foliage, glabrous, lower half slenderly pedunculate; pedicels slender; calyx rim-like; petals oblong, less than 5 mm in length; staminal tube thick, nearly equaling corolla; anthers small, inserted on tubular rim, alternating lobes; ovaries ovoid, upon large, glabrous disc; styles bearing flat, much-expanded stigmas. Fruits woody capsule, each cell with numerous seeds, winged at basal end.

Native of tropical America. Recently introduced in the Philippines.

Com. name – Mahogany (Engl.).

Exsicc. – *Alicer* CA 10417; *Estioko*, Jr. CA 1524, 1525 (CAHP).

2. ***Swietenia macrophylla*** King in Hook., Ic. Pl. 16: t. 1550, 1886; Smith, Ann. Mo. Bot. Gard. 52: 61, f. 2, 1965.

Trees tall. Leaves 30-50 cm; leaflets at base not with recurved margins, oblong, 15 x 4 cm, basal ones a trifle smaller, midrib prominent with 9 pairs of nerves, sharply acuminate, broadly obtuse toward oblique base; petiolules 5 mm long. Panicles axillary, glabrous, 8-21 cm; flowers pedicelled, spreading; calyx short; corolla much longer, pale white; staminal tube notched, anthers inserted below toothed rim; ovaries upon a disc, gradually extended into styles; stigmas subcapitate. Fruits with thick valves; seeds brown, compressed,

crested or somewhat extended into a wing at attachment end, many in each cell, pendulous, oblongish, 3 cm long, bitter.

Native of Honduras. Recently introduced in the Philippines.

Com. name – Large leaf mahogany (Engl.).

Exsicc. – *Novero CA 1522*; *Sibayan CA 1523* (CAHP); *Aldos 2212507* (US).

4. CEDRELA P. Browne

Trees tall with colored wood. Leaves pinnate; leaflets numerous, opposite or subopposite, entire or serrate. Panicles terminal or in uppermost leaf axils; flowers white, 5-merous; petals suberect, oval, free and imbricate; calyx short, 5-cleft; stamens 4-6, inserted at top of disc, occasionally with alternating staminodes; filaments subulate; anthers widely oblong, versatile; ovaries 5-celled, sessile on top of lobulate disc, each cell with 8-12 biseriate ovules; styles filiform; stigmas discoid. Capsules ligneous, 5-celled, each valve consisting of 2 plates and completely separating from 5-ridged central column; seeds very thin, winged at distal end only, pendent.

Species 3-5, in tropical America; 1 in the Philippines.

1. *Cedrela odorata* L., Syst. ed. 10, 2: 940, 1759.

Trees tall. Twigs crooked, glabrous. Leaves chiefly terminal, glabrous; leaflets opposite or subopposite, reduced toward base, submembranous, inequilateral, well-scattered from near base, acute to sharply acuminate, ovately or narrowly oblong, broadly obtuse at base, average ones 10 cm long by one-third as wide, entire, midrib ridged, stramineous beneath, 7-9 nerves much less conspicuous, reticulations minute; petiolules 5-8 mm long, slender. Panicles axillary, shorter than foliage, glabrous except corolla, slender and laxly rebranched; calyx bluntly toothed, glabrous; petals 5 mm long, grayish white-tomentose; stamens free. Capsules 3 cm long, lenticelled.

Tropical America. In Mt. Makiling, Luzon, introduced on the University campus.

Com. name – Spanish cedar (Engl.).

Exsicc. – *Champaka CA 8087*; *Fernandez CA 3254*; *Lugod CA 8255, 8256* (CAHP).

5. TOONA (Endl.) M. Roemer

Trees. Leaves paripinnate; leaflets entire or slightly serrate, usually inequilateral. Panicles terminal or axillary; flowers small; calyx short, 4- or 5-parted; petals as many as and exceeding calyx segments, imbricate in bud, united at base into a leathery rim with the disc; stamens 4-6, occasionally with

staminodes, short setaceous filaments inserted upon or grown to disc; anthers dorsifixed; ovaries inserted upon or grown to disc, sessile, 5-celled; styles narrowed; stigmas enlarged; ovules 8-10 in each cell, 2-seriate. Fruits subwoody capsules, carpels separating from 5-angular middle column; seeds many, pendulous, crowded, thin, brown, winged at both sides or only at basal end.

Species 7 or 8, in all warm countries of the Old World except in Africa; 3 in the Philippines.

1. *Toona calantas* Merr. & Rolfe, Philip. J. Sc. 3 (Bot.): 105, 1908; Merr., En. Philip. 2: 357, 1923; Edmonds, Fl. Mal. Ser. I, 12: 370, 1995.

Trees large. Leaves 30-50 cm long or longer; leaflets oblong or broadly lanceolate, 12 x 5 cm, glabrous or hairy along nerves below, sharply acute to acuminate, truncately rounded at inequilateral base; petiolules 5 mm long. Panicles profuse, lax, equaling or shorter than leaves, lower half pedunculate, flower-bearing portion finely pubescent; calyx as long as pedicels, sparsely ciliate, broad, bluntly 5-toothed; corolla twice as long as calyx, glabrous, appearing subglaucous in dry state; stamens free. Capsules dehiscent from apex to base, lenticelled, terete, slightly thicker above middle, 3-4 cm long, with 5-ridged central column; seeds packed, distinctly but usually winged at each end.

Endemic. Throughout the Philippines, in forests at low and medium altitudes.

Com. name – *Kalantas* (Pang., Sbl., Tag.).
Exsicc. – *Pancho CA 20213, 20324* (CAHP).

6. APHANAMIXIS Blume

Trees dioecious. Leaves pinnate. Inflorescences axillary, staminate paniculate, pistillate slenderly spicate; calyx mostly 5-lobed, usually united at base, broadly rounded; petals 3, broad; staminal tube almost spherical, entire or obscurely lobed; anthers 3-6, included and inserted upon middle or basal portion of tube, introrse; ovaries small, 3-celled, each 1- or 2-ovuled; styles none; stigmas sessile, capitate. Fruits 3-celled, fleshy, tardily dehiscent; seeds surrounded by an aril-like membrane.

Three very closely related species from Sri Lanka and India to tropical China, Indochina, Malesia to the Solomon Islands; 2 in the Philippines.

1. *Aphanamixis polystachya* (Wall.) R.N. Parker, Ind. For. 57: 486, 1931; Mabblerly, Blumea 31: 136, 1985. – *Aglaiia polystachya* Wall. in Roxb., Fl. Ind. 2: 429, 1824. – *A. perrottetiana* A. Juss., Bull. Sci. Nat. Geol. 23: 239, 1830. – *A. cumingiana* (C.DC.) Harms in E. & P. Pfl. Fam. 3: 296, 1896; Merr. En. Philip. 2: 369, 1923.

Trees small or medium-sized. Leaves 40 cm long, petiole and rachis stout, olivaceous-tomentose; leaflets 6-jugate or fewer, opposite, subelliptic to oblong, 20 x 9 cm, midrib with 10-14 pairs of nerves, entire, pubescent beneath, abruptly acute, inequilateral and obtusely rounded at base; petiolules 5-10 mm long. Staminate inflorescences paniculate, long-peduncled, branches spicate, puberulous; flowers evenly scattered, globose, sessile; calyx cupular, pubescent, obscurely 5-lobed; petals 3, glabrous, broadly overlapping and appearing as if closed; pistillate spikes long, pendulous. Fruits subglobose, 2-3 cm long, subglabrous.

Indo-Malesia from Sri Lanka to India and Bhutan, tropical China and Indochina; throughout Malesia to Solomon Islands. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, from 30 to 300 m.

Com. names – *Kangko* (Bik.), *Salakin* (Tag.).

Exsicc. – *Gates & Villamil CA 1510, 1511; Gates & Villenciana CA 1512; Velasco CA 1513 (CAHP); Elmer 17666, 1237243, 17831, 1237364, 18258, 1050023; Ramos BS 13647, 714686; Rosenbluth & Tamesis BS 12696, 711484 (US).*

7. **AGLAIA** Loureiro, *nom. cons.*

Trees or shrubs. Leaves imparipinnate, seldom unifoliolate, glabrous, lepidote-scurfy or stellately pubescent; leaflets entire. Inflorescences paniculate or racemosely so, lax, mostly axillary; flowers polygamo-dioecious, small, subglobose and appearing as if closed; calyx 5-lobed, imbricate in bud; petals 5, similar in bud state, concave, short; staminal tube urceolate or subglobose, entire or 5-dentate at apex; anthers 5, included or exerted, erect; disc inconspicuous; ovaries ovoid or subglobose, 1- to 3-celled, each cell with 1 or 2 ovules; styles short or none. Fruits surrounded with gelatinous, fleshy integument.

Species 130, Indochina, Malesia, Australia and Polynesia; 55 in the Philippines.

- 1. Leaf rachis decurrent; introduced 1. *A. odorata*
- 1. Leaf rachis not decurrent; indigenous
 - 2. Small trees; leaflets 7-12 cm wide 2. *A. argentea*
 - 2. Medium to large trees; leaflets much smaller
 - 3. Inflorescences and midribs of leaflets densely pubescent..... 3. *A. elliptica*
 - 3. Inflorescences scurfy; midribs of leaflets scale-covered or glabrate
 - 4. Inflorescences grayish white-lepidote..... 4. *A. rimosa*
 - 4. Inflorescences scurfy-brown
 - 5. Leaflets more than 11; inflorescences rigid with large ellipsoid flowers 5. *A. villamilii*
 - 5. Leaflets less than 11; inflorescences lax with small, globose flowers 6. *A. edulis*

1. *Aglaia odorata* Lour., Fl. Cochinch. 173, 1790; Merr., Enum. Philip. 2: 377, 1923; Pannell, Fl. Mal. Ser. 1, 12: 383, 1995.

Shrubs or small trees, young tips ferruginous-lepidote, soon entirely glabrous. Leaves 5-12 cm long, rachis slightly winged; leaflets usually 5, obovate to oblong, 2-7 cm long, less than half as wide, obtuse, subcuneate at base; petiolules short. Panicles axillary, as long as foliage, lax; flowers numerous and racemosely arranged, glabrate when old, globular, 3 mm in diameter, yellow, fragrant; pedicels slender, short; ovaries hairy. Fruits ovoid or subglobose, 12 mm long.

Native of southeastern Asia; now found all throughout Continental Southeast Asia. Cultivated in most tropical countries for its foliage and fragrant flowers. Introduced in the Philippines; in Mt. Makiling, Luzon, cultivated on the University campus.

Com. name – *Cinamomo de china* (Sp.).

Exsicc. – Baltazar CA 1057; Espiritu CA 8210; Peña CA 8273 (CAHP).

2. *Aglaia argentea* Bl., Bijdr. 170, 1825; Pannell, Fl. Mal. I, 12: 237, 1995. – *A. iloilo* (Blco.) Merr., Philip. J. Sc. 9 (Bot.): 533, 1914; En. Philip. 2: 375, 1923. – *Melia iloilo* Blco., Fl. Filip. ed. 2, 241, 1845. **Figure 84**

Shrubs or small trees. Leaves crowded toward ends of branches, nearly a meter long; petioles 20-30 cm long, finely brown-lepidote, thickened at base, leaving large scars after falling; leaflets oblong 15-25 x 7-12 cm, raised midrib scurfy-brown, with 15-20 pairs of nerves, glabrous on upper surface, densely white-lepidote beneath, broadly acute or obtuse, cordate-rounded at base, often a trifle inequilateral; petiolules 1-2 cm long, brown-scurfy. Inflorescences axillary, as long as leaves, densely covered with minute brown scales; flowers globose, numerous clustered along ultimate branches, sessile; calyx thin, truncately rounded lobes ciliate along margins and around base, grayish brown; petals twice as long as calyx, glabrous, yellowish.

Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, in second-growth forests up to 250 m.

Com. name – *Iloilo* (Pamp.).

Exsicc. – Hernaez CA 18037* (CAHP); Elmer 18293, 1050022 as *A. iloilo* var. *ampla* Merr. (US).

3. *Aglaia elliptica* Bl., Bijdr. 171, 1825; Pannell, Fl. Mal. Ser. 1, 12: 288, 1995. – *A. harmsiana* Perk., Notizb. Berl.-Dah. 3: 78, 1903; Merr., En. Philip. 2: 374, 1923. – *A. lagunensis* Merr., Philip. J. Sc. 9 (Bot): 537, 1914. – *A. apoana* Merr., Philip. Govt. Lab. Publ. 35: 30, 1906. – *A. langlassei* C.DC., Ann. Conserv. & Jard. Bot. Geneve 10: 151, 1907. See Pannell (1995) for additional synonyms.



Figure 84. *Aglaia argentea*: 1. flowering branch; 2. portion of inflorescence; 3. flower, opened to show stamens; 4. pistillate flower, petals removed to show style; 5. scales, enlarged.

Shrubs or small trees. Leaves 25-35 cm long; basal leaflets usually smaller and subopposite, upper obovately oblong, midrib raised and crisply brown-pubescent beneath with 10-15 pairs of obscure nerves, short-acute, subcuneate or obtuse and frequently inequilateral at base; petiolules 5 mm long, tomentose. Panicles lax, equaling foliage, dull brown-pubescent, axillary or subterminal, densely covered with pale brown ciliated scales; flowers numerous, subglobose to globose, clustered along ultimate branches, sessile or subsessile to distinctly pedicelled; calyx obtuse, bluntly 5-toothed, densely clothed with similarly colored, stellate pubescence; petals at least twice as long, glabrous, enclosing inner organs, yellow. Fruits subglobose, 2-2.5 cm in diameter, covered with brown felt.

Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests at low altitudes.

Com. names – *Malatumbaga*, *Salaking-pula* (Tag.).

Exsicc. – *Pancho* CA 20180, 20221 (CAHP); *Villamil* BF 20497, 902853; *Amarillas* BF 24667, 1293611; *Elmer* 17659, 1237273, 17957, 1237460 (US).

4. *Aglaia rimosa* (Blco.) Merr., Sp. Blanc. 212, 1918. – *Portesia rimosa* Blco., Fl. Filip. 297, 1837. – *Aglaia denticulata* Turcz., Bull. Soc. Imp. Nat. Mosc. 31: 410, 1858. – *A. Ilanosiana* C.DC. In DC., Monogr. Phan. 1, 621, 1878. – *A. lanceolata* Merr., Philip. J. Sc. 5 (Bot.): 184, 1910. For additional synonyms, see Pannell (1995).

Shrubs, small to large trees. Leaves alternate, 20-30 cm or more long, 9-11 foliolate; leaflets opposite, ovately elliptic to oblong, 12-14 x 4 cm, terminal ones much larger, basal shorter, oblong; conspicuous midrib with 7-12 pairs of brown scale-covered nerves, pale green beneath, abruptly short-acute to acuminate, oblique and obtusely rounded, often apiculate, narrowed to inequilateral or sometimes subcuneate base; petioles 5-10 mm long; petiolules 1 cm or much shorter. Panicles terminal or in uppermost leaf axils, shorter than foliage, rather strict or coarse, densely covered with copper-brown to grayish brown scales; flowers many, subsessile or short-pedicelled, subglobose to globose; calyx lobes rounded, grayish white lepidote, bluntly toothed; corolla nearly twice as long as calyx, yellow, glabrous. Fruits obovoidly globose or subglobose, 1.5-2.5 cm long, shiny copper-brown to densely grayish brown-lepidote.

Taiwan and Malesia: Philippines, Moluccas, Sulawesi, New Guinea, New Ireland and New Britain. Throughout the Philippines, in forests at low and medium altitudes, often along the seashore; in Mt. Makiling, Luzon, in wooded areas from sea level up to 300 m.

Com. names – *Salaking-puti*, *Bayanti* (Tag.).

Exsicc. – *Aldos* 2212512; *Tadeña* 2125843, BF 20128, 902480, 900522; *Penbluth & Tamesis* BF 12685, 711483; *Whitford* BF 19705, 900107; *Elmer* 1237719; *Elmer* 18224, 894441 (US).

5. *Aglaia villamilii* Merr., Philip. J. Sc. 9 (Bot): 536, 1914; En, Philip. 2: 379, 1923.

Trees medium-sized. Branches terete, rather thin, young portions minutely brown-scurfy. Leaves 50 cm long, terete stalks similarly lepidote; leaflets 13, coriaceous, oblong, 5-15 cm or smaller, lighter beneath, bluntly acute, obtusely rounded base slightly oblique; petiolules 5-8 mm long, densely covered with scales. Panicles rigid, equaling foliage or nearly so, axillary or subterminal, covered with minute brown scales; flowers fragrant, subsessile, crowded along divaricate branchlets; calyx glabrous, yellow; lobes very short and rounded, minutely dark brown-scurfy. Fruits not known.

Endemic and so far only known from the Philippines (Mt. Makiling and Zamboanga); in Mt. Makiling, Luzon, in second-growth forests up to 350 m.

Pannell (1995) listed this taxon (*Aglaia 'vilamilii'*) under 'Dubious Species' with a note that the type was destroyed.

Com. names – *Kuping* (Tag.), *Sandalo* (Chab.).

Exsicc. – *Pancho* CA 20188, 20271 (CAHP).

6. *Aglaia edulis* (Roxb.) Wall., Calc. Gard. Rep. 26, 1840; Hiern. in Hook. f. Fl. Brit. Ind. 1: 556, 1875; Pannell, Kew Bull., Add. Ser. 16: 229, 1992; Fl. Mal. Ser. I, 12: 272, 1995. – *Milnea edulis* Roxb., Hort. Beng. 18: 1814, *nom. nud.*, Fl. Ind. ed. Carey & Wall. 2: 430, 1824. – *Aglaia curranii* Merr., Philip. J. Sc. 7 (Bot.): 276, 1912. – *A. diffusa* Merr., *op. cit.*, 277, 1912. – *A. samarensis* Merr., Philip. J. Sc. 11: 186, 1916.

Trees erect, up to 25 m high. Leaves 25-30 cm; leaflets usually 7, lateral ones opposite, broadly lanceolate to oblong or subelliptic, 9-14 x 2.5-4 cm, stout midrib with 6-9 pairs of prominent nerves, narrowed and acuminate at both ends; petiolules 5-10 mm long, glabrous. Panicles profuse, lax, upon petiole-like peduncles, as long as or longer than foliage, numerous branches minutely brown-scurfy; pedicel short, distinct; flowers numerous, globose, minute; calyx broadly 5-lobed, scurfy-pubescent; corolla glabrous, yellow, overarching inner organs. Fruits subglobose, 1.5 cm in diameter, felty-brown.

Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, common in open wooded areas at low altitudes.

Com. name – *Malasaging* (Tag.).

Exsicc. – *Velasco* CA 1503, 3560; *Gates & Quisumbing* CA 1509; *Cabanit* CA 3054; *Blancaver* CA 4862; *Orlido* CA 10640, CA 5011; *Pancho* CA 3870; *Jarmin* CA 1505; *Flores* CA 1504; *Domingo* CA 1506; *Stern* CA 12121 (CAHP); *Rivera* 33487 (PNH), 2212546; *Elmer* 18065, 894438 (US).

8. LANSIUM Correa

Trees small or medium-sized. Leaves imparipinnate; leaflets entire, alternate or opposite. Flowers bisexual in speciform racemes, axillary or on old wood, solitary or fascicled, erect or pendulous, simple or branched only at base; calyx deeply 5-lobed, lobes imbricate; petals 5, free or at base adnate to staminal tube, imbricate, connivent, thickly fleshy; anthers 10, obtuse, in 2 rows, shorter ones included, longer partly exerted; ovaries 3- to 5-celled, each cell with 1 or 2 ovules, globose; styles short, thick; stigmas lobulate. Fruits baccate, 1- to 5-celled, skin leathery, pale or yellowish white, easily separating from edible meat with somewhat sticky juice; seeds oblong, with soft, whitish, acidulous, pulpy aril.

Species 5 or 6, Indo-Malesia; 2 in the Philippines.

1. *Lansium domesticum* Correa, Ann. Mus. Hist. Nat. Paris 10: 157, t. 10, f. 1, 1807; Merr., En. Philip. 2: 368, 1923; Mabb. *et al.*, Fl. Mal. Ser. 1, 12: 315, 1995. – *Aglaia domestica* (Correa *emend.* Jack) Pellegrin in Lecomte, Pl. Gen. Indoch. 1: 766, 1911; Kostermans, Reinwardtia 7 (pt. 3): 221-282, 1966.

Trees erect. Leaves alternately scattered, 20-40 cm long; petioles long, slender, tumid at base; leaflets alternate, elliptic or ovately oblong, 7-15 x 5-9 cm, midrib prominent beneath, cross bars prominent, abruptly subacuminate, narrowed toward base; petiolules 1 cm long. Flowers sessile, small, yellowish white, in racemes, spikes, solitary or fascicled on larger branches or along trunk, much shorter than foliage, fleshy pubescent; ovaries tomentose, 5-celled, each cell with 1 or 2 ovules. Fruits ellipsoid, 3 cm long, yellowish or pale white, finely pubescent, pericarp tough; seeds surrounded by translucent pulp, often abortive.

Southeastern Asia to Malaysia. In the Philippines, cultivated for its edible fruits.

Com. name – *Lansones* (Bik., Tag.).

Exsicc. – *Gates & Quisumbing CA 1619* (CAHP).

9. CHISOCHETON Blume

Trees or shrubs lactiferous. Leaves paripinnate, coiled at top, never scurfy; leaflets oblique, opposite or subopposite, youngest often undeveloped. Panicles mostly from above leaf axils, divaricately branched with many polygamodioecious flowers; calyx small, cup-shaped, 4- or 5-lobed; petals 4, 5 or rarely 6, adhering in a tube, ultimately separating into narrowly elongated, recurved segments; staminal tube slender with 4-8 entire or notched lobes at tip; anthers linear, included or somewhat exerted, alternating staminal lobes; disc annular; ovaries short, 2- to 4-celled; styles slender, exceeding staminal

staminal tube; stigmas capitate; ovules solitary in each cell. Fleshy capsules loculicidally 2- to 4-valved; seeds frequently enclosed in an imperfect aril.

Species 25 or more, in Indo-Malesia; 7 in the Philippines.

- 1. Fruits compressed-globose, 2 cm wide1. *C. pentandrus*
- 1. Fruits obovoidly globose or pyriform, three times larger
 - 2. Leaflets broadly oblong, obscurely reticulate beneath; flowers 2 cm long2. *C. cumingianus*
 - 2. Leaflets narrowly oblong, plainly reticulate; flowers half as long as 2 cm 3. *C. patens*

1. ***Chisocheton pentandrus*** (Blco.) Merr., Philip. Govt. Lab. Bur. Bull. 27: 210, 1905. Merr., En. Philip. 2: 367, 1923; de Guzman *et al.*, Guide Philipp. Fl. Fauna 3: 1336, 1986. Mabb. *in* Tree Fl. Malaya 4: 237, 1989; Mabb., Fl. Mal, Ser. I, 12: 180, 1995. – *Trichilia pentandra* Blco., Fl. Filip. 355, 1837. – *Dasycoleum philippinum* Turcz., Bull. Soc. Nat. Mosc. 31: 415, 1858. – *Chisocheton philippinus* (Turcz.) Harms, Nat. Pfl. 3, 4: 296, 1896. – *C. parvifoliolus* Merr., Philip. J. Sc. 13(Bot.): 297, 1918. – *C. sorsogonensis* Elmer *ex* Merr., Philip. J. Sc. 13(Bot.): 297, 1918.

subsp. ***pentandrus***

Trees or treelets, 3-20 m high, bole up to 10 m, buttressed up to 60 cm. Leafy twigs 2.5- 6 mm diameter, deciduously tawny pubescent to subglabrous. Leaves up to 45 cm and up to 9-jugate; petiole 2-10 cm, terete, minutely pubescent. Leaflets 16-27 x 6-10 cm, elliptic to ovate-oblong, dark green adaxially, paler abaxially, glabrous or sparsely pubescent on veins, base more or less asymmetric, acute to obtuse, apex acuminate to acutely cuspidate, costa 8-16 on each side; petiolules 8 mm long. Inflorescences spiciform to thyrsoid, up to 65 cm, axillary to supra-axillary, sometimes in axils of unexpanded leaves; axis finely velvety puberulous. Flowers pedicellate, more or less fragrant; calyx 4 mm long, sparsely puberulous without, margin truncate to obscurely or irregularly lobed. Petals 4-5, 8-12 x 2 mm, cream, densely fulvescent-hirsute without, valvate, apex acute. Staminal tube white, more or less densely pilose, rarely subglabrous within, pubescent without; margin 5-lobed, lobes laciniate; anthers 5, 3 mm long, glabrous. Ovary 2-locular, short stipitate, hirsute; style glabrous to pubescent. Infructescence up to 30 cm. Capsule 20 mm diameter, globose or beaked, dull red, minutely rusty tomentose; pericarp with white latex. Seeds 2, 15 mm diameter, flattened, sarcotestal.

Peninsular Thailand and Malesia: Malay Peninsula, Sumatra to Philippines and Moluccas. Throughout the Philippines, in primary and secondary forests at low and medium altitudes, near gullies and rivers; in Mt. Makiling, Luzon, at 150-300 m.

Three subspecies are recognized by Mabberly (1995), two of which have been found only in Palawan [*i.e.* *C. pentandrus* ssp. *medius* Mabb. and *C. pentandrus* ssp. *paucijugus* (Miq.) Mabb.], in addition to their extra-Philippine distribution.

Com. name – *Katong-matsing* (Tag.).

Exsicc. – *Gates CA 1514; Villamil CA1515* (CAHP); *Elmer 17552, 1237166, 18285, 89549* (US).

2. *Chisocheton cumingianus* (C.DC.) Harms, *In E. & P. Nat. Pfl.* 3, 4: 296, 1896; Merr., *Philip. J. Sc.* 1: Suppl. 72, 1906; Enum. Philip. 2: 367, 1923; de Guzman *et al.*, *Guide Philip. Fl. Fauna* 3: 335, f. 255, 1986; Mabb. *Fl. Mal. Ser. I*, 12: 164, f. 24, 1995. – *Dasycoleum cumingianum* C.DC. in DC., *Mon. Phan.* 1: 541, 1878.

Trees, up to 40 m high; bole up to 15 m, 150 cm diameter; buttresses up to 3 m tall, 2 m out or bole fluted up to 10 m. Leafy twigs 5-7 mm diameter, dark brownish black, smooth but conspicuously lenticillate, sometimes with white latex, rarely myrmecophilous. Leaves pinnately compound, alternately crowded along relatively thick twigs, petiole tumid at base and leaving large scars after falling, 50-80 cm long; leaflets 10-14 pairs, opposite, 9 radially reduced to abortive blades toward base, terminal ones largest; generally elliptic, abruptly acuminate, base obtusely rounded, slightly inequilateral, smooth and shining but paler green beneath, 10 cm long x 20 cm wide but often much larger or smaller. Inflorescences paniculate, subterminal, nearly equaling leaves. Panicles elongate, subterminal, nearly equaling leaves; flowers perfect, short-pedicelled, nearly 2 cm long, tubular; calyx cup-shaped; styles long, filiform; stigmas capitate, ascending stamens; anthers linear, attached to inner side of tube, alternating lobes. Fruits solitary or few-clustered, upon long stout stalks, lateral, dull orange-red to brown, glabrous to subscurfy to velutinous, subglobose or slightly pyriform when mature, 10-30 cm long, tardily dehiscent into 4 pairs; pericarp with white latex; seeds 3 or 4; testa blackish brown; aril circumhilar; margin crenate, sometimes with extension to micropyle, orange-red, cotyledons superposed.

Continental Asia from Assam and tropical China through Indochina to eastern Malesia: Philippines, Celebes, Moluccas (Ambon & Ternate), New Guinea, Bismarck Archipelago (New Ireland, Manus & New Britain). Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-400 m.

Com. name – *Balukanag* (Tag.).

Exsicc. – *Villamil BF 20399, 900699; Mt. Makiling Forestry School 20155, 5683773* (US).

3. *Chisocheton patens* Bl., Bijdr. 169, 1825; Mabb. Fl. Mal. Ser. I, 12: 167, 1995. – *Chisocheton tetrapetalus* (Turcz.) C.DC., Mon. Phan. 1: 530, 1878; Merr., En. Philip. 2: 368, 1923; Elmer, Leafl. Philipp. Bot. 9: 3347, 1937. – *Schizocheton tetrapetalum* Turcz., In Bull. Soc. (Imp.) Nat. Mosc. 31: 411, 1858. – *Chisocheton fulvus* Merr., Philip. J. Sc. 3 (Bot.): 146, 1908; En. Philip. 2: 367, 1923.

Trees, up to 35 m high, but often flowering when 2-3 m tall; bole up to 20 m and 70 cm diameter, sometimes fluted or buttressed; buttresses up to 2 m tall, 1 m out and 8 cm thick, concave. Leaves mostly toward ends of branchlets, 50-60 cm long; leaflets 9-12, opposite pairs, narrowly oblong, 15 x 5 cm, midrib ridged beneath with 12-16 pairs of nerves, gradually acuminate, obtuse-rounded at very oblique base; petiolules short. Panicles axillary or subterminal, elongate, as long as leaves, branches and pedicels densely puberulent; calyx cupular, finely pubescent; corolla cylindric, glabrous, 4-segmented, less than 1 cm long. Infructescences lateral, long-stalked; fruits yellowish brown, subglobose or pyriform, 5-8 cm long, solitary or few-clustered, ultimately dehiscent, solid, usually 4-celled, 4-seeded; pedicels thick. Seeds 2, 5-11 x 8 mm, scutiform, half covered by an aril.

Peninsular Thailand to Malesia: Malay Peninsula, Sumatra, Bangka, Borneo, Java, Celebes and the Philippines. Throughout the Philippines, in forests at low and medium altitudes: in Mt. Makiling, Luzon, at 150-450 m.

Com. name – *Agogoi* (Tag.).

Exsicc. – *Elmer 18055, 1237529; McGregor BS 22967, 123896* (US).

10. DYSOXYLUM Blume

Trees or subarborescent shrubs. Leaves spirally arranged, pinnate; leaflets entire, opposite or alternate, oblique at base, glabrous or pubescent, never lepidote. Flowers paniculate or racemosely spicate, axillary, bisexual or unisexual, tubular, rarely cup-shaped; calyx 4- or 5-lobed, imbricate in bud; petals as many as calyx, oblong or subelliptic, usually valvate, spreading; staminal tube cylindric, seldom urceolate, denticulate or crenate at top; anthers short, 6, 8 or 10, wholly or partly included; disc mostly tubular, equaling or twice length of 3- or 5-celled ovaries; styles as long as stamens; ovules 2 in each cell. Fleshy capsules globose or pear-shaped, 3- to 5-celled, tardily dehiscent from apex base; seeds frequently solitary.

Species 80 of tropical East Asia from India to Sri Lanka to southern China, Indochina, throughout Malesia (including Christmas Island) to the Pacific south to Australia, New Caledonia, Lord Howe Island, Norfolk Island, New Zealand and east to Nieu; 30 in the Philippines.

1. Inflorescences on stems and larger branches 1. *D. cumingianum*
1. Inflorescences axillary or terminal
 2. Leaves membranous or subchartaceous
 3. Calyx of many unequal, imbricate bracts 2. *D. gaudichaudianum*
 3. Calyx not as above
 4. Leaflets not oblique at base; flowers few, long pedicellate.....
..... 3. *D. pauciflorum*
 4. Leaflets oblique at base; flowers numerous, sessile or nearly so
..... 4. *D. mollissimum*
 2. Leaves coriaceous
 5. Inflorescences pubescent; leaflets oblique at base; fruits scurfy-brown, pyriform yellowish 6. *D. oppositifolium*
 5. Inflorescences glabrous; leaflets not oblique at base; fruits smooth, subglobose, red or purple
 6. Leaflets 10 x 4 cm, thinly coriaceous. abruptly pointed; fruits red..... 7. *D. arborescens*
 6. Leaflets 16 x 6 cm, thickly coriaceous, obtuse to subacute; fruits purple 8. *D. excelsum*

1. *Dysoxylum cumingianum* C.DC., Mon. Phan. 1: 498, 1878; Vidal, Phan. Cuming 101, 1885; Merr., Philip. J. Sc. 1: Suppl. 72, 1906; En. Philip. 2: 362, 1923; de Guzman *et al.*, Guide Philipp. Fl. Fauna 3: 341, 1986; Mabb., Fl. Mal. Ser. I, 12: 85, 1995. - *D. testaceum* Elm., Leafl. Philip. Bot. 8: 3093, 1919.

Trees small or medium-sized, 5-25 m high; bole up to 28 cm diameter, sometimes fluted and buttressed, buttresses up to 50 cm out, 3 cm thick. Leaves mostly terminal, 25-35 cm long, 9- to 13-foliolate; leaflets opposite, oblong, 15 x 5 cm, midrib hairy with 7-10 pairs of nerves, obtuse or abruptly acute, broadly obtuse or rounded, often cuneate at base; petiolules 3 mm long, furfuraceous. Inflorescences spicately racemose, solitary or clustered along branches or stems, up to 5 cm long; rachis brown-hairy; flowers white, scattered, subsessile, subtended by small bracts; calyx 2.5 mm long, urceolate rather irregularly 4-dentate, densely pubescent without, teeth subacute; petals 4, 8-15 mm long, linear-oblong, acute, imbricate at least at apices, glabrous, or sparsely hirtellous at apices. Staminal tube glabrous with 8 variously bilobed appendages; anthers 8,1 mm long, oblong, subsessile, alternating with appendages. Disc 3-4 mm long, cylindrical, long-hairy, margin erose to irregularly lobed. Ovary pubescent, 4-locular; style hairy in proximal half; style head discoid, sometimes with distinct annulus. Infructescences up to 5 cm long, usually less, or fruits solitary. Fruits 3 cm long, ovoid to top-shaped, obscurely 4-angled, often conspicuously lenticellate, bright red-purple, carpels white within, dehiscing starwise. Seeds 3 or 4, 2 cm long, 8 mm wide, plano-convex, hanging by funicles from carpel walls, aril whitish, testa black.

Taiwan to central Malesia: Philippines (Luzon, Mindoro, Polillo, Samar, Panay, Siargao), Celebes, Lesser Sunda Islands (Bali), Moluccas (Halmahera, Bacan). In the Philippines, in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-450 m.

Com. name – *Tara-tara* (Tag.).

Exsicc. – *Pancho CA 20227* (CAHP).

2. *Dysoxylum gaudichaudianum* (A. Juss.) Miq., Ann. Mus. Bot. Lugd.-Bat. 4: 15, 1868; Adelb., Blumea 6: 316, 1948; Mabb., Fl. Mal. Ser. I, 12: 68, 1995. – *Didymocheton gaudichaudianum* A. Juss., Bull. Sci. Nat. Geol. 23: '238', 1830; Mem. Mus. Nat. Hist. Paris 19: 231, 1832; Kostermans, Reinwardtia 7: 436, 1969. – *Dysoxylum decandrum* (Blco.) Merr., Philip. Govt. Lab. Bur. Bull. 27: 30, 1905; Merr., En. Philip. 2: 363, 1923; de Guzman *et al.* Guide Philip. Fl. Fauna 3: 338, f. 258, 1986. – *Turraea decandra* Blco., Fl. Filip. ed. 2, 347, 1845. **Figure 85**

Trees small to medium-sized, up to 36 m high; bole up to 80 cm diameter, fluted; buttresses up to 2.5 m tall, 3.5 m out, concave, plank-like. Crown rather irregular, of massive branches and twigs with large terminal rosettes of leaves; twigs conspicuously cicatrose, cicatrices to 1 cm, scutellar. Leaves crowded toward ends of branchlets, 50-90 cm long; petioles much-enlarged at base; leaflets opposite or alternate, very unequal in size and shape, often oblong, 20 x 7 cm, midrib ridged beneath with 15-20 pairs of nerves, acute to acuminate, obtuse or obtusely rounded at inequilateral base; petiolules subsessile or very short. Panicles axillary, branches glabrate and angular when dry; flowers scattered, solitary or few-clustered, pale yellow, sessile; calyx cup-shaped, sparsely ciliate, of many unequal, imbricate segments; corolla tubular, 1 cm long, finely tomentose on exterior, 5-segments; staminal tube hairy toward top, bearing about 10 anthers. Fruits usually clustered below foliage, compressed-globose, 2 cm across, velvety yellow and finely rugose, 3-, 5- to 10-seeded. Seeds red (raphe-aril with sarcotesta), 1 cm long, plano-convex, borne on white carpel walls.

Malesia: Philippines, Java, Celebes, Lesser Sunda Islands, New Guinea, Bismarck Archipelago, Queensland, New Hebrides, Samoa to Christmas Island (Indian Ocean). In the Philippines, in thickets and forests at low and medium altitudes; in Mt. Makiling, Luzon, at 30 to 450 m.

Com. name – *Igiu* (Tag., Pamp.).

Exsicc. – *Francia CA 3077*; *Lugod CA 4230, 4231**, 4232; *Orlido CA 19381, 10966*; *Velasco & Magnaye CA 1517* (CAHP).



Figure 85. *Dysoxylum gaudichaudianum*: 1. flowering and fruiting branch; 2. flower; 3. flower, opened; 4. ovary; 5. ovary, vertical section; 6. ovary, cross section; 7. seed.

3. *Dysoxylum pauciflorum* Merr., Publ. Gov. Lab. Philip. 35: 32, 1906; En. Philip. 2: 365, 1923; – *D. biflorum* Merr., Philip. J. Sc. 5 (Bot.): 185, 1910; En. Philip. 2: 362, 1923. – *D. laxum* Merr., Philip. J. Sc. 7 (Bot.): 278, 1912; Elm., Leaf. Philip. Bot. 9: 3370, 1937; Mabb., Fl. Mal. Ser. I, 12: 101, f. 15, 1995.

Trees small, branchlets olivaceous-pubescent at tip. Leaves alternately scattered, 20-30 cm long, rachis hairy; leaflets evenly or unevenly pinnate, 9- to 12-foliolate, narrowly oblong, 10-15 x 3-4 cm, stout midrib with 7-9 pairs of nerves, abruptly acute to subcuneate, obtuse to rounded at base. Panicles axillary, half as long as foliage, finely pubescent in early state, sparingly and laxly branched, few-flowered; pedicels slender, minutely bract-subtended; calyx cup-shaped, constricted at base; corolla twice as long as calyx or longer, tubular, pubescent above middle, especially at top, whitish. Fruits obovoidly globose, 2 cm long, usually rugose with short point, glabrate, red.

Endemic. Philippines: (Luzon, Bohol, Mindanao); species found growing in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 100-500 m.

Com. name – *Amau* (Mang.).

Exsicc. – *Pancho CA 20207, 20398* (CAHP).

4. *Dysoxylum mollissimum* Bl., Bijdr. 175, 1825; G. Don, Gen. Syst. 1: 683, 1831; Mabb., Fl. Mal. Ser. I, 12: 90, 93 1995. – *D. octandrum* (Blco.) Merr., Sp. Blanc. 209, 1918; En. Philip. 2: 364, 1923; Elm., Leaf. Philip. Bot. 9: 3372, 1937. – *Turraea decandra* Blco., Fl. Fil. 349, 1837; ed. 2, 244, 1845; ed. 3, 2: 89, 1878. – *D. floribundum* Merr., Philip. J. Sc. 9 (Bot.): 450, 1914; En. Philip. 2: 363, 1923; de Guzman *et al.*, Guide Philip. Fl. Fauna 3: 340, f. 259, 1986.

ssp. *mollissimum*

Trees erect, small to medium-sized, up to 35 m with clear bole up to 25 m and 150 cm diameter, fluted, buttresses up to 2-5 m, 1 m out, concave. Leaves crowded at ends of branchlets, imparipinnate, 25-95 cm, 14- to 17-jugate; leaflets opposite or subopposite, narrowly oblong, falcate, 10 x 2.5 cm, midrib prominent with 9-15 pairs of obscure nerves, acute to acuminate, obtuse to subcuneate or obtusely rounded and shortly oblique at base; petiolules 3-5 mm long. Panicles elongate, axillary, shorter than leaves, short-soft-pubescent, puberulent or subglabrous; flowers numerous, sessile; calyx small, subsessile, obscurely toothed, usually hairy, subtended by minute bracts; corolla glabrous, 3-5 mm long, narrowly cylindrical, 4-lobed, yellowish white; staminal tube bearing anthers 8, inserted upon staminal tube. Fruits subglobose to obovoidly globose, 2 cm across, glabrous, with thin exocarp, yellowish when ripe.

India (Assam), China (Hainan, Yunnan), Burma; Malesia: Malay Peninsula, Sumatra, Borneo, Java, Lesser Sunda Islands (Bali) and Philippines (Luzon – Bontoc, Benguet; Rizal, Laguna, Quezon). In the Philippines, in forested ravines and primary forests at low and medium altitudes, up to 1500 m; in Mt. Makiling, Luzon, at 100-500 m.

Com. names – *Himamao* (Tag.), Hairy leaf himamao (Engl.).

Exsicc. – *Pancho* CA 20422 (CAHP); *Villamil* BF 20595, 900705; *Mt. Makiling Forestry School* BF 20115, 637814 (US).

5. *Dysoxylum oppositifolium* F. Muell., *Fragm. Phyt. Austral.* 5: 177, 1865-66; C.DC. in DC., *Mon. Phan.* 1: 501, 1878; Mabb., *Fl. Mal. Ser. I*, 12: 122, 1995. – *D. turczaninowii* C.DC. In DC, *Mon. Phan.* 1: 501, 1878; Fern.-Vill., *Nov. App.* 41, 1880; Vidal, *Rev. Pl. Vasc. Filip.* 81, 1886; Merr. *En. Philip.* 2: 365, 1923. – ?*D. venosum* Merr., *Philip. J. Sc.* 5 (Bot.): 185, 1910; *En. Philip.* 2: 366, 1923. – *D. palawanense* Merr., *Philip. J. Sc.* 9 (Bot.): 538, 1914; *En. Philip.* 2: 364, 1923. – *D. capizense* Merr., *Philip. J. Sc.* 17: 268, 1920; *En. Philip.* 2: 362, 1923. – *D. ilocanum* Merr., *Philip. J. Sc.* 13 (Bot): 298, 1918; *En. Philip.* 2: 363, 1923. – *D. wenzelii* Merr., *Philip. J. Sc.* 9 (Bot.): 367, 1914; *En. Philip.* 2: 366, 1923. – ?*D. ramosii* Merr., *Philip. J. Sc.* 9 (Bot.): 539, 1914; *En. Philip.* 2: 365, 1923.

Trees small to large, 10-30 m tall; bole up to 40 cm diameter; buttresses up to 1.5 m tall. Leafy twigs, 5-7 mm diameter, pale brown when dry, brownish puberulent; apical bud 8 cm, stiletto-like. Leaves toward ends of twigs, 15-45 cm long, 3- to 10 jugate with apical scar, alternate to opposite; petiole 6-10 cm long, drying yellowish, swollen at base, more or less puberulent; rachis 4-angled, puberulent. Leaflets opposite, or nearly so, ovately oblong, midrib strong, with 1-10 pairs of nerves, acuminate, broadly rounded at oblique base; petiolules 5 mm long. Inflorescences 5-9 cm, racemose, thyrsoid to spicate, rigid, olivaceous-tomentose, axillary; flowers sessile, mainly scattered toward apex; calyx 3 mm diameter, thick, bluntly 4-toothed, puberulent; corolla yellowish white, 2-3 times as long as calyx, usually 4-lobed. Petals 4, 7 x 3-3.5 mm, oblong, obtuse, pubescent without, creamish. Staminal tube glabrous or very sparsely pubescent apically without, margin crenate; anthers 8, 1 mm long, ellipsoid, included. Disc 2 mm long and in diameter, cupular, glabrous without, pubescent within, margin undulate. Ovary pubescent, 4-locular; style terete, pubescent in proximal half; style head discoid. Fruits clustered, mainly below foliage, pyriform, 4-valved, 6-8 cm long, veined, upon thick stalks, russet-scurfy-brown, heavy with solid white meat which soon turns yellowish; seeds 1-4 in each fruit, 1 cm long, ellipsoid, with red sarcotesta.

Malesia: Philippines (Luzon, Mindoro, Palawan, Leyte, Panay) and Borneo; New Guinea to northeastern Australia. In the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-500 m.

Com. name – *Kayatau* (Sul.).
 Exsicc. – *Villamil 902842* (US).

6. *Dysoxylum arborescens* (Bl.) Miq., Ann. Mus. Bot. Lugd.-Bat. 4: 24, 1868; Adelb., Blumea 6: 317, 1947-48; Merr. En. Philip. 2: 362, 1923; Mabb., Fl. Mal. Ser. I, 12: 103, f. 16, 1995. – *Goniocheton arborescens* Bl., Bijdr. 177, 1825. – *Dysoxylum rubrum* Merr., Publ. Govt. Lab. Philip. 35: 32, 1906; Philip. J. Sc. 1: Suppl. 72, 1906.

Trees medium-sized to large, 20-30 m high but usually less and often flowering when 1 m or so high; bole 45 cm diameter, fluted or with buttresses to 1 m tall and 45 cm out. Leaves 20-45 cm long, 4-jugate, imparipinnate, though some leaves paripinnate; petioles 7 cm long, subterete to weakly angled, canaliculated, glabrous; base swollen, drying blackish; leaflets 8.5-18 x 3-7 cm, proximal smallest, opposite, oblong, obovate to subelliptic, chartaceous to subcoriaceous, glabrous; bases cuneate, sometimes asymmetric; apices conspicuously acuminate, acumen up to 12 mm long; petiolules 5 mm long. Panicked racemes axillary, half as long as foliage; flowers sweet scented; calyx 2.5-4 mm diameter distally, shallowly cupular or saucer-shaped, articulated with pedicel by slender pseudopedicel 3-6 mm long, adpressed, tawny pubescent, margin irregularly 5-lobed. Corolla cylindrical, weakly clavate in bud, 5-8 mm long, yellowish white, 4- or 5-lobed, adhering to tube at base; petals 5, sometimes 4 or 6, 7-10 x 1.5-2.5 mm, valvate, waxy, creamy green to off white, glabrous or sometimes with minute hairs without, apex boat-shaped. Staminal tube weakly adpressed sparsely pubescent within, glabrous without, margin truncate to weakly crenulate; anthers 10, 1 mm long, inserted near margin. Disc 1-1.5 mm tall, shortly tubular, pubescent within, glabrous without, margin crenulate. Ovary 3- to 5-locular, each locule with 2 collateral ovules, pubescent; style terete, ascendant-pubescent in proximal two-third. Infructescence 25 cm long, sometimes appearing terminal, erect axes 5 mm diameter, terete. Fruits upon thickened stalks, 3 cm diameter, flattened-globose, 3- to 5-valved, often irregular and weakly angled between valves, bright pink-red, drying black, glabrous; endocarp white within. Seeds 1-6, 18 x 15 mm, plano-convex, exarillate; seed coat bright orange, sarcotestal; hilum 8 mm across, white.

Throughout Malesia, Nicobars and Andamans, Taiwan, Solomon Islands, New Hebrides and Queensland. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-500 m.

Com. name – *Kalimutain* (Tag.).
 Exsicc. – *Velasco CA 1516* (CAHP); *Nano 20378, 902699*; *McGregor BS 23174, 1051263*; *Elmer 17796, 1237336, 18180, 1237621* (US).

7. *Dysoxylum excelsum* Bl., Bijdr. 176, 1825; Mabb., Fl. Mal. Ser. I, 12: 109, 1995. – *D. altissimum* Merr., Philip. Gov. Lab. Bur. Bull. 17: 25, 1904; Philip. J. Sc. 1: Suppl. 72, 1906; Robins, Philip. J. Sc. 6(Bot.): 207, 1911; Merr., En. Philip. 2: 362, 1923; de Guzman *et al.*, Guide Philipp. Fl. Fauna 3: 337, f. 256, 1986.

Trees large, up to 36 m high; bole up to 80 cm diameter, buttressed up to 3 m, buttresses 2.5 m out, concave. Leafy twigs, 5-10 mm diameter, lenticellate, pubescent when young; apical bud with fist-shaped leaves. Leaves 25-90 cm, 2-, 4- or 5-jugate, paripinnate with terminal scar; petiole 5-10 cm, puberulent, flattened adaxially, weakly swollen at base. Leaflets 10-25 x 4-10 cm, ovate-elliptic to lanceolate, subcoriaceous, glabrous to rufescent-pubescent abaxially, especially on venation, opposite to alternate; base rather symmetrical, acute to attenuate, apices obtuse to acuminate; petiolules 5-15 mm, sulcate in sicco. Panicked racemes axillary or subterminal, rigid, branches minutely scaly; calyx saucer-shaped, apiculate; pedicels stout, 3-5 mm long; corolla 1 cm long, cylindrical, puberulent outside, 4-lobed; anthers 8, inserted upon staminal tube. Ovary densely sericeous, 3- or 4-locular, each locule with 1 or 2 ovules; style glabrous in distal half, otherwise sericeous; style head discoid to subcapitate. Fruits compressed-globose to pyriform, 5-8 cm across, 4 cm long, upon ligneous stalks, smooth, purple, occasionally rugose, 3- or 4-lobed, glabrous to scurfy, chestnut brown when ripe; seeds 1-4, 1.5 cm wide, subreniform, pendent on funicles at fruit dehiscence, testa bright red, scarlet-red or vermilion; hilum white.

Sri Lanka, Nepal and northeastern India, southern China to Indochina throughout Malesia to Solomon Islands. In the Philippines (Luzon to Palawan, Polillo, Samar and Panay), in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-450 m.

Com. name – *Kuling-babui* (Tag.)

Exsicc. – *Pancho CA 20425, 20578* (CAHP).

78. MALPIGHIACEAE

Trees or shrubs, often scandent. Leaves opposite or in whorls of 3, simple, entire, often with glands beneath especially at base, mostly petioled. Inflorescences axillary or terminal; pedicels articulate, usually 2-bracteolate; flowers small or medium-sized, white or yellow, seldom red or blue, bisexual, regular or irregular; calyx usually 5-parted; segments imbricate or valvate, 1 or more, but all never furnished with large glands, rarely eglandular; petals 5, clawed or not, imbricate, often fimbriate; stamens hypogynous or subperigynous, equal or 1 or more, much larger; filaments free or connate; anthers bilobed; ovaries superior 2- or 4-celled; styles 1-3, strict or circinnate; ovule solitary in each cell. Fruits capsular or winged samaras.

Genera 57, species 700, widely distributed in the tropics, but chiefly in America; 5 genera and 17 species in the Philippines.

1. Erect shrubs or small trees; fruits not winged
 2. Calyx 6-partite, usually eglandular; fruits capsular 1. *Galphimia*
 2. Calyx 5-partite, with 6-10 glands; fruits drupaceous 2. *Malpighia*
1. Scandent shrubs; fruits winged
 3. Calyx glands large; styles 1 or 2 3. *Hiptage*
 3. Calyx eglandular; styles 3 4. *Aspidopterys*

1. GALPHIMIA Cavanilles

Shrubs low. Leaves small, glandular on margins near base or at apex of petioles. Inflorescences terminal, racemose; pedicels bibracteolate; flowers almost actinomorphic; petals distinctly clawed; stamens all perfect; filaments distinct or united at base; ovaries 3-celled; styles 3; calyx -partite, usually eglandular. Capsules of 3 indehiscent cocci, never winged.

Species 10, tropical America; 2 in the Philippines.

1. *Galphimia gracilis* Bart., *Linnaea* 13: 552, 1839; Jacobs, *Fl. Mal. Ser. I*, 5: 144, 1955. – *Thryallis glauca* (Cav.) O. Kuntze, *Rev. Gen. Pl.* 89, 1891. – *Galphimia glauca* (non Cav.) Merr., *Fl. Man.* 277, 1912. **Figure 86**

Leaves diverse in size, mostly ovately elliptic, 5 x 2.5 cm, lateral nerves few and obscure, obtuse at both ends; petioles 1 cm long, usually with setiform axillary stipules. Racemes terminal, erect; brown branches short, subtended by bracts; pedicels as long as bracts, with setaceous bracteoles; calyx small, green; petals less than 1 cm long, yellow; filaments unequal, subsistent. Capsules 5-8 mm across, trigonous, glabrous, green; seeds 3, solitary in each cell, brown, smooth and shiny.

Native of tropical America. Cultivated in the Philippines.

Com. name – *Cuisia* (Tag.), Yellow bush (Engl.).

Exsicc. – *Champhaka* CA 8086; *Mathmorosa* CA 4573; *Olegario* CA 1530; *Gates* CA 1529; *Espiritu* CA 6087*; *Peña* CA 6099 (CAHP).

2. MALPIGHIA Linnaeus

Shrubs or small trees. Leaves shortly petioled or sessile, sometimes thorny-dentate; stipules minute, deciduous. Flowers in axillary or terminal umbels or corymbs, rarely solitary; calyx 5-lobed, with 6-10 glands; petals unequal, fimbriate to entire, distinctly clawed, glabrous; stamens glabrous, shorter than petals, 2 opposite ones in transversal plane different from other 8;



Figure 86. *Galphimia gracilis*: 1. flowering and fruiting twig; 2. fruit; 3. ovary, cross section; 4. seed, 3 views; 5. flower, 2 petals removed; 6. flower, ventral view.

ovaries 3-lobed, glabrous; styles 3, free, often thickened above. Drupes usually with 3 stones with 3-5 dorsal crests.

Species 30, in Central America, a few introduced in tropical Asia.

1. Shrubs up to 2 m high; leaf margins recurved and wavy-toothed, teeth ending in spiny bristles; flowers solitary or 2 on a short peduncle..... 1. *M. coccigera*
1. Small trees up to 5 m high; leaf margins entire; flower clusters in pedunculate umbels 2. *M. glabra*

1. ***Malpighia coccigera*** L., Sp. Pl. 426, 1753; Jacobs, Fl. Mal. Ser. I, 5:145. f. 15-16, 1955.

Shrubs, up to 2 m high. Leaves roundish or ovate, 0.75-2 cm long, margins recurved and wavy-toothed, teeth large, coarse, ending in spiny bristles, upper surface shiny, nerves and veins prominent above. Flowers solitary or 2 on a short peduncle; pedicels jointed, 1.5-2 cm long; sepals oblong or oblong-ovate, 3 mm long; glands 6, 1 mm long; petals pink, 1 cm long. Drupes red, subglobose, 1 cm long.

Central America and the Caribbeans; cultivated in many tropical countries. In Mt. Makiling, Luzon, cultivated for ornamental purposes in nurseries.

Com. name – Chinese holly (Engl.).

Exsicc. – *Pancho CA 20126, 20217* (CAHP).

2. ***Malpighia glabra*** L., Sp. Pl. 425, 1753; Backer & Bakh. f., Fl. Java 1: 440, 1963.

Trees small, up to 5 m high. Leaves elliptic or obovate-elliptic, 1.5-6 cm long, entire, glabrous, obtuse, rounded or retuse, base usually wedge-shaped, subsessile. Flowers cluster in paniculate umbels; pedicels slender; sepals ovate, more or less hairy; petals pink, 7-9 mm long, slightly keeled; stamens 2, thicker and larger than the rest. Drupes scarlet, globose, 1.-1.5 cm in diameter; stones rounded, 3-crested.

Tropical America. In Mt. Makiling, Luzon, introduced recently on the University campus.

Com. name – Barbado's gooseberry (Engl.).

Exsicc. – *Champhaka CA 8102; Orlido CA 4918; Pancho CA 3219, 9974, 10042; Peña CA 8171* (CAHP).

3. HIPTAGE Gaertner

Shrubs climbing or suberect. Leaves eglandular or with a row of remote, inter-marginal glands beneath; stipules minute or wanting. Racemes terminal or axillary, simple or compound; peduncles erect, bracteate, articulate with bibracteolate pedicels; flowers white, fragrant, fifth petal discolored; calyx 5-parted, glands large, adnate to pedicels; petals clawed, unequal, silky; stamens declinate, all fertile, one much larger; filaments connate at base; ovaries 3-lobed, segments appendiculate; styles 1 or 2, circinnate, others rudimentary; stigmas 1 or 2. Fruits schizocarps; mericarps 1-3, surrounded by one large and two much smaller wings; seeds subglobose.

Species 30, all in tropical Asia; 8 in the Philippines.

1. *Hiptage luzonica* Merr., Publ. Gov. Lab. Philip. 35: 33, 1906; Jacobs, Fl. Mal. Ser. I, 5: 135, f.7a-c, 1955. – *H. cebuensis* Elm., Leaflet. Philip. Bot. 2: 683, 1910. – *H. reticulata* Merr., Philip. J. Sc. 5 (Bot.): 186, 1910. – *H. cumingii* Merr., Philip. J. Sc. 5 (Bot.) 190, 1910. – *H. loheri* Merr., Sp. Blanc. 213, 1918.

Figure 87

Shrubs scandent. Leaves ovately elliptic to oblong, 5-9 x 3-5 cm, midrib stout with 4 or 5 pairs of ascendingly obscure nerves, acuminate or abruptly so, base acute or rounded; petioles 5-7 mm long. Racemes axillary, solitary, chiefly in upper axils and simulating terminal inflorescences, 5-8 cm long, pubescent; pedicels 1 cm long, with bracts about middle; sepals oblong, rounded, 3 mm long; petals at least twice as long as sepals, pubescent. Carpels 2 or 3, nut portion pubescent, obscurely crested, central wing broadly oblong, 1.75 cm long, lateral half as long as central wing.

Celebes. In most parts of the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests up to 450 m.

Com. name – *Komimpol* (P. Bis.).

Exsicc. – *Pancho* CA 20190, 20260* (CAHP).

4. ASPIDOPTERYS A. Jussieu

Lianas. Leaves eglandular, entire; stipules small and caducous or wanting. Inflorescences of simple or compound, axillary or terminal panicles, peduncles bracteate, jointed at top, pedicels often minutely bibracteolate; flowers small, yellow or white; calyx short, 5-parted, eglandular; petals not clawed, spreading or reflexed; stamens perfect; filaments distinct, sometimes connate at base; ovaries narrowly 6-winged; styles 3, glabrous; stigmas capitate. Fruits schizocarps; mericarp surrounded by a disc-like lateral wing; seeds oblong, subterete.

Species 20, in tropical Asia; 1 in the Philippines.

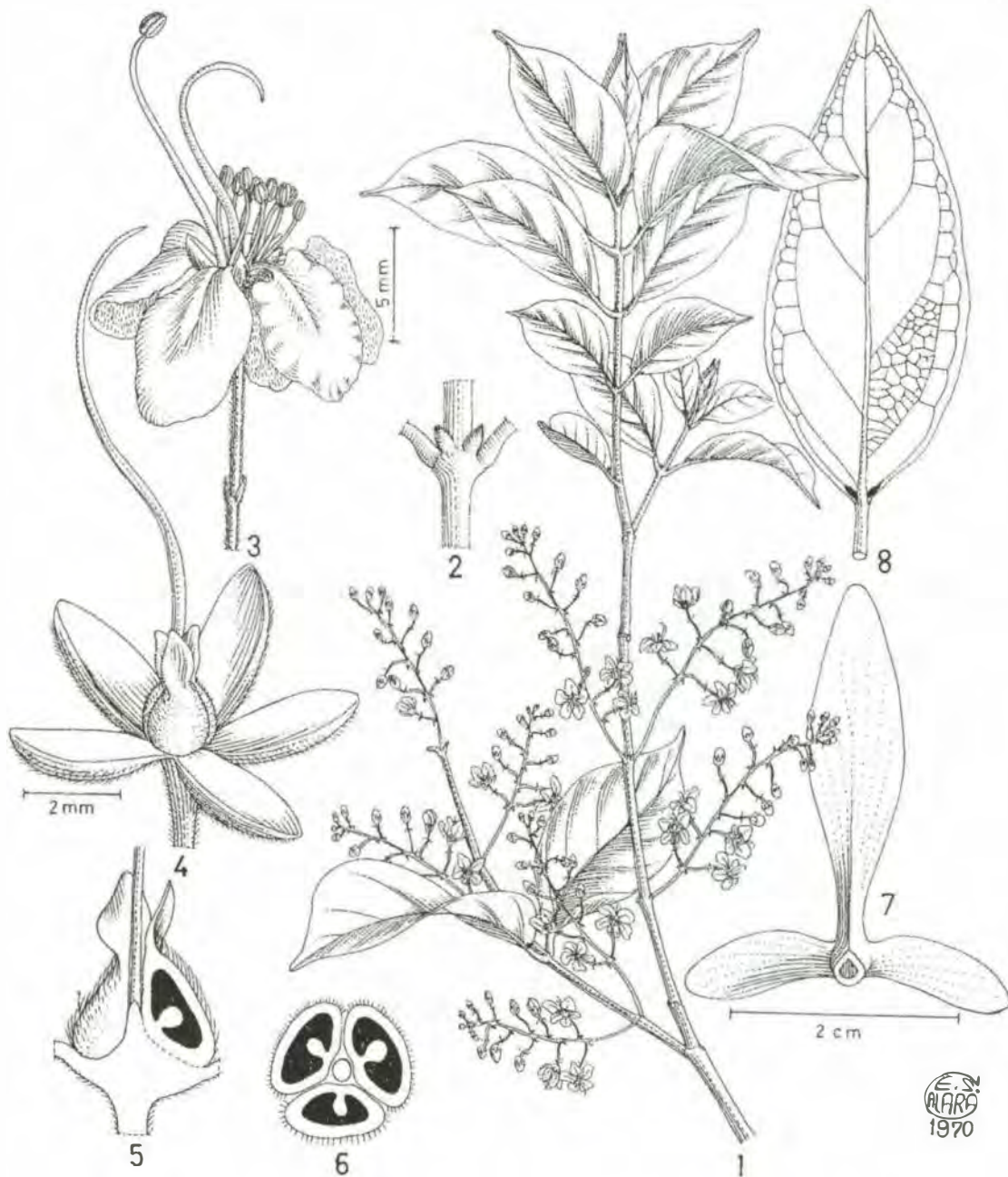


Figure 87. *Hiptage luzonica*: 1. flowering branch; 2. portion of stem with stipules; 3. flower; 4. flower, corolla and stamens removed; 5. ovary, vertical section; 6. ovary, cross section; 7. samara; 8. ventral side of leaf showing glands at base.

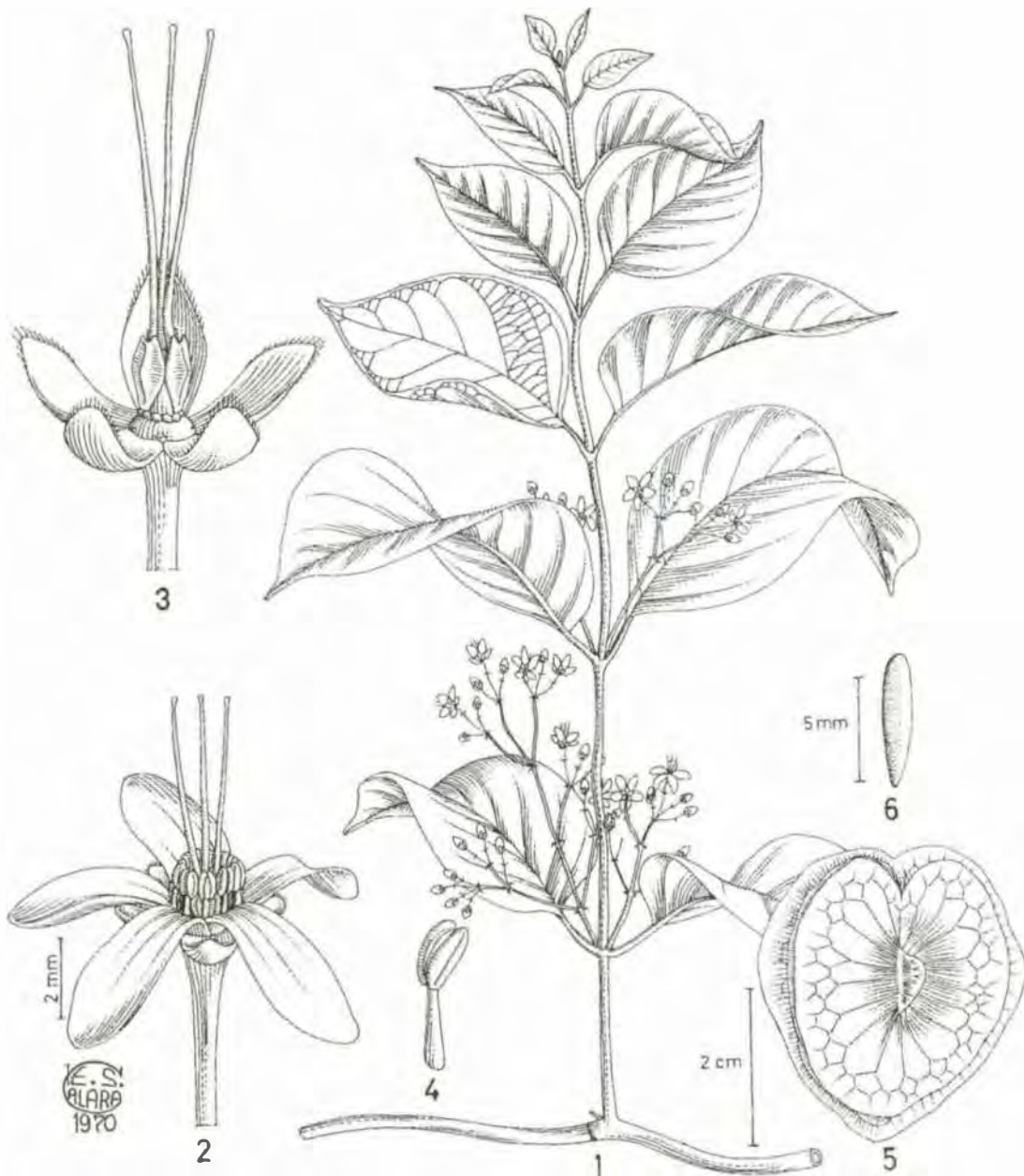


Figure 88. *Aspidopterys elliptica*: 1. flowering branch; 2. flower; 3. flower, corolla and stamens removed; 4. stamen; 5. fruit; 6. seed

1. *Aspidopterys elliptica* (Bl.) Juss., Ann. Sc. Nat. II, 13: 266, 1840; Jacobs Fl. Mal. Ser. I, 5: 127, 1955. – *Hiraea elliptica* Bl., Bijdr. 225, 1825. – *Aspidopterys ovata* Merr. & Rolfe, Philip. J. Sc. 3 (Bot.): 106, 1908.

Figure 88

High climbers. Leaves ovate or ovately rotund to elliptic, 10 x 5 cm, glabrous or sparsely appressed-pubescent beneath, midrib with 3 pairs of ascendingly curved nerves, bluntly acute, broadly rounded or shallowly cordate at base; petioles 1-2 cm long. Racemes axillary, shorter than foliage, pubescent, bracteate; flowers fragrant, terminally clustered; pedicels slender, 1.5-2 cm long, glabrous, articulate below middle; calyx of 5 oblong segments, thin, glabrate; petals yellowish white, glabrous; stamens bearing bluntly oblong anthers. Fruits rotund, up to 5 cm across, glabrous; seeds oblong with dry, thin, reticulately nerved wings.

Lower Burma, Tenasserim, Malay Peninsula, Sumatra and Java. Throughout the Philippines, in thickets and second-growth forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly in second-growth forests at low altitudes.

Com. name – *Tauag-amo* (Tag.).

Exsicc. – *Villamil CA 1528*; *Velasco CA 1527**; *Estrada CA 4598* (CAHP).

79. POLYGALACEAE

Trees, shrubs or herbs. Leaves alternate or rarely whorled, entire, simple, occasionally reduced to mere scales or absent, estipulate. Flowers irregular, bisexual, 3-bracteate, usually clustered in terminal or axillary inflorescences; sepals 5, unequal, 2 inner ones often petaloid, deciduous or persistent, imbricate in bud; petals as many as sepals or fewer, distinct, unequal; stamens 1 or half as many as petals plus 1; filaments usually united into a sheath; anthers opening by terminal pores; ovaries free, 1- to 3-celled; styles curved; stigmas capitate; ovules solitary in each cell. Fruits 2-seeded, 2-celled capsules or indehiscent, 1-seeded or with 3 indehiscent carpels.

Genera 16, species 725, chiefly in temperate regions; 5 genera and 22 species in the Philippines.

1. Trees or shrubs; stamens 8
 2. Trees or erect shrubs; petals 5 1. *Xanthophyllum*
 2. Scandent shrubs; petals 3 2. *Securidaca*
 1. Small, erect, delicate saprophytes; stamens 3 or 5..... 3. *Epirixanthes*

1. **XANTHOPHYLLUM** Roxburgh, *nom. cons.*

Shrubs erect or trees medium-sized. Leaves subchartaceous, generally curing yellowish green. Inflorescences usually terminal; sepals brown or brownish yellow, 2 lateral ones larger than others; petals 5, unequal, lowermost keel-shaped, soft-hairy, 4 other keels subequal, narrowly oblong, glabrous, crested; stamens 8, distinct, 2 hypogynous and attached to base of petals; disc annular, often lobed, hypogynous; ovaries stipitate, 1-celled; styles curved; ovules various in number and insertion. Fruits indehiscent with solitary seed, exarillous and exalbuminous.

Species 45, southeastern Asia, Malaysia to tropical Australia; 6 in the Philippines.

1. *Xanthophyllum excelsum* (Bl.) Miq., Fl. Ind. Bat. 1: 129, 1858; Merr. En. Philip. 2: 386, 1923. – *Jackia excelsa* Bl., Bijdr. 62, 1825. – *Xanthophyllum glandulosum* Merr., Publ. Gov. Lab. Philip. 35: 34, 1904.

Trees erect, medium-sized. Leaves alternate, oblong or smaller ones lanceolate, 9 x 4.5 cm, midrib prominent, with 4-6 ascendingly obscure nerves, sharply acute to acuminate, obtuse or abruptly cuneate at base; petioles 5-8 mm long. Inflorescences terminal and in uppermost leaf axils, puberulent, 5-8 cm long, spicate racemes often few-flowered, rarely rebranched; flowers fragrant, solitary or in pairs, alternatingly scattered; pedicels 3 mm long; calyx puberulent, segments acute to obtuse, one-third as long as corolla; petals yellowish white, glabrous. Fruits glabrous, hard-shelled, spherical, 1.25 cm in diameter, upon short much-thickened stalks.

Tenasserim to the Malay Peninsula, Sumatra, Borneo and Java. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-450 m.

Com. name – *Bokbok* (Tag., C. Bis.).

Exsicc. – *Pancho CA 20210, 20336* (CAHP).

2. **SECURIDACA** Linnaeus, *nom. cons.*

Shrubs scandent. Leaves well-developed, distichous. Flowers in terminal or axillary, usually compound racemes, individuals terminally clustered, bract-subtended; sepals deciduous, 2 inner wings larger, petaloid; petals 3, lateral ones distinct from glabrate, crooked keel, upper absent, stamens 8, monadelphous; anthers 2-celled, dehiscing by oblique pores; ovaries orbicular with curved styles, 1-celled, 1-ovuled; stigmas large. Fruits 1-seeded samaras with broad, coriaceous, greenish, veined wing, indehiscent; seeds exarillate, exalbuminous.

Species 30, numerous in tropical America, rare in tropical Africa and Asia; 3 in the Philippines.

1. *Securidaca corymbosa* Turcz., Bull. Soc. (Imp.) Nat. Mosc. 27: 360, 1854; Merr., En. Philip. 2: 385, 1923. **Figure 89**

Tree climbers. Branches long, drooping, ultimately freely branched, young tips crisply pubescent. Leaves ovate, 10 x 4 cm, shiny above, subglaucous and puberulent beneath, acute, broadly rounded at base; petioles 5 mm long. Inflorescences large, profuse, lower branches subtended by reduced leaves, crisply tomentose; flowers terminally clustered; pedicels 5-8 mm long, bract-subtended, buds pale white to purplish tinge. Samaroid fruits upon elongate pedicels, glabrous; subglobose, basal, 1-seeded portion coarsely reticulate, bearing wings 5-7 cm long.

Endemic. Philippines: (Luzon to Mindoro, Negros), in forests at low and medium altitudes. In Mt. Makiling, Luzon, in open wooded areas up to 400 m.

Com. names – *Gogong-bisaya* (Tag.), *Hinaki* (P. Bis.).

Exsicc. – *Pancho* 3477, 3478* (CAHP).

3. EPIRIXANTHES Blume

Saprophytes erect, delicate, yellowish brown or violet. Leaves spirally arranged, minute, scale-like, appressed, ovate or ovate-oblong. Flowers spicate in axils of bracts, minutely bibracteolate at base; sepals persistent, free or connate, subequal; petals 3, connate halfway or lobed, lowermost broader than others, strongly vaulted, lateral ones longer and less vaulted; stamens 3 or 5, monadelphous, tube adnate to corolla-tube; ovaries 2-celled, cells 1-ovuled. Fruits enclosed by calyx, slightly compressed, inermous, indehiscent. Seeds black, glabrous.

Species 8, in eastern Asia to Australia; 1 in the Philippines.

1. *Epirixanthes cylindrica* Bl., Cat. Gew. Buitenz. 82, 1823; Merr., Philip. J. Sc. 1: Suppl. 203, 1906. **Figure 90**

Stems erect, 8-10 cm long, with fastigiated branches; root system 10-15 mm deep, much-branched. Bracts obovate to subspatulate, up to 2 mm long. Sepals free, 1.5-2 mm long; corolla yellowish white, up to 2 mm long; anthers 5. Fertile portion of spike 8-20 mm long, 4-6 mm thick. Fruits ovoid-urceolate, 1.25-1.5 mm long; seeds black, 0.5-1 mm, orbicular.

Malay Peninsula, Sumatra, Borneo, Java, New Guinea. Throughout the Philippines, in primary forests at medium and high altitudes; in Mt. Makiling, Luzon, in the cloud-belt forest, rare or at least very difficult to detect.

Com. name – *Bunok bañgat* (Bag.).

Exsicc. – *Hernaez* CA 19733* (CAHP).



Figure 89 *Securidaca corymbosa*: 1. flowering twig; 2. seed, 3 views; 3. fruit bunch; 4. flower; 5. petals; 6. flower bud, 2 views; 7. stamen, opened with pistil.

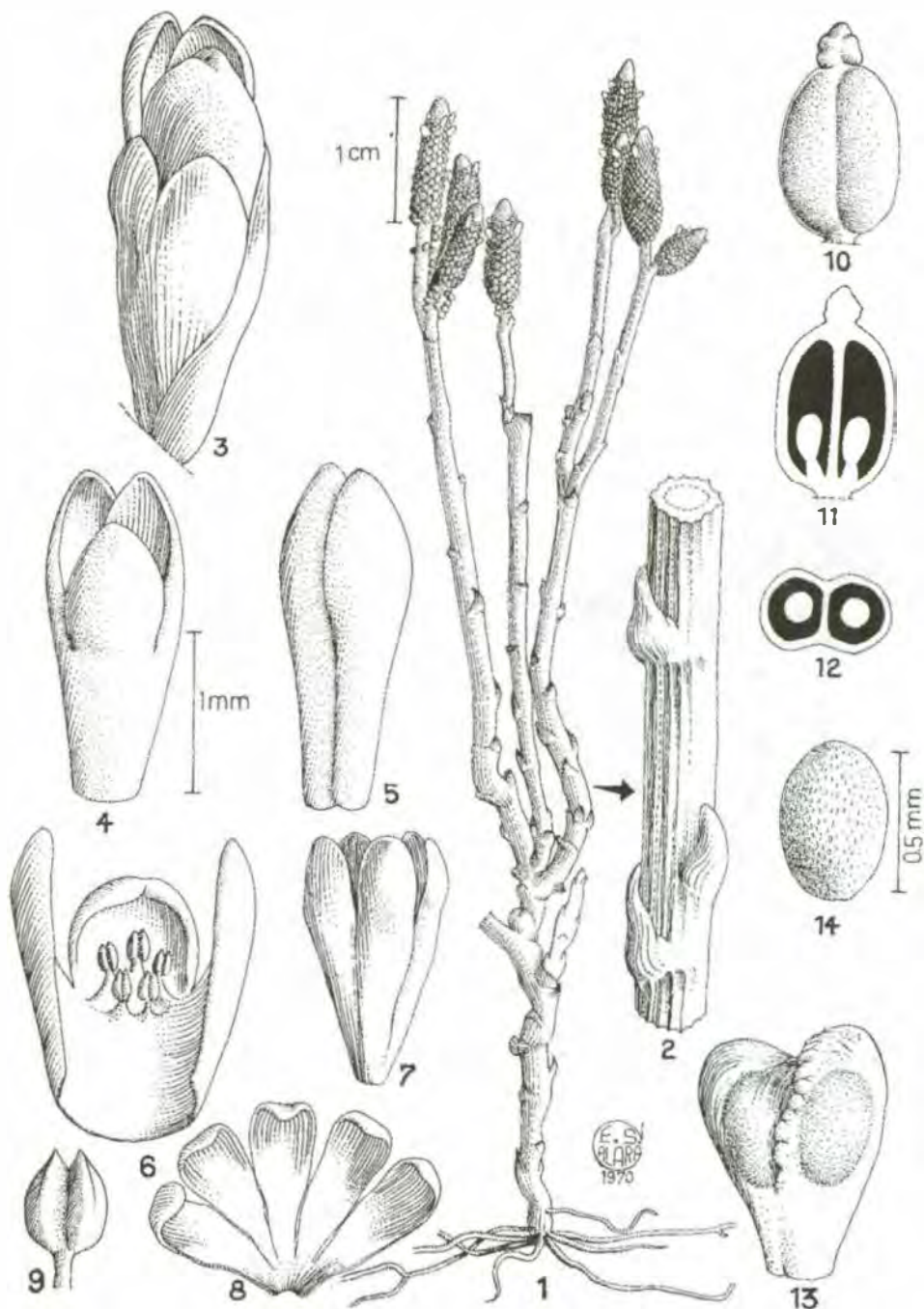


Figure 90. *Epirixanthes cylindrica*: 1. habit; 2. portion of stem; 3. flower; 4. corolla., front view; 5. corolla, back view; 6. corolla, opened; 7. calyx; 8. calyx, opened; 9. stamen; 10. pistil; 11. ovary, vertical section; 12. ovary, cross section; 13. fruit; 14. seed.

80. ANACARDIACEAE

Trees or shrubs, seldom climber, often with acrid and sometimes milky juice. Leaves alternate, rarely opposite, simple or compound, estipulate. Inflorescences various, but mostly paniculate; flowers small, regular, unisexual or bisexual; calyces 3- to 6-parted, sometimes accrescent, petals 3-6, alternate with sepals, free, imbricate or valvate in bud, seldom wanting; disc flat, cup-shaped or annular, entire or lobed, rarely obsolete; stamens 3-6 or twice number of petals, rarely fewer or solitary, inserted under, rarely on the disc; filaments usually subulate; anthers 2-celled, attached at base or on back; ovaries superior, 1- or 2- to 6-celled, often rudimentary in staminate flowers; styles 1-6; stigmas sessile; ovules solitary in each cell. Fruits usually 3- to 5-celled and as many seeded drupes; seeds without albumen.

Genera 70, species 680, chiefly tropical; 14 genera and 50 species in the Philippines.

1. Leaves simple
 2. Fruits without hypocarpia
 3. Stamens 5, 1 fertile, the rest sterile; fruits 5 cm long or more, edible 1. *Mangifera*
 3. Stamens 8-10; fruits 1.5 cm long or less, not edible..... 2. *Buchanania*
 2. Fruits with hypocarpia
 4. Fruits ferrugineous 3. *Oncocarpus*
 4. Fruits glabrous
 5. Stamens 7-10, usually longer than the rest; hypocarpium 5 cm long or more 4. *Anacardium*
 5. Stamens 4 or 6, hypocarpium up to 2 cm long or less..... 5. *Semecarpus*
1. Leaves compound
 6. Leaf rachis narrowly winged between leaflets; drupes red, 4-8 mm long or less 6. *Schinus*
 6. Leaf rachis otherwise; drupes yellow to orange, 1.5 cm long or more
 7. Endocarps thin and crustaceous, with solitary, large seeds 7. *Koordersiodendron*
 7. Endocarps thick and bony, with encrusted, small seeds
 8. Styles united at apex, ovary usually 3, scattered 8. *Dracontomelon*
 8. Styles free at apex; ovary usually 4- or 5-celled, 1-ovuled, radially set 9. *Spondias*

1. MANGIFERA Linnaeus

Trees with dense crown. Leaves alternate, simple, entire, coriaceous. Flowers small, 4- to 6-merous, bisexual or unisexual in terminal panicles; pedicels articulate subtended by small, deciduous bracts; calyces 4- to 5-partite,

segments imbricate, deciduous; petals 4 or 5, rarely 6, free or adnate to disc, imbricate; stamens 5, 1 fertile, others sterile and smaller, or nearly obsolete; ovaries sessile, 1-celled, oblique; styles lateral; ovules pendulous, funicle basal, inserted on side of cell above base, rarely horizontal. Drupes large, fleshy, skin smooth, leathery, somewhat compressed or subcylindric; seeds flattened or subcylindric, large, fibrous or nearly smooth.

Species 53, Ceylon, India, the Himalayas, Yenan, Indochina through Malesia; 7 in the Philippines.

- 1. Stamens solitary, without staminodes..... 1. *M. altissima*
- 1. Stamens 5, with 4 staminodes
 - 2. Flowers yellowish white; endocarp yellow or orange; pyrene rather thick-walled 2. *M. indica*
 - 2. Flowers pale lilac; endocarp white; pyrene thin-walled 3. *M. caesia*

- 1. *Mangifera altissima* Blco., Fl. Filip. 181, 1837; ed. 2, 129, 1845; ed. 3, 1: 230, 1877; Merr., En. Philip. 2: 467, 1923; D. Angeles, PROSEA 2: 206, *f. s.n.*, 1991.

Trees large, 10-35 (-55) m tall; trunk 35-100 cm diameter, with angular or ridged branches and prominent leaf scars. Leaves glabrous, alternately grouped toward ends or in subwhorls, elliptic to oblong-lanceolate, 20 x 6 cm, subacute to sharply acuminate, base attenuate, lucidulous, paler beneath; petioles 2-5 cm long, compressed. Panicles erect, glabrous, branched from base, usually equaling foliage; flowers mostly clustered, pedicelled; calyces greenish; flowers acutely pointed, pale white petals ovately thickened. Fruits 5 cm long, short-ellipsoid and somewhat compressed.

Native to the Solomon Islands, New Britain, New Guinea (north and west), Lesser Sunda Islands, Sulawesi, Moluccas, and the Philippines (Luzon, Mindoro, Sibuyan, Samar); in forests at low altitudes; also found in backyards in large numbers. In Mt. Makiling, Luzon, cultivated in the University nursery.

Com. name – *Pahutan* (Sbl., Tag.).

Exsicc. – *Pancho CA 20236* (CAHP).

- 2. *Mangifera indica* L., Sp. Pl. 200, 1753; Merr., En. Philip. 2: 468, 1923; Mukherji, Lloydia 12: 83, 1949; Verheij, PROSEA 2: 211, *f.s.n.*, 1991.

Trees large. Leaves oblong or broadly lanceolate, 18 x 5 cm, stout midrib with about 20 pairs of pinnate nerves, sharply acute to acuminate, base obtuse; petioles 3 cm long. Panicles solitary or few at twig ends, often shorter than foliage, usually pubescent; flowers yellowish white, clustered toward ends of branchlets, short-stipitate; calyces 5-lobed; petals as many as calyx, glabrous, nearly twice as long as calyx; stamens 5, usually 1 fertile; pistil abortive in male flowers, style

lateral; stigma simple. Fruit a fleshy drupe, very variable in shape, size and color, usually ovoid-oblongoid, up to 30 x 10 cm, very unequal-sided, yellowish green to reddish; exocarp fairly thick, gland-dotted; edible mesocarp variable, yellow to orange, fibrous or free of fibers, juicy and sweet to turpentine flavored; endocarp thick, woody and fibrous. Seed inside endocarp, mono- or polyembryonic, not labyrinthine.

Supposedly originated in the Indo-Burma region and in the subtropics; now distributed in the tropics of both hemispheres; widely cultivated throughout the Philippines for its edible fruits.

Com. name – Mango (Engl.).

Exsicc. – *Gates CA 4678; Valdez CA 1671; Pancho CA 3037* (CAHP).

3. *Mangifera caesia* Jack in Roxb., Fl. Ind. ed. Carey & Wall. 2: 441, 1824; Merr., En. Philip. 2: 468, 1923; Mukerji, Lloydia 12: 126, 1949; Bompard, PROSEA 2: 207, 1991. – *M. verticillata* C.B. Rob., Philip. J. Sc. 6 (Bot.): 337, 1911. – *M. caesia* Jack var. *verticillata* (C.B. Rob.) Mukerji, Lloydia 12: 128, 1949.

Trees, up to 30 m high or more. Leaves subverticillate, obovate-oblong, 12-30 x 5-8 cm, stout midrib with 25-35 pairs of nerves, shortly and obtusely acuminate, base attenuate; petioles 1-2 cm long. Panicles erect, tawny-tomentose, 30-40 cm long; flowers pale lilac, 1 cm long; bracteoles broad, elliptic, 2 mm long, densely pubescent outside, polygamous; sepals 5, 2-3 x 1 mm; petals 5, adnate to disc, linear, 8 x 1 mm; stamens 5, only 1 fertile, shorter than petals; staminodes minute; ovaries 1-celled, obliquely ovoid; styles subterminal, longer than petals. Drupes obovate-oblong, 18-20 x 9-10 cm, right shoulder or bulge above, slightly broader towards base; sarcocarp white; pyrene thin-walled.

Malay Peninsula, Sumatra, Java and Borneo. Apparently indigenous in Mindanao, Philippines; in forests at low altitudes; in Mt. Makiling, Luzon, cultivated on the University campus.

Com. name – *Balunos* (Bik.).

Exsicc. – *Ballesteros CA 8001; Novero CA 8118; Pancho CA 3450; Pancho & Paysan CA 3452, 3453* (CAHP)

3. BUCHANANIA Sprengel

Trees. Leaves simple, thick, coriaceous, petioled. Panicles or corymbs near twig apices, crowded; flowers small, perfect, whitish, sessile or short-pedicellate; calyx short, persistent, roundly 3- to 5-lobed or toothed, imbricate; petals 4 or 5, oblong, ultimately recurved, imbricate; stamens 8-10, free, inserted around orbicular disc, 5-lobulate; filaments linear or subulate toward top; ovaries 5, free, 4 empty, subglabrous, fifth 1-ovuled, appressed-hairy; styles columnar;

stigmas truncate. Drupelets lenticular, orbicular-cordate, tipped by style base; seeds gibbous.

Species 30, tropical Asia, Australia and Polynesia; 6 in the Philippines.

1. Panicles narrowly elongated, puberulent; flowers subsessile; fruits 1 cm wide 1. *B. nitida*
 1. Panicles spreading, glabrous; flowers pedicellate; fruits less than 1 cm wide 2. *B. arborescens*

1. *Buchanania nitida* Engl. in DC., Mon. Phan. 4: 193, 1883; Merr., En. Philip. 2: 466, 1923.

Trees. Leaves densely crowded terminally, obovately oblong, 30-40 x 9-12 cm, stout midrib ridged with 25 pairs of nerves, rounded at apex with short-acute point, attenuate toward base; petioles short, stout, compressed; bud bracts thick, pubescent. Panicles shorter than foliage, narrowly elongated peduncles compressed, stout and elongate, puberulent; flowers whitish, glabrate, clustered toward ends of short branches, subsessile and bract-subtended. Fruits 1 cm wide, reddish brown, short-stalked, hard, smooth.

Throughout the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, in open woods, up to 450 m.

Com. name – *Balitantan* (Tag.).

Exsicc. – *Gates & Catalan CA 1663* (CAHP); *Whitford BF 20058, 1237837* (US).

2. *Buchanania arborescens* Bl., Mus. Bot. Ludg.-Bat. 1: 183, 1850; Li, Woody Fl. Taiwan 445, f. 172, 1963. **Figure 91**

Trees. Leaves obtuse or obtusely acuminate, 5-30 x 2-8 cm, conspicuous midrib with 10-30 pairs of nerves, obtuse or rounded, base acute or decurrent; petioles 1-3 cm long. Panicles not exceeding foliage, spreading, glabrous; flowers dingy white, pedicellate; calyces broadly toothed; petals 5 or as many as calyx teeth, much longer, oblong. Fruits short-stalked, smooth, less than 1 cm across, dull red.

Burma, Taiwan, Borneo, Malay Peninsula, Sumatra, Java, Timor and Celebes. Throughout the Philippines, in second-growth forests at low and medium altitudes; in Mt. Makiling, Luzon, at 30 to 350 m.

Com. name – *Balinghasai* (Tag.).

Exsicc. – *Ballesteros CA 2886, 1098*; *Champhaka CA 8853*; *Desampero CA 10951*; *Guantes CA 10087*; *Hernaez CA 1246*; *Novero CA 8117*; *Orlido CA 10947, 10948, 10949, 10950*; *Pancho CA 10037, 10274, 10275**; *Siapno CA 1661*; *Valencia CA 4676*; *Velasco CA 1662, 9983* (CAHP); *Elmer 897734*; *Tamesis 711188*; *Whitford 902239* (US).

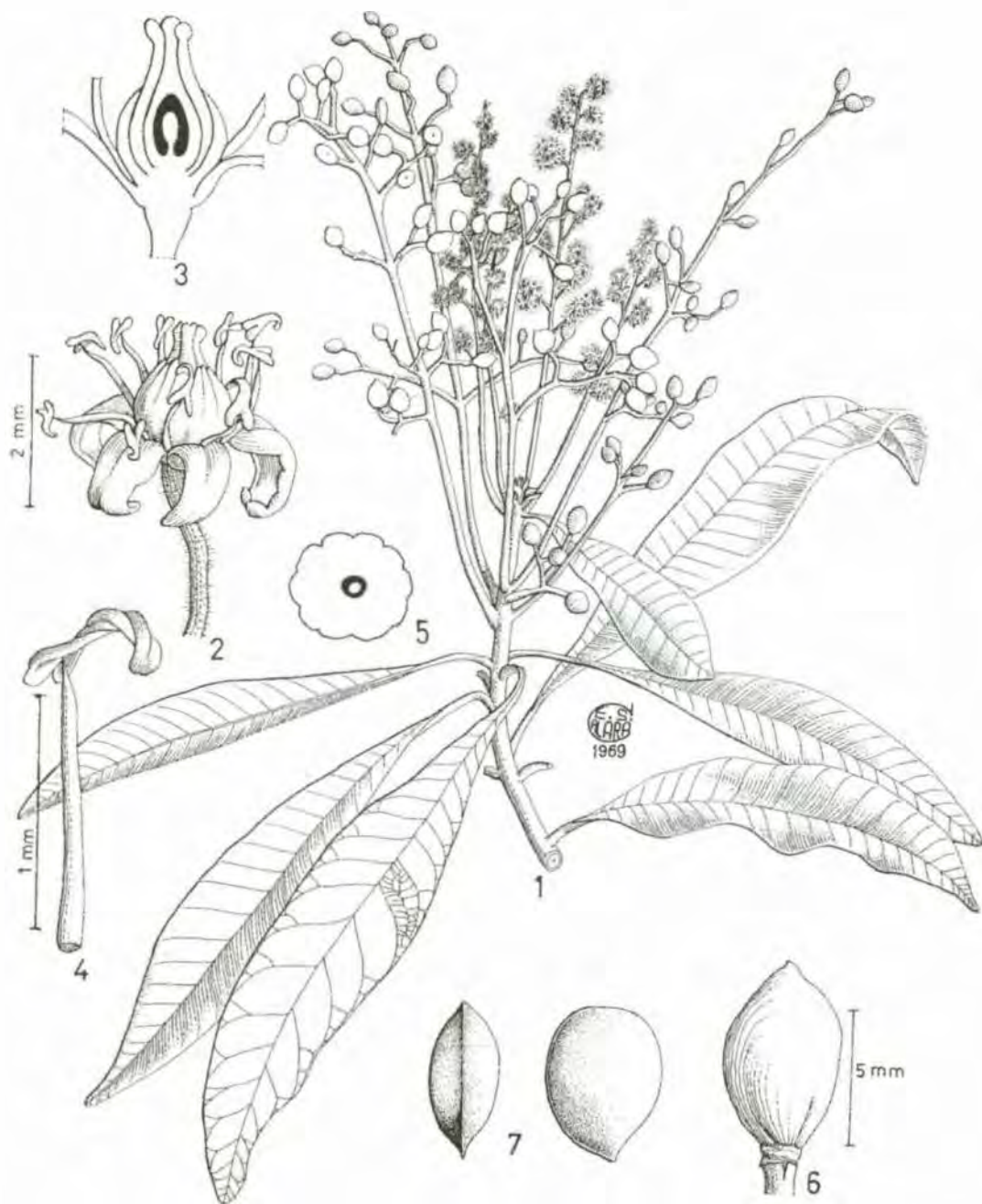


Figure 91 *Buchanania arborescens*: 1. flowering and fruiting branch; 2. flower; 3. flower, vertical section; 4. stamen; 5. ovary, cross section; 6. drupe; 7. seed, 2 views.

3. ONCOCARPUS A. Gray

Trees or shrubs. Leaves alternate, simple, coriaceous. Inflorescences terminal or subterminal, paniculate; flowers bisexual; calyx tube hemispheric, short-lobed or 5-toothed; petals 5, valvate, glabrous on inner side; stamens 5, inserted upon disc margin; ovaries pubescent, 1-celled, with traces of invagination or spuriously many-celled; style apical, base entire, top 3-lobed. Hypocarpium elongate, pyriformly thickened, longitudinally rugose at maturity, apex irregularly sulcate, obovoid, larger than base, often appearing oblique or irregularly rugose in subnormal ones, resinous, pedicel short, ovary solitary, pendulous.

Species 6 or 7, Polynesia; 4 in the Philippines.

1. *Oncocarpus trachyphylla* (Perk.) Merr., En. Philip. 2: 476, 1923.
 – *Semecarpus trachyphylla* Perk., Fragm. Fl. Philip. 29, 1904.
 – *Oncocarpus ferruginea* C. B. Rob., Philip. J. Sc. 6 (Bot.): 340, 1911.

Trees small or large, erect. Leaves obovately oblong, 15 x 5 cm, midrib pronounced with 10 pairs of nerves, obtuse to abruptly acute, broadly cuneate at base; petioles 2 cm long, stout. Staminate inflorescences narrowly elongate, pistillate widely branched; staminate flowers sessile, subtended by broad bracts, pistillate slender, pedicelled; petals roundedly elongate. Fruits 2-3 cm long, densely ferruginous, obconic, rugose with sunken apex, hypocarpium scarcely one-third as long as fruit and thick.

Throughout the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, in open wooded areas up to 450 m.

Com. name – *Malaligas* (Tag.).

Exsicc. – *Pancho CA 20241, 20327* (CAHP).

4. ANACARDIUM Linnaeus

Trees small. Leaves simple, alternate, entire, coriaceous. Panicles terminal, bracteate; flowers small, polygamous; calyces 5-parted, segments erect, imbricate, deciduous; petals 5, linearly lanceolate, recurved, imbricate; disc erect, filling base of calyx; stamens 7-10, usually 9, all fertile, 1 longer than the rest; filaments short and adnate to disc; ovaries obovoid; styles filiform, excentric, bearing short stigmas; ovules solitary, ascending from a lateral funicle. Seed portion of fruits kidney-shaped, compressed, seated upon a large, pyriform, fleshy hypocarpium; pericarp cellular, oleiferous.

Species 8, Tropical America; 1 in the Philippines.

1. *Anacardium occidentale* L., Sp. Pl. 383, 1573; Merr., En. Philip. 2: 469, 1923; van Eijnatten, PROSEA 2: 60, f. s.n., 1991. **Figure 92**

Trees small. Leaves elliptic to obovately elliptic, 10-20 x 5-9 cm, ridged midrib with 8-14 pairs of divaricate nerves, apex rounded or slightly retuse, broadly cuneate at base, shortly petioled. Panicles much-exceeding foliage, glabrate except cinereous flowers; calyces lanceolately segmented, subtended by similar bracts; petals larger than sepals, yellowish white, often with pink stripes; stamens about 9. Hypocarpium obovoid or pyriform, up to 7 cm long, dull yellow, juicy, kidney-shaped, 2 cm long.

Tropical America. Introduced and cultivated in the Philippines, occasionally spontaneous in waste fields near villages.

Com. names – *Kasoy* (Ibn., Tag.); *Cashew* (Engl.).

Exsicc. – *Cabantac CA 1659*, *Champhaka CA 8052*; *Espiritu CA 7034*; *Orlido CA 20393, 12383**; *Peña CA 8144* (CAHP).

5. SEMECARPUS Linnaeus f.

Shrubs or small trees. Leaves, simple, alternate, entire, chartaceous, short-petioled, tapering toward base, usually pale beneath. Inflorescences paniculate, terminal; flowers small, polygamous or unisexual; calyces 5- or 6-parted, segments deciduous; petals as many, imbricate; disc broad, annular; stamens 5 or 6, inserted at base of disc, 1 perfect in pistillate flowers; ovaries 1-celled, with 3 styles; ovules pendulous from basal funicle. Drupes fleshy, oblong or subglobose, up to 1.5 cm in length, oblique, terminal or seed portion upon a fleshy hypocarpium; pericarp with acrid resin.

Species 40, tropical Asia, Malaysia and Australia; 17 in the Philippines.

1. Branches few, thick; leaves 35 cm long; inflorescences lateral 1. *S. longifolia*
 1. Branches numerous, not thick; leaves 25 cm long or less; inflorescences terminal
 2. Leaves sharply acute 2. *S. glauciphylla*
 2. Leaves obtuse or rounded at apex
 3. Foliage and inflorescences glaucous 3. *S. philippinensis*
 3. Foliage and inflorescences pubescent 4. *S. cuneiformis*

1. *Semecarpus longifolius* Bl., Mus. Bot. Lugd.-Bat. 1: 188, 1850; Ding Hou, Fl. Mal. ser. I, 8: 507, 1978. - *S. gigantifolia* Vid., Sinopsis 22, t. 36, f. A, 1883; Li, Woody Fl. Taiwan 451, f. 175, 1963.

Trees small, slender. Leaves terminally crowded, obovately oblong, larger ones 1 m x 30 cm, much paler below, thick midrib with 25 pairs of prominent nerves, abruptly acute to acuminate, cuneate to attenuate toward base; petioles short, thick. Inflorescences lateral or even cauline, elongate, clustered upon



Figure 92. *Anacardium occidentale*: 1. flowering, branch; 2. fruit; 3. flower; 4. seed. (After Pancho 1983, with permission).

ligneous protuberances, 10-30 cm long, glabrous; flowers pale white, pedicelled, bract-subtended; petals acuminate, twice as long as 5-segmented calyces. Fruits glabrous, 3 cm long; pedicels 1-2 cm long; seed portion obliquely ellipsoid, yellowish; hypocarpium shiny, red, one-half as long as fruit.

Taiwan to Philippines, Moluccas, Sulawesi, E. Java and Lesser Sunda Islands. In forests at low altitudes; in Mt. Makiling, Luzon, at 30 to 250 m.

Com. name – *Manalu* (Sul.).

Exsicc. – *Gates & Villamil CA 1601; Pancho CA 4346* (CAHP); *Elmer 17495, 1050288* (US).

2. *Semecarpus glauciphyllus* Elm., Leaflet. Philip. Bot. 4: 1501, 1912 (April 20); Merr., En. Philip. 2: 474, 1923. – *S. acuminatissima* Merr., Philip. J. Sc. 7 (Bot.): 282, 1912 (November 15).

Shrubs or small trees. Leaves crowded, subwhorls, 20 x 5 cm, raised midrib with 12 pairs of nerves with ends usually interarching, sharply acute to subcaudate, gradually narrowed toward base, petioles 2-3 cm long. Inflorescences terminal, shorter than leaves or equaling them, glabrate; branches brown, smooth, basal ones largest; flowers dingy white, puberulent, short-pedicelled in small clusters, bract-subtended; infrutescences elongate. Fruits upon 5-15 cm long stalk, 2-3 cm long, hypocarpium much thinner, one-third as long as seed portion, the latter strongly oblique, compressed terminally.

Endemic. Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, in open wooded areas at low altitudes.

Com. name – *Masukal* (Tag.).

Exsicc. – *Pancho CA 20334* (CAHP).

3. *Semecarpus philippinensis* Engl. in DC., Mon. Phan. 4: 481, 1883; Merr., En. Philip. 2: 475, 1923.

Shrubs or small trees. Leaves oblanceolate, 18 x 6 cm, prominent midrib with 9-12 pairs of nerves, obtuse to subacute or rounded, narrowed toward base; petiole 3 cm long, canaliculated. Inflorescences terminal, glabrate, elongate, exceeding foliage, branches striate, basal ones largest; flowers white, glomerated, puberulent. Fruits 2-3 cm long, apical portion obliquely ellipsoid, hypocarpium turbinate; pedicels 1-2 cm long, brownish.

Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests up to 450 m.

Com. name – *Kamiring* (Ilk.).

Exsicc. – *Pancho CA 20202* (CAHP).

4. *Semecarpus cuneiformis* Blco., Fl. Filip. 220, 1837; Merr., En. Philip. 2: 473, 1923.

Shrubs or small trees. Leaves obovately oblong or lanceolate, 20 x 6 cm, chartaceous, grayish white beneath, stout midrib with 15-20 prominent divaricate nerves, obtuse-rounded and retuse, gradually toward rounded or cuneate base; petioles 1.25 cm long, pubescent. Inflorescences exceeding foliage, soft-pubescent, diffuse; flowers whitish, glomerate, 2.25 cm long, subsessile. Drupes shiny, small, oblique, ovoid, 1 cm long; hypocarpium fleshy, pyriform, as long as drupe, much thinner in dry state, glabrous.

Taiwan and Philippines (Luzon, Mindoro, Palawan, Negros, Guimaras and Leyte). In dry thickets, primary and secondary forests in lowland, up to 600-700 m altitude, occasionally to 1200 m.

Com. name – *Ligas* (Pamp., Tag.).

Exsicc. – *Estioko* CA 1677; *Gates* CA 1678, 1679; *Huang* CA 1680; *Pancho* CA 8042; *Rivera* CA 3164 (CAHP); *Gabot* 33452 (PNH), 2212487 (US); *Tadeña* 6053 (PNH), 2376114 (US); *Steiner* 508, 2376504 (US).

6. SCHINUS Linnaeus

Shrubs or small trees. Leaves alternate, simple or imparipinnate, rachis often winged. Flowers usually unisexual, regular, small, whitish, in terminal or axillary panicles; calyces 4-5, lobes imbricate; corolla lobes 4-5, oblong to elliptic, imbricate; stamens twice as many as corolla lobes, often unequal, inserted at base of annular disc; ovaries 1-celled; styles usually 3. Drupes oily, globose; seeds nutlet, lenticular.

Species 28, chiefly in South America; 1 in the Philippines.

1. *Schinus terebinthifolia* Reddi, Mem. Med. 18: 399, 1820; Degener, Fl. Hawaiiensis 196, *cum fig.*, 1946; Barkley, Lilloa 26: 35, 1957.

Shrubs or trees small and spreading. Leaves 10 cm long; petioles 1-2 cm long; leaflets 5-9 on slightly winged rachis, lanceolate to elliptic, lower pair, 3-4 cm long, short-petioled, upper subsessile to sessile, longer, terminal leaflet 5-7 cm long. Panicles axillary, much-branched, 15 cm long, puberulent; staminate flowers with calyces over 1 mm wide; corolla lobes usually 5, ovate, 2 mm long; stamens inserted in annular disc; filaments opposite corolla lobes, shorter, those alternate with them longer; anthers small, yellow; ovaries abortive, stigmas faintly 3-lobed; pistillate flowers with calyces, 2 mm wide; corolla lobes 5, ovate, 2 mm long; stamens aborted; filaments shorter than corolla lobes; ovaries seated on disc; styles 3; stigmas capitate. Fruits bright red, shiny, 4-5 mm across, with persistent black style; seeds reniform, yellowish.

Native of tropical America. In Mt. Makiling, Luzon, introduced recently on the University campus.

Com. name – Christmas berry (Engl.).

Exsicc. – *Pancho CA 10387, 10388; Sulit CA 2989 (CAHP).*

7. KOORDERSIODENDRON Engler

Trees large-sized. Leaves numerous crowded toward end of twig, imparipinnate, 30-50 cm long, glabrous; petioles one-third as long as leaves, terete, thickened at base; leaflets in 15 opposite pairs, paler beneath, those toward base usually reduced, narrowly oblong to lanceolate, frequently subfalcate, 3-10 cm, acuminate to subcaudate, obtuse at oblique base; margins wrinkled, midrib with 10-15 pairs of obscure nerves; petiolules very short. Inflorescences slenderly paniculate, shorter than leaves, glabrous, axillary or arising from among foliage; flowers scattered, short-pedicelled, whitish, bract-subtended. Fruits ellipsoid, 3 cm long, flattened, long-stalked, green, glabrous; exocarp somewhat fleshy, thin endocarp crustaceous with solitary, large, compressed seed.

A monotypic genus. Philippines, Celebes, Borneo to New Guinea.

1. *Koordersiodendron pinnatum* (Blco.) Merr., Bull. Bur. For. Philip. 1: 33, 1903; En. Philip. 2: 470, 1923. – *Helicteres pinnata* Blco., Fl. Filip. 384, 1837. – *Koordersiodendron celebicum* Engl. ex Koord. in Medeb. Lands Plantent 19: 410, 1898.

Characteristics (Refer to generic description).

Throughout the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, at 150-450 m.

Com. name – *Amugis* (Bik., C.Bis., Tag.).

Exsicc. – *Gates CA 1668 (CAHP).*

8. DRACONTOMELON* Blume

Trees. Leaves alternate, imparipinnate; leaflets opposite or alternate, entire with domatia. Panicles axillary or terminal; flowers small, pale white or greenish, bisexual; calyces 5-parted, imbricating segments conniving; petals 5, suberect, subvalvate; disc cup-shaped, crenulate; stamens 10, inserted at base of disc; ovaries sessile, 5-celled; styles 5, thick, erect, simulating ovaries, connate by their obtuse stigmatiferous tips; ovules solitary, pendulous in cells. Drupes subglobose, fleshy, tubercled above middle by style lobes; stones large, exceedingly hard, depressed, rugose, 2- to 5-celled, cells diverging, opening

*This is the original spelling, not *Dracontomelum*.

through top of stone; seeds 3, small, usually compressed, scattering.

Species 7, Indo-Malesian region; 2 in the Philippines.

1. Leaves and inflorescences glabrous 1. *D. dao*
 1. Leaves and inflorescences pubescent 2. *D. edule*

1. ***Dracontomelon dao*** (Blco.) Merr. & Rolfe, Philip. J. Sc. 3 (Bot.): 108, 1908; Merr., En. Philip. 2: 471, 1923. – *Paliurus dao* Blco., Fl. Filip. 174, 1837.

Trees large, buttressed. Leaves 10-30 cm long, 13-foliolate; leaflets opposite, 12 x 6 cm, midrib with obscure anastomosing nerves, paler beneath, acute to acuminate, obtusely rounded at oblique base; petiolules short. Panicles terminal, glabrate, shorter than foliage, branches alternate, scattering; flowers pale white, pedicelled; calyx segments oblong, united at base, shorter than petals; disc and ovary glabrous or nearly so. Fruits flattened, yellow when ripe, 2.5 cm across; juicy, sour leathery rind; endocarp hard, usually with 3 small, irregularly placed seeds.

Celebes and Moluccas. Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, at 30 to 300 m.

Com. name – *Dao* (Bik., P. Bis., S.-L. Bis., Tag.).

Exsicc. – *Cabrera CA 4979*; *Cadiz CA 1665*; *Champhaka CA 8054*; *Espiritu CA 7835*; *Pancho CA 10421*; *Reyes CA 2825*; *Velasco CA 1666*; *Villamil CA 1667 (CAHP)*; *Rosenbluth & Tamesis BF 12770, 711486 (US)*.

2. ***Dracontomelon edule*** (Blco.) Skeels, Bull. U.S. Dep. Agr. Pl. Ind. 261: 52, 1912; Merr., En. Philip. 2: 471, 1923. – *Paliurus edulis* Blco., Fl. Filip. 173, 1837.

Trees large. Leaves 30-50 cm long, 15-foliolate, rachis densely fulvous, thickened at base; leaflets oblong or basal smaller ones ovately oblong, 15-18 x 5 cm, midrib prominent beneath with 10-14 pairs of ascendingly curved nerves, broadly rounded at base, subsessile. Panicles elongate, in uppermost leaf axils or terminal, olivaceous-soft-pubescent; flowers dingy white, pedicelled; calyx puberulent, united at truncate base, obtusely segmented; petals narrowly oblong, clawed, glabrous, nearly twice as long as calyx lobes; stamens equaling corolla; disc and ovary hairy. Fruits yellow, glabrous, compressed, 3-4 cm across, endocarp hard, usually with 3 small, irregularly encrusted seeds.

Throughout the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, at 30 to 450 m.

Com. name – *Lamio* (Tag.).

Exsicc. – *Foxworthy's collector s.n. 1591451; Elmer 8307, 85429; Villamil BF 23121, 1292330 (US); Sulit 2212343 (PNH), 2212343 (US).*

9. SPONDIAS Linnaeus

Trees deciduous. Leaves pinnate, alternate, crowded at ends of branchlets; leaflets subopposite. Panicles terminal, rarely fasciculate in axils; flowers small, bisexual or polygamous, pale yellowish white or slightly red; calyx minute, deciduous, 4- or 5-toothed; petals as many as calyx-lobes, spreading, subvalvate; disc cupular, broad, crenate; stamens 8-10, inserted beneath disc; ovaries sessile, free, 4- or 5-celled; styles as many as ovaries, conniving; ovules slightly pendulous. Drupes fleshy, sour, subglobose or short-ellipsoid; stone large, hard, obscurely roughened, usually 4- or 5-celled, 1-ovuled, cells radially arranged around a small central axis, opening by canals through top of stone; seeds small, compressed.

Species 10, in Southeast tropical Asia to South India and Malesia; 5 in the Philippines.

1. Leaflets without distinct intra-marginal nerves; ovaries with 1 carpel; wild 1. *S. philippinensis*
1. Leaflets with distinct intra-marginal nerves; ovaries with 5 carpels; species cultivated
 2. Inflorescences racemiform, not more than 15 cm long, lateral on leafless branches, solitary or fasciculate 2. *S. purpurea*
 2. Inflorescences thyrsiform, usually more than 15 cm long, terminal, paniculate
 3. Inflorescences accompanied by mature leaves; fruits 2-3.5 cm long, cavities alternating loculi 3. *S. mombin*
 3. Inflorescences appearing before leaves or accompanied by young leaves only; fruits 4-5 cm long, without cavities alternating with loculi
 4. Flowers distinctly pedicellate; endocarp spinose 4. *S. dulcis*
 4. Flowers sessile; endocarp not spinose 5. *S. pinnata*

1. *Spondias philippinensis* (Elm.) Airy-Shaw & Forman, Kew Bull. 21(1): 13-14, f. 2, 1967. – *Pegia philippinensis* Elm., Leaflet. Philip. Bot. 8: 3100, 1919. – *Phlebochiton philippinense* (Elm.) Merr., En. Philip. 2: 472, 1923. *Solenocarpus philippinensis* (Elm.) Kosterm., New and Crit. Malaysian Plants 3: 1, 1955; Jacobs, Acta Bot. Neerl. 10: 109, 1961.

Trees deciduous. Leaves alternate or subopposite, 10-20 cm long, 5- to 9-foliolate; leaflets oblong or smaller ovate, 8 x 3 cm, midrib prominent beneath with 5-7 obscure nerves, abruptly acute to acuminate, rounded at base,

subsessile. Panicles terminal, developing before leaves, widely branched from base, shorter than foliage, glabrous, yellowish white; flowers pedicellate, bract-subtended; calyx short, teeth vestiges ciliate; petals 5, much longer, ultimately reflexed, lanceolately oblong; stamens about 10, free, ovaries glabrous; styles columnar. Fruits bluntly ellipsoid, subcompressed, 5-8 mm long, glabrous; endocarp crustaceous, 1-seeded, usually a trifle thicker above middle, juice sour. A very variable species.

Sumatra to the Philippines and New Guinea (*cf.* Kostermans, *l.c.*). In primary forests at low altitudes; in Mt. Makiling, Luzon, at 100-350 m.

Com. name – *Malasineguelas* (Tag.).

Exsicc. – *Mabesa* BF 26351, 1294334, 26778, 1735326, 24068, 1375327; *Ramos* BS 15130, 1376293; *Elmer* 17913, 1237425; *Elmer* 1236003 (US), phototype of *Pegia philippinensis* Elm. (CAHP).

2. *Spondias purpurea* L., Sp. Pl. ed. 2, 613, 1762; Merr., En. Philip. 2: 471, 1923; Airy-Shaw & Forman, Kew Bull. 216: 12, f. 2, 7-2, 1967.

Leaves imparipinnate, 15-25 cm long; leaflets 5-9 pairs, oblong-ovate, 5-7 cm long, midrib with 7-9 pairs of nerves, entire or subcrenate, acute, broadly obtuse at oblique base; petiolules short. Flowers solitary or fascicle in axils of fallen leaves, reddish, 3.25 mm long, upon jointed pedicels; stamens 10, in 2 unequal series. Fruits upon short, thick stalks, subglobose, 2.5 cm long, shiny, purplish, large stone with at least 5 radially arranged seeds.

Native of tropical America, now pantropic and widely grown for its edible fruits. Throughout the Philippines, in cultivation at low altitudes.

Com. name – *Sineguelas* (Tag.).

Exsicc. – *Pancho* CA 20187, 20254, 20340 (CAHP).

3. *Spondias mombin* L., Sp. Pl. 371, 1753; Backer and Bakh. f., Fl. Jav. 2: 151, 1963. – *S. lutea* L., Sp. Pl. ed. 2, 613, 1762-63.

Stems and main branches excrescent; branchlets glabrate or finely cinereous. Leaves up to 13-foliolate, up to 30 cm long, rachis glabrate or grayish pubescent beneath, imparipinnate; leaflets opposite, ovate to ovately oblong or lanceolate, 3-10 cm long, main midrib soft-hairy, with 10-15 pairs of nerves, acuminate, rounded at oblique base; petiolules 5 mm long, pubescent. Panicles spreading from base, exceeding foliage, glabrate or puberulent; flowers white, fragrant, short-pedicelled, subtended by minute bracts; calyx short, apiculate; petals oblong, ultimately reflexed; stamens 10, bearing versatile anthers; ovaries and connate styles glabrous. Fruits subellipsoid, 2 cm long, glabrous, yellow, upon stout stalks, large stone with 5 or more small seeds arranged about a central axis.

Tropical America. Recently introduced in the University campus, Mt. Makiling, Luzon, Philippines.

Com. name – Hog plum (Engl.).

Exsicc. – *Gruezo & Hernaez CA 18230, 18231; Pancho CA 20285* (CAHP).

4. *Spondias dulcis* Soland. ex Park., Jour. 30, 1773; Merr., Chron. Bot. 14(5-6): 360, pl. 91, 1934. – *S. cytherea* Sonn., Voy. Ind. II, 222, 1782; Ochase, Fruits Dutch East Ind. 19, pl. 8, 1931; Airy-Shaw & Forman, Kew Bull. 21: 10, f.2, 3-4, 1967.

Branchlets lenticellate. Leaves 20-30 cm long with 10-12 pairs of leaflets; leaflets elliptic or lanceolate, 5-10 x 1.5-3.5 cm, entire or slightly serrate, acute on both ends; petiolules 5 mm long, narrowly winged. Panicles up to 35 cm long; flowers numerous; pedicels 2 mm long; calyx lobes acute, 1 mm long; petals 5, ovate, 5 x 1.5 mm, white; stamens 10, filaments 1.5-2 mm long; anthers 1 mm long, versatile; styles 5, erect. Drupes ovoid, 7 cm long; exocarp fleshy, edible; endocarp large, rough.

Probably a native of Tahiti. Throughout Indo-Malesia, Indo-Australia, Polynesia and other tropical countries. Cultivated throughout the Philippines.

Com. name – Viapple (Engl.).

Exsicc. – *Pancho CA 3880* (CAHP).

5. *Spondias pinnata* (L. f.) Kurz in Pegu, Report A, 44, 1875; Merr., Sp. Blanc. 233, 1918; Merr., En. Philip. 2: 470, 1923. – *Mangifera pinnata* L.f., Suppl. 156, 1781.

Leaves imparipinnate, 9- to 15-foliolate; leaflets ovate to oblong, 10 x 3-4 cm, midrib conspicuous with numerous lateral nerves whose ends unite into a submarginal vein, pale green beneath, acuminate, rounded or slightly inequilateral base; petiolules short. Panicles terminal, equaling foliage, succulent, widely branched from base, smooth; flowers short-pedicelled, bract-subtended, scattered, pale or yellowish white; calyx toothed; petals reflexed; stamens 10; pistil glabrous. Fruits green or when fully ripe yellowish tinged, ellipsoid, 3 cm long, glabrous, large stone with 5 small seeds radially placed about the central axis.

India, Celebes, Java and Moluccas. Throughout the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, at 50-350 m.

Com. name – *Libas* (Mag., P. Bis., Sul., Tag.).

Exsicc. – *Hernaez CA 26014; Pancho CA 20252, 20344* (CAHP).

81. ACERACEAE

Trees or shrubs. Leaves opposite, simple or palmately lobed, estipulate. Inflorescences racemes, umbels, panicles or spikes, terminal or lateral; flowers regular, bisexual or unisexual; sepals 4-5, clustered or basally connate, imbricate; petals 4-5, distinct, imbricate, sometimes wanting; stamens 4-10, usually 8, inserted upon outside annular, glabrous disc; filaments free, mostly glabrous; ovaries superior, 2-celled, laterally flattened, each cell with 2 ovules; styles bipartite, divisions linear, stigmatous along inner surface. Fruits double samaras, indehiscent, each carpel winged or occasionally with dwarf wing; seeds exalbuminous.

Genera 2, species 200, mostly in the temperate regions of the northern hemisphere; 1 genus and species in the Philippines.

1. ACER Linnaeus

Characteristics (Refer to family description).

1. *Acer laurinum* Hassk. in Hoeven & de Vries, Tijd. Nat. Geschied. & Phys. 10: 138, 1843, Fl. Mal. I, 4: 592, 1954. – *A. niveum* Bl., Rumphia 3: 193, 1847; Bloembergen, Fl. Mal. I, 4: 3, f.1, 1648. – *A. philippinum* Merr., Publ. Gov. Lab. Philip. 35: 36, 1906. – *A. curranii* Merr., Philip. J. Sc. 4(Bot.): 245, 1909. – *A. caesium* (Reinw. ex Bl.) Kosterm., Reinwardtia 7: 142, 1965 *non* Brandis 1874. **Figure 93**

Trees buttressed. Leaves ovately oblong, 15 x 6 cm, entire, glaucous, whitish or light blue-gray below, 3-nerved at base, middle or more prominent one with 2 or 3 extra pairs of lateral nerves from above middle, acute to subacuminate, base broadly obtuse to rounded; petioles 3-10 cm long. Paniculate racemes terminal and subterminal from leafless shoot, short, nearly glabrous, arising from prominent imbricate bracts, margins woolly-pubescent; flowers mainly terminal, whitish, slenderly pedicelled, glabrate; pedicels subtended by large, deciduous, acuminate bracts. Infrutescences much elongated, usually from below foliage; fruits slenderly stalked, chartaceous, glabrate, bilobed or in pairs, subtended by a rugose rim, basal seed portion with wing 3-4 cm long.

Malay Peninsula, Sumatra, Java and Celebes. In the Philippines, in mountain forests of Luzon, Negros and Mindanao (Davao) at 1900-2400 m; in Mt. Makiling, Luzon, in the cloud-belt forests.

Com. name – *Laing* (Tag.).

Exsicc. – *Fernando* CA 27479* (CAHP); *Santos* BF 25445, 1264206 (US).



Figure 93. *Acer laurinum*: 1. fruiting twig; 2. flowering twig; 3. flower; 4. fruits; 5. seed, 3 views.

82. SAPINDACEAE

Trees or shrubs; sometimes wiry herbaceous, tendril-bearing vines. Leaves alternate, rarely opposite, simple, trifoliolate, pinnately or palmately compound; leaflets entire or toothed, pinnae alternate or opposite. Inflorescences terminal or axillary, racemous or paniced; flowers small, regular or irregular, unisexual or bisexual; calyx 4- or 5-toothed, often small, lobes imbricate or valvate; petals free, equal or unequal, 4 or 5 or wanting, often bearded or with scales at base within; disc annular or unilateral; stamens 4-12, inserted inside or outside disc; filaments distinct or united at base, frequently pubescent; ovaries superior, often excentric, entire or lobed, 1- to 4-celled, each 1- or 2-ovuled. Fruits schizocarps, capsules, drupes or berries, dehiscent or indehiscent, entire or lobed; seeds naked or arillate.

Genera 125, species 1000 or more, chiefly tropical; 33 genera and 124 species in the Philippines.

1. Herbaceous vines, with tendrils; leaves biternate; capsules inflated 1. *Cardiospermum*
1. Erect shrubs or trees; leaves and capsules otherwise
 2. Leaves palmately 3- to 5-foliolate 2. *Allophylus*
 2. Leaves pinnate
 3. Leaf rachis narrowly winged; fruits glutinous 3. *Sapindus*
 3. Leaf rachis not winged; fruits not glutinous
 4. Basal pair of leaflets simulating stipules
 5. Leaflets entire; inflorescences glabrous 4. *Otophora*
 5. Leaflets entire or coarsely serrate; inflorescences pubescent 5. *Pometia*
 4. Basal pair of leaflets not simulating stipules
 6. Ovaries and fruits tuberculate
 7. Plants steliately pubescent; fruits muricate, brownish when ripe 6. *Cubilia*
 7. Plants otherwise; fruits bluntly tuberculate to nearly smooth or covered with spine-like processes
 8. Fruits bluntly tuberculate to nearly smooth, glaucous-green
 9. Fruits 2.5-3 x 2-2.5 cm, densely set with acute or blunt pyramidal warts .. 7. *Litchi chinensis* ssp. *philippinensis*
 9. Fruits 1.25-1.5 cm across, mostly pusticulate to granulate and nearly smooth... 8. *Dimorcarpus (longan)*
 8. Fruits covered with spine-like processes, red or yellowish red 9. *Nephelium*
 6. Ovaries and fruits not tuberculate
 10. Fruits indehiscent
 11. Fruits less than 5 cm with thin exocarp 10. *Lepisanthes*
 11. Fruits 5 cm with thick exocarp 11. *Glenniea*

- 10. Fruits dehiscent
 - 12. Fruits winged or bilobed
 - 13. Fruits 3-winged 12. *Guioa*
 - 13. Fruits bilobed
 - 14. Mature fruits inflated, red 13. *Harpullia*
 - 14. Mature fruits not inflated, yellow 14. *Arytera*
 - 12. Fruits not winged nor bilobed, 2- or 3-angled
 - 15. Sepals lanceolate, longer than petals; fruits compressed 15. *Lepidopetalum*
 - 15. Sepals cup-shaped, minute; fruits not compressed
 - 16. Fruits long-stipitate, trigonous or tricostate 16. *Mischocarpus*
 - 16. Fruits sessile, subglobose and without costa 17. *Clattostachys*

1. **CARDIOSPERMUM** Linnaeus

Vines herbaceous, climbing, tendril-bearing, slender. Leaves alternate, biternate, estipulate; leaflets coarsely toothed or lobed. Inflorescences axillary, solitary, few-flowered, long-peduncled, cymose or racemose, lowest pair of pedicels developed into spinal tendrils. Flowers small, irregular, polygamodioecious; sepals 4, concave, two outer ones small; petals 4, two larger ones usually adhering to sepals with an emarginate scale above base, two smaller ones distant from stamens; stamens 8, excentric; filaments free or connate at base; ovaries 3-celled; styles trifid; ovules solitary. Capsules inflated, loculicidal, 3-celled, 3-valved, valves thin, veiny; seeds globose, arillate at base.

Species 11, mostly in tropical America and Africa; 1 in the Philippines.

1. *Cardiospermum halicacabum* L., Sp. Pl. 366, 1753; Merr., En. Philip. 2: 493, 1923. **Figure 94**

Vines slender, 1-3 m long, pubescent, often prominently furrowed. Leaves 5-9 cm long, deltoid; leaflets ovate to lanceolate, 1-5 cm long, acuminate, coarsely dentate or lobed, membranaceous. Flowers small, white, 3-3.5 mm long. Fruits obovoid, 1.5-2.5 cm long, somewhat triangular and 3-keeled, apex subtruncate. Seeds globose, black, with prominent, white, heart-shaped aril at base.

Pantropic. In the Philippines, a common weed in cultivated areas and wastelands.



Figure 94. *Cardiospermum halicacabum*: 1. fruiting branch; 2. root system; 3. flower; 4. flower, perianth removed; 5. stamens; 6. ovary, vertical section; 7. ovary, cross section; 8. fruit, partly excised to show seeds; 9. seed, 2 views. (After Pancho & Obien 1983, with permission).

Com. name – *Parol-parolan* (Tag.)

Exsicc. – *Blancaver* CA 5057; *Dauid* CA 2858, *Guantes* CA 10715; *Gutierrez* CA 1708, 1709; *Obligado* CA 5008; *Orlido* CA 4921, 10309, 10930*, 10931, 12977 (CAHP).

2. ALLOPHYLUS Linnaeus

Shrubs or small trees. Leaves 1- to 5-foliolate, estipulate; leaflets entire or serrate. Racemes simple or branched, axillary; flowers small, 4-merous, unisexual or bisexual, globose, greenish, yellowish or pale white; pedicels short; sepals 4, in opposite pairs, hooded, thin, imbricate, 2 upper ones shorter than inner pairs; petals 4, small, sometimes declinate, rarely obsolete, naked or with shaggy scale above claw, disc one-sided, with 5 glands opposite petals; stamens 8, inserted on receptacle inside disc; ovaries usually 2-lobed, 2-celled; ovules solitary in each cell. Fruits fleshy or subcrustaceous, of 2 or 3 globose or obovoid, indehiscent cocci; seed with short, thin or fleshy aril.

Species 225, pantropic; 26 in the Philippines.

- 1. Leaves 5-foliolate 1. *A. dimorphus*
- 1. Leaves 3-foliolate
 - 2. Foliage pubescent beneath 2. *A. filiger*
 - 2. Foliage glabrous
 - 3. Leaflets coarsely dentate; inflorescences branched 3. *A. grossedentatus*
 - 3. Leaflets entire or nearly so; inflorescences unbranched
 - 4. Blades rounded at base, coriaceous 4. *A. racemosus*
 - 4. Blades cuneate at base, membranaceous 5. *A. macrostachys*

- 1. *Allophylus dimorphus* Radlk., Act. Congr. Bot. Amsterdam 126, 1877 (1878); Merr., En. Philip. 2: 494, 1923.

Shrubs, up to 3 m high. Branchlets lax, brown-tomentose. Leaves 5-foliolate; petioles 8 cm long, olivaceous-tomentose; leaflets broadly lanceolate, basal ones much smaller, 3-10 cm long for terminal ones, midrib with 9-14 pairs of obscure nerves, acuminate, entire toward acute base, otherwise obscurely serrate, upon short petiolules. Spikes solitary in leaf axils, ascending, unbranched, shorter than foliage; rachis pubescent; flowers whitish, glabrate, usually in small, short-pedicelled clusters. Fruits subglobose, 5 mm across, glabrous, turning yellowish red.

Indochina. Throughout the Philippines, in second-growth forests at low altitudes; in Mt. Makiling, Luzon, common in open wooded areas.

Com. name – *Malalagundi* (Tag.).

Exsicc. – *Gates CA 1707; Manzano CA 1702; Rivera CA 3472; Velasco CA 1701, 1704* (CAHP).

2. *Allophylus filiger* Radlk., Act. Congr. Bot. Amsterdam 126, 1877 (1878); Merr., En. Philip. 2: 495, 1923.

Shrubs, up to 5 m high, twigs ferruginous-pubescent. Leaves trifoliolate, pale green and canescent beneath; petioles 10 cm long, pubescent; leaflets obovately oblong, terminal or larger ones 10-20 cm long, prominent vein with 12 divaricate nerves, acute, entire toward cuneate base, otherwise serrate or occasionally dentate; petiolules short. Spikes solitary, slender, equaling or exceeding foliage; rachis sparsely hairy; flowers yellowish white, usually in small fascicles; pedicels bract-subtended, glabrous. Fruits obovately ellipsoid, 8 mm long, glabrous, yellow with red tinge.

Endemic. Luzon, Philippines; in secondary forests at low altitudes and up to 500 m; in Mt. Makiling, Luzon, common in abandoned *kaingin* areas and forest borders.

Com. name – *Bating* (Tag.).

Exsicc. – *Dumaran CA 10475; Ferrer CA 14073; Hernaez CA 12395, 12499; Jarmin CA 1705* (CAHP).

3. *Allophylus grossedentatus* (Turcz.) F.-Vill., Nov. App. 51, 1880; Merr., En. Philip. 2: 495, 1923. – *Schmidelia grossedentata* Turcz., Bull. Soc. Nat. Mosc. 31: 401, 1858.

Trees small, erect. Leaves trifoliolate; petioles 12 cm long; leaflets oblong or lateral ones ovate, 10-15 x 5-8 cm, midrib with 7-10 pairs of ascendingly curved nerves, coarsely dentate, acute, base obtuse to cuneate. Inflorescences erect; peduncles exceeding petiole, few- to several branched, rachis puberulent; flowers pale or dingy white, few-fasciculate, scattered along length of branches, pedicellate, glabrate. Fruits subglobose, 5-8 mm in diameter, glabrous.

Endemic. Philippines (Laguna, Leyte); in forests at low altitudes, ascending to 500 m; in Mt. Makiling, Luzon, in second-growth forests at 100-350 m.

Com. name – *Barotangol* (Neg.).

Exsicc. – *Gates CA 1706; Stern CA 12136* (CAHP).

4. *Allophylus racemosus* (L.) Radlk. in E. & P., Pfl. Fam. 3: 313, 1895; Merr., Trans. Am. Phil. Soc. New Series 24: 246, 1935. – *Schmidelia racemosa* L., Mant. 1: 67, 1767. – *Allophylus ternatus* (Forst.) Radlk. in E. & P., Pfl. Fam. 3: 313, 1895, non Lour. 1790. – *Aporetica ternata* Forst., Char. Gen. 132, 1776.

Shrubs. Leaflets ovately oblong to subelliptic, 10 x 5 cm, midrib with 7 pairs of ascendingly curved nerves, frequently with domatia in axils, acute to acuminate, obtusely or truncately rounded at base; petioles 5-8 mm long. Spikes solitary, slender, equaling or exceeding foliage; peduncle and rachis glabrous or sparsely puberulent; flowers yellowish white, small, in groups, short-stalked, glabrate. Fruits with thin, fleshy skin, globose, 8 mm in diameter, yellowish to pale red, endocarp crustaceous.

Borneo to the Caroline Islands, Timor, Tropical Australia, New Caledonia, New Hebrides and the Marshall Islands. Throughout the Philippines, in thickets along seashores and tidal streams.

Com. name – *Mambahino* (Sul.).

Exsicc. – *Pancho CA 20151* (CAHP).

5. *Allophylus macrostachys* Radlk. in Perk., Fragm. Fl. Philip. 56, 1904; Merr., En. Philip. 2: 496, 1923. **Figure 95**

Shrubs or small trees. Leaves trifoliolate; petioles 7 cm long; leaflets obovately oblong, 15 x 6 cm, midrib with 9-12 pairs of nerves, terminal or larger ones cuneate at entire base, lateral ones obtuse, otherwise serrately apiculate; petiolules short, puberulent. Spikes axillary, filiform, exceeding foliage; peduncles puberulent; flowers whitish, in small bracteate clusters, short-pedicelled, outer organs glabrous. Fruits subglobose, 8 mm across, stalked, glabrous.

Endemic. Philippines (Luzon and Mindoro); in second-growth forests at low altitudes; in Mt. Makiling, Luzon, in forest-borders and abandoned *kaingin* areas.

Com. name – *Bating-bating* (Tag.).

Exsicc. – *Dumaran CA 18476**; *Rivera CA 3135* (CAHP)

3. SAPINDUS Linnaeus

Trees. Leaves alternate or subverticillate, usually paripinnate, estipulate; leaflets entire. Inflorescences terminal or axillary; flowers bisexual, regular; sepals 4-5, unequal or in 2 divergent rows; petals as many, with or without scales, nearly equal; disc fleshy, circular or one-sided; stamens 8-10, inserted within disc; filaments hairy; anthers versatile, ovaries subentire or 3-lobed; styles simple, terminal; ovules solitary; stigma usually lobulate. Fruits fleshy



Figure 95. *Allophylus macrostachys*: 1. flowering branch; 2. staminate flower; 3. staminate flower, one sepal removed to show glands; 4. scales.

or coriaceous, consisting of 1-3 indehiscent carpels, particularly containing saponin; cocci 1 or 2, oblong or globose; seeds subglobose, black.

Species 20, in tropical and subtropical regions of the world, except Africa and Australia; 1 in the Philippines.

1. *Sapindus saponaria* L., Sp. Pl. 367, 1753; Merr., Sp. Blanc. 238, 1918; En. Philip. 2: 498, 1923.

Trees medium-sized. Leaves 20 cm long, alternately crowded; petiole and rachis decurrent or winged, evenly 3- to 5-pinnate; leaflets subalternate or opposite at apex, broadly lanceolate, usually falcate from base, 10 x 3 cm, midrib prominent with numerous ascendingly curved nerves, gradually acuminate, cuneate and often a trifle inequilateral at base. sessile. Panicles profusely branched, terminal, equaling foliage, olivaceous pubescent; flowers white, upon short stalks, bract-subtended, glabrate. Fruits drupaceous, glutinous, obovoidly globose, up to 1.5 cm long; pedicels short, thick.

Pantropic. Throughout the Philippines, at low altitudes; in Mt. Makiling, Luzon, in open areas in the lowlands.

Com. name – *Kusibeng* (Ilk.).

Exsicc. – *Beltran CA 2826; Blancaver CA 5050; Cabrera CA 5841; Gates CA 1723* (CAHP).

4. OTOPHORA Blume

Shrubs or small trees. Leaves alternate, paripinnate or imparipinnate, basal pair of leaflets stipule-like; leaflets entire. Inflorescences axillary or terminal, paniculate; flowers regular or irregular, bisexual; sepals usually 5, rarely 4, concave, imbricate; petals 5, rarely 4, smaller than sepals; disc annular, crenate or entire; stamens 6-10, inserted within disc; filaments short; anthers oblong, included; ovaries ovate to elliptic, 2- to 4-celled, with much ascending ovules; stigmas sessile, thick. Fruits baccate, faintly 2- to 4-lobed, 1- to 4-celled; seeds 1-4, arillate.

Species 15, Malay Peninsula and Java; 4 in the Philippines.

1. *Otophora fruticosa* (Roxb.) Bl., Rumphia 3: 142, 1849; Merr., En. Philip. 2: 500, 1923. – *Sapindus fruticosa* Roxb., Fl. Ind. ed. 2, 2: 283, 1832.

Shrubs. Leaves 10-30 cm long, evenly 3- to 4-pinnate; leaflets subopposite or subalternate except terminal, nearly sessile pair, 12 x 3 cm, conspicuous midrib with about 10 obscure nerves, reticulate beneath, obtusely pointed, obtuse to cuneate and inequilateral at base, base subtended by

a pair of rotund, stipule-like leaflets, 3-5 cm across; petiolules 1 cm long. Panicles equaling foliage, glabrous, single or few in leaf axils; flowers slenderly pedicelled, globose before anthesis, purple. Infrutescences profuse; fruit glabrous, subglobose, 1 cm thick, red when mature.

Thailand through Malesia. Throughout the Philippines, in thickets and secondary forests at low and medium altitudes; in Mt. Makiling, Luzon, in open wooded areas and ravines, altitude up to 350 m.

Com. name – *Balinawnaw* (Pamp., P. Bis., Tag.).

Exsicc. – *Velasco CA 1720* (CAHP); *Elmer 18128, 1050246*; *Villamil BF 20975, 903608*; *US Expl. Exp. Capt. Wilkes 17707* (US).

5. POMETIA J.R. & G. Forster

Trees. Leaves alternate, large, paripinnate, reddish tinged when young; leaflets entire or coarsely serrate, elongate, often with cordate base, subopposite, reduced toward base, basal pair usually stipuliform. Racemes simple or paniced, elongate or slender; flowers minute, fascicled, regular, bisexual; calyx cup-shaped, 4- or 5-parted, valvate or slightly imbricate in bud; petals 4 or 5, small, with or without 2 scales; disc annular, lobed; stamens 4-8; filaments elongate; anthers minute; styles elongate, crowded, with blunt stigmas; ovaries hairy, deeply 2-lobed, lobes 1-celled; cells 1-ovuled. Fruits ellipsoid or subglobose, crustaceous, indehiscent, smooth; seeds covered with mucilaginous aril.

Species 5; Sri Lanka, Andaman Islands, throughout Malesia to the South Sea Islands; a few in southeastern Asia and Taiwan; 1 in the Philippines.

1. *Pometia pinnata* J.R. & G. Forst., Char. Gen. 109, t.55, 1776; Jacobs, Reinwardtia 6: 130, 1962; Li, Woody Fl. Taiwan 497, 1963.

forma *pinnata*

Trees medium-sized. Leaves 3-7 cm long, with 4-9 pairs of leaflets; leaflets oblong, upper ones obovately oblong, 24 x 9 cm, acute, midrib raised with numerous pinnate nerves, entire or coarsely toothed, lower ones falcately acuminate, frequently inequilateral at obtuse or cordately rounded base, subsessile. Inflorescences terminal, profuse, as long as foliage, olivaceous-pubescent; flowers small, yellowish white, pedicelled, upon short branchlets, evenly scattered. Fruits globose, 3 cm in diameter, crustaceous, glabrous.

Com. name – *Malugai* (Tag.).

Exsicc. – *Antonio CA 1721*; *Fernando CA 27908* (CAHP).

forma *tomentosa* (Bl.) Jacobs, Reinwardtia 6: 130, 1962.

Inflorescences lax, slender, repeatedly branched; densely hairs rust-brown, somewhat hanging; leaf rachis up to 1 m long, densely hairy.

Java, Moluccas, New Guinea to the Solomon Islands. Throughout the Philippines, in forests at low altitudes, especially along streams; in Mt. Makiling, Luzon, along Molawin Creek.

Com. names – *Tugawi* (Bik., Tag.); Small leaf malugai (Engl.).

Exsicc. – Antonio CA 1721; Velasco CA 1722 (CAHP); Elmer 17609, 1237204, 18254, 1050254 (US).

6. CUBILIA Blume

Trees. Leaves alternate, paripinnate, 3- to 7-foliolate, estipulate; leaflets alternate or subopposite, entire, paler green on nether side. Panicles terminal or in uppermost leaf axils, shorter or equaling foliage, pubescent; flowers stipitate, fascicled upon very short, ultimate branchlets, small, regular, polygamous; calyx thick, 5-dentate, villous; petals as many as calyx-lobes, narrowly oblong, exceeding calyx; stamens 5-8, attached to inner side of disc; ovaries 2-, rarely 3-celled with as many styles, cells uniovulate. Fruits upon very thick, woody stalks, ellipsoid, tuberculate; seeds solitary, large.

Monotypic; eastern half of Borneo, Celebes, Philippines to New Guinea.

1. *Cubilia cubili* (Blco.) Adelb., Blumea 6: 325, 1948. – *Euphoria cubili* Blco., Fl. Filip. 287, 1837.

Trees medium-sized to large. Leaves 30-50 cm long; petioles swollen at base; leaflets oblong, 15 x 5 cm, midrib ridged beneath with 15 pairs of ascendingly curved nerves, falcate at acute apex, occasionally a trifle inequilateral at subcuneate base; petiolules 5 mm long. Panicles terminal, shorter than leaves, tawny-pubescent; flowers in small fascicles on short, thick, ultimate branchlets, usually pedicelled. Fruits ellipsoid, 3 x 2 cm, turning brown, short-stipitate; seeds solitary, brown.

Java, Celebes and Moluccas. Throughout the Philippines, in primary forests at medium altitudes; in Mt. Makiling, Luzon, in second-growth to primary forests, but rarely encountered.

Com. name – *Kubili* (Tag.).

Exsicc. – Pancho CA 20250 (CAHP).

7. LITCHI Sonnerat

Trees polygamous. Leaves even-pinnate. Flowers regular, small, greenish white or yellowish, in terminal panicles, sometimes 1.20 m long; sepals valvate; petals wanting; disc fleshy; stamens usually 8 with hairy filaments; ovaries on short stalks, 2- to 3-lobed and 1-celled; ovules solitary in each cell, pubescent; stigmas 2-lobed. Drupes covered with prominent angular tubercles.

One species with 3 subspecies; in tropical and subtropical Asia; 1 subspecies in the Philippines.

1. *Litchi chinensis* Sonn. subsp. *philippinensis* (Radlk.) Leenh., *Blumea* 19: 129, 1971; *Fl. Mal. Ser. I*, 11: 659, 1994. – *L. philippinensis* Radlk., *Phil. J. Sc.* 8(Bot.): 458, 1914. – *Euphoria didyma* Blco., *Fl. Filip.* 288, 1837, *nom. illeg.*

Twigs 1.5-3 mm across, yellowish to silvery grey, glabrous. Leaves 1- to 3-, mostly 2-jugate; petiole 1 mm across, rachis terete or upper portion slightly flattened and carinate; petiolules 4-10 mm long. Leaflets widest at or slightly below middle, stiff-coriaceous, midrib prominent beneath and rounded. Inflorescences 6-14 cm long, often tufted; branches fork, patent, sparsely rebranched, with 5- to 15-flowered cymules. Calyx 4- or 5-merous. Disc hairy. Stamens 6 or 7, 2-4 mm long, densely hairy all over. Fruits 2.5-3 x 2-2.5 cm, densely set with acute, pyramidal warts, 4 mm across and 3 mm thick.

Southeast New Guinea and throughout the Philippines. In primary and secondary forests from sea level up to 500 m altitude.

Com. name – *Alupag-amo* (Tag.).

Exsicc. – *Hernaez CA 19634*; *Lugod CA 4626-B, 8383*; *Pancho CA 19744*; *Viniegas CA 3084* (CAHP).

8. DIMOCARPUS Loureiro

Trees or shrubs. Indument often of dense hair tufts. Leaves spiral, paripinnate, rarely unifoliolate, 1- to 7-jugate, estipulate, axial parts variably hairy; petioles slightly swollen and somewhat hollow at base, scars cordate; leaflets opposite to alternate, widest at middle, glabrous to variably hairy, lower side often with naked glands in nerve axils; midrib prominent to sunken above, prominent and rounded to angular beneath. Inflorescences terminal, often with lower 1-3 strong branches in upper leaf axils, thyrsoid, sparsely branched, lower branches sparsely rebranched, all branches oblique-erect, spicoid, with scattered, stalked to sessile cymules, the latter mostly 5- to 7-flowered; pedicels slender, 2-4 mm wide; bracts triangular-lanceolate to subulate, up

to 4 mm long, patent or reflexed. Flowers unisexual; calyx cupular, 5-, rarely 6-merous, with dense short hairs outside and at least in upper part inside; petals 0-5, rarely 6, oblanceolate, entire; disc slightly 5-lobed, without appendage, densely hairy; stamens 6-10; pistils 2-, rarely 3-merous; styles as long as ovaries, hairy at least on lower half; ovules solitary in each cell. Fruits warty, sometimes smooth or with dense long spines, reddish, purplish or brownish when ripe; seeds enveloped by translucent white aril.

Species 5, in South and Southeastern Asia and India to eastern Malesia. 3 species with 3 subspecies and 2 varieties in the Philippines.

1. *Dimocarpus longan* Lour., Fl. Cochin. 233, 1790; ed. 2, 1: 288, 1793; Leenh., Blumea 19: 122, 1971; Fl. Mal. Ser. I, 11: 517, 1994. – *Euphoria longan* Lam., Encyl. 3: 574, 1792, *nomen illeg.* – *E. didyma* auct. non Blco.

subsp. *malesianus* Leenh. var. *malesianus*, Blumea 19: 126, 1971; Fl. Mal. Ser. I, 11: 518, 1994.

Trees, rarely shrubs, up to 30-40 m high, 30-80 cm diameter-at-breast height. Leaves (2-) 4- or 5-jugate; petioles 2-10 cm long; petiolules 1.5-10 mm long, grooved or not; leaflets opposite, glabrous above, subglabrous beneath, rarely with naked glands in nerve beneath, base at least in upper leaflets distinctly oblique, apex bluntly acuminate. Cymes 1- or 3-flowered, stalked. Calyx lobes puberulous inside; petals often reduced, not exceeding calyx in length, subglabrous outside, sparsely woolly inside. Fruits subglobular, 1.25-2.5 cm across, pusticulate to granulate and nearly smooth.

Sri Lanka, Burma, Laos, Cambodia, South Vietnam to India, southern China, Indochina to Malesia. In the Philippines, at sea level up to 700 m.

Com. name – *Alupag* (Tag.)

Exsicc. – *Ballesteros* CA 8030; *Blancaver* CA 4862; *Champhaka* CA 8101; *Espiritu* CA 8220; *Fernando* CA 27210; *Gates* CA 1710; *Hernaez* CA 19454; *Lugod* CA 4606; *Orlido* CA 5011; *Pancho* CA 9059 (CAHP).

9. NEPHELIUM Linnaeus

Trees. Leaves alternate, paripinnate, rarely simple, estipulate; leaflets entire, glabrous beneath. Inflorescences terminal and axillary; flowers regular, bisexual; calyx cup-shaped, 4- to 6-lobed, subvalvate to imbricate in bud; petals minute, as many as or fewer than calyx-lobes or wanting, without scales; disc annular-scutelliform, crenate; stamens 5-8, filaments pubescent; ovaries pubescent, 2- to 3-lobed, verrucose, each lobe 1-celled, 1-ovuled; styles erect.

lobulate. Fruits of 1-3 globose or oblong carpels, indehiscent, echinate, tubercled, rarely smooth; seeds included in pulpy aril.

Species 30, India to southern China, Malesia to Australia; 5 in the Philippines.

1. Leaflets glaucous-green beneath; panicles olivaceous-tomentose; fruits wine-red 1. *N. ramboutan-ake*
1. Leaflets dull green beneath; panicles shortly brown-hairy; fruits yellow-orange or red 2. *N. lappaceum*

1. ***Nephelium ramboutan-ake*** (Labill.) Leenh., *Blumea* 31: 415, 1986; Seibert, *PROSEA* 2: 233, 1991. – *Litchi ramboutan-ake* Labill. in DC., *Bull. Soc. Philomath. Paris* 2: 161, 1801. – *Nephelium mutabile* Bl., *Rumphia* 3: 104, 1847; Merr., *En. Philip.* 2: 505, 1923. – *N. intermedia* Radlk. in Perk., *Frag. Fl. Philip.* 1: 61, 1904.

Trees small. Leaflets 2-8, ovate-oblong, 3.5-8.5 x 2-6 cm, shiny green above, glaucous-green beneath, midrib with 10 pairs of ascending nerves, obtusely rounded or simply acute, oblique base obtuse or obtusely rounded; petiolules profusely branched, equaling foliage, subolivaceous-tomentose; flowers dingy white, in small fascicles; pedicels short, subtended by bract vestiges. Fruits frequently in pairs, ellipsoid or subglobose, 3-4 cm long, upon much-thickened stalks, wine-red, covered with flexible spine-like processes; seeds surrounded by fleshy, edible aril.

Malay Peninsula, Sumatra, Borneo and Java. Throughout the Philippines, in low forests; in Mt. Makiling, Luzon, in the vicinity of Mudspring about 300 m altitude.

Com. name – *Bulala* (Bik., Tag.)

Exsicc. – *Gates CA 1717, 1719; Montilla CA 3271 (CAHP); Rivera 33459 (PNH), 2212539 (US); Elmer 17505 (US).*

2. ***Nephelium lappaceum*** L., *Mant.* 2: 566, 1771; Merr., *En. Philip.* 2: 504, 1923; van Welzen & Verheij, *PROSEA* 2: 235, *f. s.n.*, 1991.

Trees. Leaflets 2-8, mostly 4-6, oval-oblong or subobovate, 5-22 x 2.5-10 cm, dull green beneath, shortly acuminate, often broadly rounded-emarginate, base acute; petiolules short, brown-hairy to glabrous. Panicles 10-25 cm long; pedicels short, brown-hairy; calyx brown-hairy, segments oval-ovate; disc glabrous. Fruits ellipsoid, 3-5 cm long, glabrous, red or yellow-orange, prickles compressed, curved at the tip, 1-1.5 cm long or shorter; seeds surrounded by fleshy, edible aril.

India to Indochina and Malesia. Cultivated in the Philippines.

Com. name – *Rambutan* (Tag.).

Exsicc. – *Lugod* CA 4627, 4628, 4645, 4646; *Pancho* CA 9931, 10932 (CAHP).

10. LEPISANTHES Blume

Shrubs or small trees. Leaves alternate, paripinnate, estipulate; leaflets entire. Inflorescences axillary, paniculately branched, flower-bearing branches spicately racemose; flowers unisexual or polygamous, 4- or 5-merous, regular, upon short branches; sepals large, 4 or 5, concave, imbricate in 2 rows; petals as many as sepals, each with 1 or 2 hairy scales; disc annular, regular; stamens 8, (4-18), erect, inserted within disc; ovaries entire, 3-celled; ovules solitary in each cell; styles simple; stigmas blunt. Fruits drupaceous, 3-celled, subglobose or obscurely 3-sided, occasionally didymous; seeds solitary, erect, exalbuminous.

Species 24, Indo-Malesian; 5 in the Philippines.

1. *Lepisanthes tetraphylla* (Vahl) Radlk., Sitzungsber Math.-Phys. Cl. Konigl. Bayer. Akad. Wiss. Munchen 8: 276, 1878; Leenh., Blumea 17: 63, 1969; Fl. Mal. Ser. I, 11: 630, 1994. – *Sapindus tetraphylla* Vahl, Symb. 3: 54, 1794. – *Lepisanthes eriolepis* Radlk., Sapind. Holl.-Ind. 36, 1879. – *L. schizolepis* Radlk., Sapind. Holl.-Ind. 87, 1879. – *L. pervirides* Elm., Leafl. Philip. Bot. 8: 3101, 1915.

Small trees or shrubs. Leaves up to 5 cm long, 10- to 14-foliolate; petioles enlarged at base, dirty brown-pubescent; leaflets opposite, oblong, reduced toward base, larger ones 30 x 10 cm, midrib ridged beneath with 15-18 pairs of much ascending nerves, pubescent beneath, acute to acuminate, obtusely rounded at base; petiolules 1 cm long, brown-pubescent. Panicles axillary, half as long as foliage, deep brown-pubescent, elongate, divaricately branched toward base; flowers solitary or few-clustered; pedicels short, subtended by small bracts. Fruits subglobose, 2-3 cm in diameter, yellowish brown-tomentose or glabrescent. A very variable species.

Sri Lanka, India, Burma, Thailand, Kampuchea, Vietnam, Malay Peninsula to the Philippines. In primary forests at low altitudes; in Mt. Makiling, Luzon, in the vicinity of Mudspring, about 300 m altitude.

Com. name – *Sarakag* (Neg.).

Exsicc. – *Villamil* CA 1716 (CAHP); *Villamil* BF 20635, 1238723; *Elmer* 17824, 1237359 (US); *Elmer* 18355 [Isotype of *L. pervirides* Elm. (NY, UC)].

11. *GLENNIEA* Hook. f.

Trees, shrubs, seldom scandent, monoecious or dioecious. Leaves spiral or partly decussate, unifoliolate or paripinnate, 1-to 6-jugate, lower part somewhat stipule-like. Leaflets opposite to alternate, glabrous or variably hairy, base equal-sided to slightly oblique. Inflorescences terminal and mostly in upper leaf axils, thyrsoïd or paniculate with few, spreading, often densely flowered branches. Flowers actinomorphic; calyx 3-, 4- or 5-merous, lobes connate at base, imbricate in bud, tomentose outside, hairy to glabrous inside; petals 5, shorter than calyx; stamens 5-8, exserted, dehiscence lateral to introrse; pistils 3-merous, ovaries sessile, densely hairy; ovules 1 per cell. Fruits indehiscent, tomentose, scurfy or glabrous, hardly to distinctly 2-lobed.

Species 8, in tropical Continental Africa, Indochina, Malesia to New Guinea; 2 in the Philippines.

1. *Glenniea philippinensis* (Radlk.) Leenh., Blumea 22: 412, 1975; Fl. Mal. Ser. 1, 11: 542, 1994; Gruèzo, Proc. XI International Association of Botanic Gardens Conference, Wuxi, China (1993), 164-168, 1995. – *Hedyachras philippinensis* Radlk. in Engl., Bot. Jahrb. 56: 258, 1920; Merr., En. Philip. 2: 502, 1923.

Trees stocky. Leaves alternate, scattered, 30 cm long or longer, paripinnate, 8- to 12-foliolate, subangular or striate rachis similar in vesture when young; leaflets chartaceous, subalternate, narrowly oblong, 5-14 cm long or basal ones smaller, bluntly acute, base obtusely rounded; petiolules very short, 5 mm long, glabrous or nearly so on both sides, shiny above; midrib pronounced beneath, 7-10 lateral pairs of nerves with much-ascending tips. Inflorescences stout, terminal, few-branched, as long as or exceeding leaves, blackish brown-canescenscent; flowers clustered from short tubercles or branchlets, subsessile, leaving prominent scars after falling, subtended by bract vestiges. Fruits subglobose, 5-8 cm in diameter, drupaceous, yellowish at maturity, glabrous; seeds large, 2 or 3, imbedded in hard, fleshy meat.

Vietnam, Thailand to Philippines. In the Philippines, this species has been found only in Mt. Makiling, Luzon, with its type locality in the vicinity of Palma Bridge, University of the Philippines Los Baños. It is frequently growing along banks of streams at low altitudes. Reports of occurrence elsewhere need verification.

Com. names – *Mamoko*, *Malachico* (Tag.).

Exsicc. – *Lugod* CA 10977, 10978; *Mabesa* BF 25719, 1294276, 26180, 1264262; *Velasco* CA 1715; *Villamil* 9016 - photograph of lectotype (CAHP); *Elmer* 18280, 1050184 (US).

12. GUIOA Cavanilles

Trees or shrubs. Leaves alternate, paripinnate, estipulate; leaflets entire, oblique, opposite, subopposite or alternate, broadly lanceolate. Panicles or racemes axillary or subterminal, many-flowered; flowers bisexual, regular or irregular: sepals 5, free or united at base, rounded, concave, imbricate in 2 rows with pubescent margins, petals as many as sepals, with 2 scales at base on the inside; stamens 8, inserted with annular disc; ovaries 3-angled, 3-celled, obovate to obcordate; styles single, curved, terminated by 3-lobed stigmas; ovules solitary. Fruits sessile or short-pedicelled, capsular, obovoid, 3-winged, obcordate, loculicidally 3-valved; seeds compressed, entirely or partly arillate.

Species 35, India to southern China, Malesia southward to Australia and Polynesia; 19 in the Philippines.

1. *Guioa koelreuteria* (Blco.) Merr., Sp. Blanc. 241, 1918; En. Philip. 2: 507, 1923. – *Sapindus koelreuteria* Blco., Fl. Filip. 209, 1837.

Shrubs or small trees. Leaves 10-30 cm long, leaflets opposite, usually a trifle subfalcate, lanceolate to narrowly oblong, 6-16 x 1.5-4 cm, prominent midrib with 10 pairs of obscure nerves, acuminate, base acute to obtuse, inequilateral; petiolules very short. Panicles terminal, usually shorter than foliage, glabrate except bract vestiges; flowers white, short-pedicelled or subsessile at ends of short, slender branchlets. Fruits dry, glabrous, broadly 3-winged, 1 cm across, dehiscent, constricted at base, broad apex emarginate, glaucous-green, finally tinged with red.

Throughout the Philippines, in second-growth forests at low and medium altitudes; in Mt. Makiling, Luzon, in open wooded areas mostly at low altitudes.

Com. name – *Alahan* (Tag.).

Exsicc. – *Cabanit* CA 3440; *Cabrera* CA 5079; *Gates* CA 1711; *Orlido* CA 5075; *Pancho* CA 11033, 11036; *Rivera* CA 3134 (CAHP).

13. HARPULLIA Roxburgh

Trees with hairs finely stellate. Leaves alternate, paripinnate or by loss of leaf rachis, seemingly imparipinnate, estipulate; leaflets alternate, entire, 2-7 pairs, occasionally with winged leaf-rachis. Flowers in racemes or thyrsoid panicles, unisexual or bisexual, regular, loosely flowered, mainly toward ends of branchlets; sepals 4 or 5, oblong, imbricate; petals as many, narrowly obovate, exceeding calyx, without glands or scales, rarely inflated lobes at base of lamina, stamens 5-8, long, inserted within obscure disc; ovaries usually 2-lobed, tomentose, ellipsoidal or oblong, 2-celled, seldom more, each cell with 2 superposed ovules; styles elongated or short; stigmas linear, twisted.

Capsules coriaceous, inflated, dehiscent, bilobed, rarely 3- or 4-lobed; seeds solitary in each cell, subglobose, usually arillate.

Species 23, tropical Africa through Madagascar to Asia, Malesia and Australia; 3 in the Philippines.

1. *Harpullia arborea* (Blco.) Radlk., Sitz. Kgl. Bayer. Akad. 16: 404, 1886; Merr., En. Philip. 2: 515, 1923. – *Ptelea arborea* Blco., Fl. Filip. 63, 1837.

Figure 96

Trees small. Leaves 10-30 cm long, 5- to 9-jugate; petioles and rachis yellowish, puberulent; leaflets oblong or broadly lanceolate, 15 x 5 cm, those toward base much reduced, ovate, midrib with 7-10 pairs of ascendingly curved nerves, slenderly acuminate, base obtuse, oblique; petiolules very short. Panicles in upper leaf axils, one half as long as leaves, few-rebranched, yellowish brown-velvety; pedicels slender, subtended by setaceous bracts; flowers large, greenish; stamens 5. Fruits dehiscent, slenderly stalked, bilobed, 1.5 x 2.5 cm, inflated, glabrous, yellowish red.

Java. In most parts of the Philippines, in thickets and second-growth forests at low and medium altitudes; in Mt. Makiling, Luzon, locally numerous in open wooded areas.

Com. name – *Puas* (Tag.).

Exsicc. – Ferrer CA 10539; Hernaez CA 12397; Velasco CA 1713, 1714* (CAHP); Galutera 33365 (PNH), 2212421 (US); McGregor BS 12473 (US).

14. ARYTERA Blume

Trees or shrubs small. Leaves alternate, paripinnate; leaflets elliptic or lanceolate, entire, sometimes foveolate in nerve axils underneath. Flowers bisexual, actinomorphic, in axillary or subterminal panicles; calyx small, cupular; sepals 5, imbricate; petals 5, each with a pair of pectinate basal scales or nearly scaleless; disc entire, annular; stamens 8; styles conical, erect, solitary, subsistent, terminated by small, capitate stigma. Fruits 2- to 3-celled, short-stipitate when young, appearing winged or lobed, lobes elliptic, obcordate or obovate, divaricate, connate along ventral edge; pericarp fleshy outside; endocarp often hairy; seeds with a saccate aril.

Species 20, Burma to southern China, Malay Archipelago, Java and Australia; 1 in the Philippines.

1. *Arytera litoralis* Bl., Rumphia 3: 170, 1847; Merr., Sp. Blanc. 241, 1918; En. Philip. 2: 512, 1923.

Trees small. Leaves 2- to 4-pinnate; leaflets opposite, oblong, 5-12 cm, entire; midrib prominent, with 8 pairs of ascending nerves, acute to



Figure 96. *Harpullia arborea*: 1. flowering and fruiting branch; 2, 3. flower, 2 views; 4. petal; 5. stamen; 6. flower, vertical section; 7. ovary, vertical section; 8. ovary, cross section; 9. fruit, opened; 10. seed.

acuminate, base obtusely rounded; petioles 5 mm long. Panicles brown-pubescent; flowers greenish white, in small clusters; pedicels bract-subtended; petals scarcely as long as calyx. Fruits bilobed, not inflated, ellipsoid lobes at right angle from short stipe, glabrous, 1.25 cm long, dehiscent, yellowish red.

Burma to southern China through Malesia. Throughout the Philippines, in thickets and second-growth forests at low and medium altitudes; in Mt. Makiling, Luzon, scattered in second-growth forests mostly at low altitudes.

Com. name – *Alasan* (Tag.).

Exsicc. – *Pancho* CA 203461, 20496 (CAHP).

15. LEPIDOPETALUM Blume

Shrubs or small trees. Leaves alternately scattered, paripinnate; leaflets entire, ovately lanceolate to elliptic. Racemes often thyriform, axillary, 5-10 cm in length; flowers stalked, yellowish green; sepals 4, united at base, valvate; petals smaller as many, alternate with sepals, each with a large scale, connate; stamens 8; filaments glabrous; ovaries 2-celled with solitary ovule in each cell. Fruits capsular, coriaceous, obovate, compressed, 2-celled, reddish brown when ripe; pericarp fleshy, endocarp bright scarlet; seeds black, with mucilaginous coating, cupular aril pink.

Species 6, Indo-Malaysian; 1 in the Philippines.

1. *Lepidopetalum perrottetii* (Cambess.) Bl., Rumphia 3: 172, 1847; Merr., En. Philip. 2: 514, 1923; v. Welzen, Fl. Mal. Ser. I, 11: 624, 1994. – *Cupania perrottetii* Cambess., Mem. Mus. Hist. Nat. Paris 18: 45, t. 3, 1829. – *C. richii* A. Gray, Bot. Wilkes U.S. Explor. Exped. 257, 1854.

Shrubs or small trees. Leaves 3- to 5-pinnate; leaflets oblong, 12 x 4 cm, opposite, or subopposite, midrib pronounced with 12 pairs of nerves, subacute, base inequilateral, obtusely rounded. Inflorescences cymosely paniculate, up to 5 cm long, usually clustered, slender stalks subglabrate. Flowers nearly white; pedicels slender; petals shorter than acuminate calyx segments; ovaries woolly. Infrutescences elongated; fruits hard, glabrous, compressed, obovoid, 1.5 cm long, finally dehiscent, terminated by short, sharp point, yellowish red when mature; pedicels slender.

Endemic. Throughout the Philippines, usually found along roadsides, in wastelands, thickets and secondary forests at low and medium altitudes; in Mt. Makiling, Luzon, in open wooded areas, but rarely encountered.

Com. name – *Dapil* (Tag.)

Exsicc. – *Pancho* CA 20171, 20343 (CAHP).

16. MISCHOCARPUS Blume, *nom. cons.*

Trees or shrubs. Leaves alternate, paripinnate, estipulate; leaflets entire, ovately lanceolate or subelliptic, usually glabrous, reticulate. Racemes in upper leaf axils and seemingly terminal, simple or branched. Flowers bisexual or unisexual; calyx minute, cup-shaped, 5-parted, segments valvate; petals 0-3 (-5), each with or without 2 large pectinate scales; disc entire, annular; stamens 7-9; styles shortly 3-branched. Fruits pyriform, blunt, 3-celled with as many angles or trigonously globose, pedicelled, rarely sessile, when subglobose, longitudinally 3-ridged; seeds completely surrounded by thin aril.

1. Inflorescences glabrate; fruits sharply triangular 1. *M. sundaicus*
 1. Inflorescences short-pubescent; fruits tricostate 2. *M. pentapetalus*

1. ***Mischocarpus sundaicus*** Bl., Bijdr. 23, 1825, Merr., En. Philip. 2: 513, 1923; v.d. Ham, Fl. Mal. Ser. I, 11: 667, 1994.

Shrubs or small trees. Leaves up to 15 cm long, leaflets about 3 pairs, narrowly oblong to broadly lanceolate, 10 x 3 cm, midrib prominent with about 7 pairs of interarching nerves, acute but bluntly pointed, base broadly obtuse; petioles 5-8 mm long. Inflorescences shorter than leaves, clustered, sometimes few-branched from near base, glabrate, spicately racemous. Flowers whitish, upon short, puberulent pedicels, in small fascicles from very short branchlets. Fruits 1 cm long, glabrous, slenderly stipitate, sharply triangular.

India, Burma, southern China, Indochina, Malesia, Philippines, to tropical Australia. In Mt. Makiling, Luzon, in dry woods or ravines up to 350 m altitude.

Com. name – *Malasalati* (Tag.).

Exsicc. – *Ramos BS 1001, 1179434* (US).

2. ***Mischocarpus pentapetalus*** (Roxb.) Radlk., Sapind. Holl.-Ind. 43, 1879; van der Ham, Blumea 23: 271, 1977; Fl. Mal. Ser. I, 11: 662, 1994. – *Schleichera pentapetala* Roxb., Hort. Beng. 29, 1814, *nom. nud.*; Fl. Ind. ed Carey 275, 1832. – *Mischocarpus fuscescens* Bl., Rumphia 3: 169, 1847.

Shrubs or small trees. Leaves rigidly coriaceous or chartaceous, glabrous, 3-4, evenly pinnate or fewer, 20-40 cm long; petioles 4-7 cm long, terete, enlarged at base; leaflets opposite or basal ones subopposite, oblong, acute to acuminate, obtusely rounded at base, larger ones 20 x 7 cm, with very prominent midrib and about 10 pairs of ascendingly curved lateral nerves, reticulations very fine; petiolules 1 cm long. Inflorescences short-pubescent, one half as long as foliage, occasionally branched from near base into spicate racemes, terminal and from upper leaf axils. Flowers dingy white, pedicellate, upon

very short branchlets. Fruits subglobose, tricostate, 1 cm long, short-stipitate, glabrous.

India, Burma, southern China, Indochina to Malesia. In most parts of the Philippines, in dry woods of low elevations; in Mt. Makiling, Luzon, common in open wooded areas in the lowlands.

Com. name – *Dapil* (Tag.).

Exsicc. – *Cadiz CA 2848; Rivera CA 3471; Siapno CA 2839; Villarica CA 10653* (CAHP); *Cabot 33431* (PNH), *2212483* (US); *Forestry Student 34120* (PNH), *2372311* (US); *Olegario Jr. 33368* (PNH), *2212423* (US); *Villamil BF 20716, 900706* (US).

17. ELATTOSTACHYS (Blume) Radikofer

Trees. Leaves alternate, paripinnate; leaflets entire or serrately dentate, usually glabrous, nerve axils beneath frequently pitted with jug-shaped glands. Inflorescences of simple or much-branched, catkin-like racemes, axillary. Flowers bisexual, regular; sepals 5, imbricate, almost free; petals 5, clawed on inner side of blade, with 2-lobed, long-ciliate apex, white; disc cupular, smooth; stamens 8 with large basifixed anthers; ovaries bottle-shaped, gradually extended into short neck which ends in a blunt stigma. Fruits 3-celled, obscurely 3-angled, spherical with 3 conspicuous longitudinal ridges, sessile; pericarp ligneous, tardily dehiscent; seeds with short, cup-shaped seed costa, 2-lobed.

Species 11; Malesia, Australia and the Pacific Islands; 1 in the Philippines.

1. *Elattostachys verrucosa* (Bl.) Radlk., Act. Congr. Bot. Amsterdam 113, 1877 (1878); Sapind. Holl.-Ind. 12, 1879; Merr., En. Philip. 2: 511, 1923; Adema, Fl. Mal. Ser. I, 11: 533, 1994. – *Cupania verrucosa* Bl., Rumphia 3: 161, 1847.

Trees small. Leaves 5- to 10-jugate; leaflets narrowly oblong to broadly lanceolate, 7-20 x 1.5 cm, prominent midrib with 10-15 pairs of nerves, slenderly acuminate, oblique base subentire or wavy, occasionally toothed; petiolules 1 cm long. Inflorescences yellowish brown-pubescent, few-rebranched, 5-8 cm in length. Flowers solitary, forming dense spikes, brownish white, pedicels short; stamens glabrous. Fruits sessile, upon short stalks, subglobose, 1.5 cm diameter, glabrous, with 3 or 4 longitudinal costate, reddish when mature.

Java, Celebes and Timor. Throughout the Philippines, forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-350 m.

Com. name – *Malakaniwa* (Tag.).

Exsicc. – *Pancho CA 20194, 20277* (CAHP).

83. SABIACEAE

Trees or shrubs, seldom climbing. Leaves alternate, simple or compound, estipulate. Flowers small, bisexual, usually paniced; calyx 4- or 5-partite, imbricate; petals 4 or 5, equal or unequal, opposite or alternate with sepals, imbricate; disc usually small, annular; stamens 4 or 5, opposite petals, inserted at base of or on disc, all perfect or 2 perfect and 3 without anthers; filaments clavate, flattened or subulate; anthers didymous, cells distinct, usually adnate to large connective; ovaries 2- or 3-celled; styles distinct or connate, rarely none; stigmas punctiform; ovules 1 or 2 in each cell. Fruits drupaceous, dry or fleshy, indehiscent; seeds compressed or globose, exalbuminous or with thin albumen, embryo various; cotyledons contorted.

Genera 4, species 130; throughout South-Central America, the West Indies, southeastern Asia to Malesia; 2 genera and 14 species in the Philippines.

1. MELIOSMA Blume

Trees or shrubs. Leaves simple or odd-pinnate; leaflets subopposite, terminal rarely wanting. Flowers in branched, terminal or subterminal panicles, supported by bracteoles similar to sepals; sepals somewhat unequal, generally 5, ciliate, rarely glabrate; petals 5, dissimilar, three outer concave or orbicular, 2 inner much smaller, bifid; stamens 5, fertile ones adnate to smaller petals, 3 sterile ones opposite larger petals; anther cells attached to a large, flat connective; disc cupular or annular, toothed; ovaries 2- rarely 3-celled; ovules 2 in each cell; styles simple, subulate. Fruits small, drupaceous, subglobose, generally oblique, 1-seeded; seeds crustaceous, globose.

Species 25; throughout South-Central America, the West Indies, southeastern and eastern Asia; 2 species and 8 subspecies in the Philippines.

1. Leaves 60 cm long or less; leaflets slightly oblique at base; dry fruits reticulate, subtended by lobed calyx 1. *M. pinnata* ssp. *sylvatica*
1. Leaves 60 cm long or more; leaflets obtusely rounded or shallowly cordate at base; dry fruits smooth, subtended by apiculate calyx 2. *M. pinnata* ssp. *macrophylla*

1. *Meliosma pinnata* (Roxb.) Walp. ssp. *sylvatica* (Elm.) v. Beus., *Blumea* 19: 513, 1971; v. Beus & v.d. Water., *Fl. Mal. Ser. I*, 10: 713, 1989. – *M. sylvatica* Elm., *Leaflet. Philip. Bot.* 2: 492, 1908; Merr., *En. Philip.* 2: 518, 1923.

Shrubs or small trees. Leaves 30-50 cm long; leaflets 9-15, oblong, 15 x 5 cm, midrib with 10 pairs of nerves, basal ones gradually reduced, ovate, often tinged with red on paler side, serrately denticulate, sharply acuminate, obtuse at slightly oblique, entire base; petiolules 5-15 mm long. Panicles terminal, equaling or exceeding foliage, stout branches puberulent. Flowers pale white; pedicels short, subtended by sparsely hairy bracts; calyx prominently lobed, glabrous, persistent. Fruits 8 mm long, reddish in fresh mature state, conspicuously reticulate when dry, obscurely compressed, short-pedicelled, subtended by lobed calyx.

Central Celebes and the Philippines (Luzon to Visayas). In Mt. Makiling, Luzon, mostly in the dipterocarp forest.

Com. name – *Kadabu* (Buk.).

Exsicc. – *Elmer 18252, 1237675* (US).

2. *Meliosma pinnata* (Roxb.) Walp. ssp. *macrophylla* (Merr.) v. Beus, *Blumea* 19: 510, f. 33, 1971; v. Beus & v.d. Water, *Fl. Mal. Ser. I*, 10: 711, 1989. – *M. macrophylla* Merr., *Philip. J. Sc.* 7(Bot.): 294, 1912; *En. Philip.* 2: 517, 1923. **Figure 97**

Trees large. Leaves up to 1 m long, alternately clustered toward ends of twigs; leaflets 15-17, ovately oblong, 25 x 18 cm, midrib with 9-13 pairs of ascending nerves, sharply acuminate, base obtusely rounded or shallowly cordate; petiolules 1 cm long. Inflorescences terminal, paniculate, equaling leaves, thick branches brown-puberulent. Flowers whitish, densely crowded along ultimate branches, glomerated upon short tubercles, subtended by finely pubescent bracts. Fruits ovoid to subglobose, 5-6 mm thick, glabrous, smooth, upon short stalks, subtended by apiculate calyx.

East Malesia, Celebes, Moluccas, throughout New Guinea to New Britain. Throughout the Philippines, in primary forests at low and medium altitudes, up to 900 m; in Mt. Makiling, Luzon, at 200-700 m.

Com. name – *Balilang-uwak* (Tag.).

Exsicc. – *Calacosa CA 1725** (CAHP).



Figure 97. *Meliosma pinnata* ssp. *macrophylla*: 1. flowering twig; 2. flower; 3. flower, petals removed; 4. petal with attached stamen; 5. stamen, 2 views; 6. ovary, vertical section.

84. BALSAMINACEAE

Herbs erect, succulent, branched. Leaves opposite, alternate or somewhat whorled, simple, estipulate. Flowers irregular, perfect, large and showy, on axillary or terminal 1- to several-flowered peduncles; sepals 3, imbricate, posterior one large, petaloid, produced into a hollow sack or spur, 2 anterior ones small, green; petals 3 or 5, lateral ones 2-lobed; stamens 5; filaments short, broad; anthers cohering; disc none; ovaries oblong, 5-celled; stigmas sessile, 5-toothed; ovules many. Fruits loculicidal capsules, valves springing elastically away from axis; seeds smooth or tubercled, small.

Genera 3, species 410, in tropical Asia and Africa, few in temperate Europe, North America, etc.; 1 genus and 25 species in the Philippines.

1. *IMPATIENS* Linnaeus

Characteristics (Refer to family description).

1. *Impatiens balsamina* L., Sp. Pl. 2: 938, 1753; Merr., En. Philip. 2: 518, 1923. **Figure 98**

Herbs erect, succulent, branched. 1 m high or less. Leaves glabrous or pubescent, 3-5 cm long, narrowly lanceolate or oblanceolate, acuminate, deeply serrate, alternate; petioles glandular. Flowers axillary, showy, 2-3 cm long, usually pink but forms with white, red, purple and variegated petals; spur long, slender. Fruits pubescent.

Native of British India, throughout the Philippines, now cultivated in most warm and tropical countries; in Mt. Makiling, Luzon, cultivated as an ornamental.

Com. name – *Kamantigi* (Ilk., Pamp., Tag.).

Exsicc. – *Antonio CA 1737; Obligado CA 5081** (CAHP).



Figure 98. *Impatiens balsamina*: 1. fruiting and flowering branch; 2. portion of stem with stipule; 3. flower, 2 views; 4. flower, vertical section; 5. flower, perianth removed; 6. ovary, vertical section; 7. ovary, cross section; 8. fruit, undehiscent; 9. fruit, dehiscent; 10. seed.

85. AQUIFOLIACEAE

Trees or shrubs, sometimes epiphytic, unarmed. Leaves alternate, simple, mostly coriaceous, evergreen, estipulate or with 2 minute stipules. Flowers small, in axillary cymes, fascicles, spikes or umbels, bisexual or unisexual; calyx 3- to 6-partite, segments imbricate, persistent; petals 4 or 5, rarely 6-8, connate at base or connate in staminate and free in pistillate, imbricate, deciduous; stamens 4 or 5, adhering to base of corolla, sometimes free and hypogynous in pistillate flowers; filaments subulate; anthers shortly oblong, sub-basifixed or dorsifixed; disc absent; ovaries free, 3- to 15-celled; styles none or very short; stigmas capitate or discoid; ovules 1 or 2 in each cell, pendulous. Drupes with 2- or more 1-seeded, free, rarely connate stones or achenes; seeds with membranous testa, fleshy endosperm and minute embryo.

Genera 3, species 300, temperate to tropical; 1 genus and 20 species in the Philippines.

1. *ILEX* Linnaeus

Trees or shrubs. Leaves coriaceous and shiny, usually entire, sometimes serrate. Inflorescences axillary or subterminal, fascicled or cymose, occasionally spicately racemose, few- to many- flowered; flowers whitish, calyx small, persistent, 4- or 5-lobed; corolla 4, rotate or rarely 3- or 4-parted, exceeding calyx lobes, usually united at base; stamens isomerous, alternating with petals and inserted upon the latter near base; anthers basifixed, oblong; ovaries sessile, 4- to 6- celled, rarely 7 or 8, subglobose; styles very short or absent; stigmas fleshy and confluent on top of ovary; ovules solitary or in pairs in each cell, collateral. Fruits berry-like, spherical, 4- to 8-seeded; seeds stramineous, crustaceous.

Species 200, cosmopolitan but majority in the tropics.

1. *Ilex halconensis* (Merr.) Merr., Philip. J. Sc. 5 (Bot.): 358, 1910; En. Philip. 2: 478, 1923. – *Embelia halconensis* Merr., *op. cit.* 2 (Bot.): 297, 1907. – *Ilex apoensis* Elm. var. *glandulosa* Elm., Leafl. Philip. Bot. 3: 3071, 1919. **Figure 99**

Shrubs, sometimes epiphyte. Leaves rigidly coriaceous, broadly lanceolate to subelliptic, 6 x 3 cm, entire; midrib with about 7 pairs of relatively faint nerves, abruptly acute, obtuse or obtusely rounded at base; petioles 5-8 cm long. Racemes spicate, up to 3 cm long, glabrate, usually solitary in leaf axils; pedicels bract-subtended, 3-5 mm long; calyx broadly lobed, whitish petals twice as long. Fruits ovoidly globose, nipple-pointed; calyx persistent, saucer-shaped, lobes broader than long, glabrous, 3-4 mm long; seeds encrusted.



Figure 99. *Ilex halconensis*: 1. staminate twig; 2. pistillate twig; 3. staminate inflorescence; 4. staminate flower; 5. staminate flower, dorsal view; 6. flower, vertical section; 7. ovary, cross section; 8. fruit.

Philippines: Luzon (Laguna), Mindoro, Panay, Camiguin de Misamis and Mindanao (Bukidnon); in mossy forests, 1000-2000 m elevation.

Com. name – *Halcon kalasan* (lg.).

Exsicc. – *Navarro 9540* (PNH), *2376115* (US); *Mabesa 25727*, *1294063* (US); *Brown BS 26659*, *1294445* (US); *Elmer 1237215* (US, as *I. apoensis punctata*); *Gates CA 1682*, *1683** (CAHP).

87. CELASTRACEAE

Trees or shrubs, often scandent or twining. Branches glabrous, occasionally spinescent and pubescent. Leaves opposite or alternate, seldom whorled, usually coriaceous, simple, petiolate or rarely sessile; stipules caducous or absent. Flowers bisexual or polygamous, small, cymose or paniced; calyx 4- or 5-lobed, imbricate, persistent; petals as many, imbricate; stamens 3-5, alternate with petals; filaments subulate or flattened; anthers 2-celled; disc prominent, lobed or entire, rarely absent; ovaries sessile, disc free at base or confluent, (1-) 2- to 5-celled; styles short or none; stigmas simple or lobed; ovules mostly 2 in each cell. Fruits capsular, baccate, drupaceous or samaroid; seeds erect or pendulous, sometimes winged, aril present or absent.

Genera 90 (including Hippocrateaceae) and species 1000, in most temperate and tropical regions, 14 genera and 45 species in the Philippines.

1. Leaves opposite
 2. Inflorescences cymose with large flowers; fruits not elongate, usually 5-angular1. *Euonymus*
 2. Inflorescences paniculate with small flowers; fruits elongate, 3-winged2. *Lophopetalum*
1. Leaves alternate (decussate in *Reissantia*)
 3. Leaves densely serrate with narrow incisions; fruits berries 3. *Perrottetia*
 3. Leaves crenate-serrate, entire or remotely crenulate; fruits drupes or follicles 4. *Reissantia*

1. EUONYMUS Linnaeus

Trees or shrubs erect, scandent or creeping. Leaves opposite, petioled, seldom sessile; stipules lanceolate, caducous. Flowers in axillary cymes or panicles; calyx deeply lobed, segments spreading or recurved; stamens inserted upon disc; anthers broad, 2-celled; disc large, 4- to 5-lobed; ovaries

sunken in the disc, 3- to 5-celled; styles short or absent; stigmas 3- to 5-lobed; ovules mostly 2 in each cell. Fruits loculicidal capsules, 3- to 5-lobed; seeds covered by aril.

Species 170, mainly in the Indo-Malesian region and Australia, some in Europe and the western hemisphere; 3 in the Philippines.

1. Inflorescences fasciculate; fruits sharply angled 1. *E. javanicus*
 1. Inflorescences paniculate; fruits roundly angled 2. *E. cochinchinensis*

1. *Euonymus javanicus* Bl., Bijdr. 1146, 1827; Ding Hou, Fl. Mal. Ser. I, 6: 248, 1962. **Figure 100**

Shrubs or small trees. Leaves often unequal, oblong or obovately so, 15 x 6 cm, stout midrib with 5-7 pairs of ascendingly curved nerves, acute to acuminate, base obtuse or rounded; petioles 1 cm long or less. Flowers fascicled in axils of leaves or their scars, yellowish green, purple-spotted, glabrate, 1 cm wide; petals fimbriate, exceeding calyx segments; pedicels 1.5 cm long, subtended by brown-pubescent bracts. Fruits hanging, red, 2 cm long, bearing an apiculate apex, 4- to 5-celled with 1 or 2 seeds in each cell.

India, Burma, Andaman Islands, Malay Peninsula, Sumatra, Java and Borneo. Throughout the Philippines, in primary forests at low and medium altitudes.

Com. name – *Malasangka* (Tag.).

Exsicc. – *Stern* CA 2212; *Pancho* CA 11051; *Gutierrez* CA 1686, 1689; *Nano* CA 1687; *Gibe* CA 1688; *Pancho & Vega* 3419, 3420 (CAHP); *Elmer* 17547, 1237163 (US); *Bañaga* 33387 (PNH), 236305 (US); *Lazo* 33404, 2212459 (US); *Foxworthy's collector* BS #10, 1091579 (US).

2. *Euonymus cochinchinensis* Pierre, Fl. Coch. 4: t. 309, 1894; Merr., En. Philip. 2: 480, 1923. – *E. philippinensis* Merr. & Rolfe, Philip. J. Sc. 3(Bot.): 238, 1908. – *E. viburnifolius* Merr., Philip. J. Sc. 9 (Bot.): 312, 1914.

Shrubs or small trees. Leaves obovately elliptic to short-oblong, 4-10 cm, prominent midrib with 5 pairs of obscure nerves, bluntly acute, base subcuneate to obtuse; petioles short. Flowers ovoid when young, finally spreading, pedicelled, greenish yellow; petals larger than calyx segments, fimbriate. Fruits ovoid or subglobose, 1 cm long, concave at apex, deeply 5-lobed, reddish.



Figure 100. *Euonymus javanicus*: 1. fruiting twig; 2. fruit bunch; 3. flower; 4. sepal; 5. petal; 6. fruit; 7. fruit, vertical section; 8. fruit, dorsal view; 9. flower, vertical section; 10. seed, 2 views.

Thailand, Indochina, Hainan, Malay Peninsula, North Borneo, Celebes, Moluccas and West New Guinea. Philippines: Luzon to Palawan and northern Mindanao; in forests at low and medium altitudes.

Com. name – *Burubatuan* (Tag.).

Exsicc. – *Pancho CA 20101, 20339* (CAHP).

2. LOPHOPETALUM Wight ex Arnott

Shrubs or trees. Leaves opposite, entire; stipules hair-like, tufted, caducous. Flowers in cymose panicles; calyx obtusely 5-lobed, lobes short, rounded; petals continuous with large flat disc or inserted under disc margin, sometimes crested or papillose on upper surface; stamens isomerous, inserted on disc, entire or lobed; ovaries small, immersed in fleshy disc and continuous with it, trigonal or pyramidal, 3-celled; stigmas obscure; ovules 4-10 in each cell, arranged in two series. Capsules oblong, 3-lobed, winged or angular, loculicidally dehiscent; seeds few, oblong, flat, attached at middle, rarely winged.

Species 18; India, Burma, Thailand, Indochina and Malesia (except the Lesser Sunda Islands and East Java); 1 in the Philippines.

1. *Lophopetalum javanicum* (Zoll.) Turcz., Bull. Soc. (Imp.) Nat. Hist. Mosc. 36: 598, 1863, as *javanum*; Ding Hou, Fl. Mal. I, 6: 269, 1962.
 – *Solenospermum javanicum* Zoll., Nat. Tijd.N. I, 14: 169, 1857.
 – *Lophopetalum toxicum* Loher, Ic. Bog. 1: 55, t.16, 1897.
 – *L. paucinervium* Merr., Philip. J. Sc 20: 402, 1922.

Trees medium-sized. Leaves elliptic-oblong, 10 x 7 cm, stout midrib with 5-8 pairs of ascendingly curved nerves, margins often rugose, obtuse or short and bluntly acute, base rounded; petioles 1 cm long, canaliculated. Panicles terminal or in upper leaf axils, equaling or exceeding foliage. glabrous, brown when dry; flowers greenish white, 5-merous; pedicels subtended by bract vestiges; ovules 5-8 in each cell. Fruits leathery, smooth or sometimes minutely tuberculate, 12 x 3.5 cm.

Thailand to Malesia. Throughout the Philippines; forests at low and medium altitudes; in Makiling, Luzon, at 150-400 m.

Com. name – *Dayangdang* (Tag.).

Exsicc. – *Villamil BF 20198, 560603* (US).

3. PERROTTETIA Bonpland & Kunth

Shrubs or small trees. Leaves alternately scattered; stipules small, triangular, caducous. Inflorescences paniculately cymose, usually solitary in leaf axils; flowers minute, bisexual or unisexual; calyx usually cup-shaped or depressed-spherical with 5 short, erect points; petals a trifle longer than calyx; disc smooth, cupular or saucer-shaped, entire or finely indented; stamens inserted at edge of disc, exceeding petals in staminate flowers, very short in pistillate; filaments filiform; anthers versatile; ovaries ovate, flask-shaped or ovate, 2- to 4-celled; styles short; stigmas parted; ovules 1 or 2 in each cell. Fruits berry-like, fleshy, spherical; seeds rounded, surrounded by membranous aril.

Species 15; Mexico, Colombia, central China through Malesia to northeastern Queensland, the Solomons and Hawaiian Islands; 1 in the Philippines.

1. *Perrottetia alpestris* (Bl.) Loesen. in E. & P. Pfl. Fam. 3: 220, 1892; Merr., En. Philip. 2: 484, 1923. – *Celastrus alpestris* Bl. ssp. *philippinensis* (Vid.) Ding Hou, Fl. Mal. I, 6: 291, f. 21, l, j, 1962. – *Caryospermum philippinense* Vid., Rev. Pl. Vasc. Filip. 89, 1886.

Leaves diverse in size, ovately oblong, 10 x 4 cm, midrib prominent with 7-10 pairs of ascending nerves with anastomosing ends, acuminate, rounded basal portion entire, otherwise serrate; petioles 5-15 mm long. Inflorescences profuse in upper leaf axils, equaling leaves or longer, numerous, branched, glabrate; flowers greenish white; pedicels short, subtended by bracteoles. Fruits berry-like, shiny, globose, 3-5 mm in diameter, juicy, subtended by persistent calyx.

Borneo, Celebes and Java. Throughout the Philippines, in rocky or open places in mossy forests; in Mt. Makiling, Luzon, mostly on exposed ridges in the mossy forest.

Com. name – *Bubayug* (Ig.).

Exsicc. – *Elmer 18037, 1237520* (US).

3. REISSANTIA Malle

Lianas, shrubs scandent or erect, trees rarely small. Leaves decussate. Inflorescences axillary, dichotomously cymose or rarely paniculate; flowers small; calyx lobes 5, imbricate; petals 5, imbricate, erect or suberect at anthesis; disc inconspicuous, usually united with ovary, uppermost part

slightly extended like a rim; stamens 3, inserted at base of pistil; anthers transversely oblong, extrorse; ovaries 3-celled; styles short; stigmas obscure; ovules 2, rarely 4-8 in each cell. Fruits capsular, of 3 divergent, inconspicuous median sutures; seeds with transparent, membranous basal wing.

Species 7, Central and West Africa and Indo-Malesia; 8 in the Philippines.

1. *Reissantia grahamii* (Wight) Ding Hou, *Blumea* 12: 33, 1963, *Fl. Mal.* 1, 6: 402, f. 29, 1964. – *Hippocratea grahamii* Wight, *Ill. Ind. Bot.* 134, 1839. – *H. megalocarpa* Merr., *Philipp. J. Sc.* 13(Bot.): 20, 1918.

Lianas or scandent shrubs. Leaves broadly elliptic, 7-13 x 5-10 cm, prominent midrib with 5-6 pairs of nerves, entire or remotely crenulate, apex short-acuminate, sometimes obtuse or rounded, base cuneate or rounded; petioles short, stout. Inflorescences paniculate or thyriform, 4-12 cm long, many-flowered; peduncles 3-5 cm long; bracts deltoid, lacinulate; pedicels 0.5-1.75 mm. Flowers pale yellowish green, divided at base; lobes suborbicular, slightly curved inward at anthesis, erose; disc slightly 5-angular; ovules 4-7 in each cell. Follicles hard, flattened, elliptically oblong, 10 x 4 cm, upon short thick stalks. apex rounded; base obtuse. subequally narrowed at both ends; seeds oblong-lanceolate, 6-10 x 1.5-2.5 cm.

India, Burma, Thailand through Malesia. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests up to 350 m.

Com. name – *Lagotoc* (Tag.).

Exsicc. – *Mabesa 1375810* (US) (photograph of Lectotype, as *Hippocratea megalocarpa* Merr.).

87. SIPHONODONACEAE

Trees or lianas. Leaves alternate, petiolate, crenate-serrate or subentire; stipulate minute, caducous. Flowers in axillary peduncles, 3-4, umbelliform, pedicels short, bracteate; sepals 5, imbricate, petals 5, free, imbricate, erect-spreading; stamens 5, inserted below and arcuate over disc; anthers 2-locular, short, opening lengthwise; disc large and hemispherical, entirely covering carpels with small opening at top through which protrudes tip of floral axis; carpels embedded in disc, styles adnate to inner wall of disc tube; ovules solitary in each carpel. Seeds with bony endosperm, cotyledons large, foliaceous, orbicular, subcordate at base.

One genus with about 7 species. Tropical Asia from Bengal and Little Cocos Island through Malaysia to the Philippines and in East Queensland; 2 species in the Philippines.



Figure 101. *Siphonodon celastrineus*: 1. flowering branch; 2. inflorescence; 3. flower, vertical section; 4. flower, petals removed to show connivent stamens; 5. ovary, cross section; 6. fruit; 7. stamens; 8. flower, top view, lobes and petals removed.

1. SIPHONODON Griffith

Trees. Leaves alternate, short-petioled, entire or crenate; stipules minute, deciduous. Inflorescences axillary, subcymosely few-flowered; peduncles short; flowers very small, 5-merous; calyx 5-cleft; petals spreading; disc not distinct from base of calyx; stamens 5, isomerous, connivent around pistil; filaments flattened; ovaries half immersed, conical, depressed at top; stigmas sessile, lying in concavity; cells numerous, in 2-4 series, each with single ovule. Fruits ovoid or globose, hard, fleshy of uniform pulp throughout; seeds small, achene-like, irregularly placed, imbedded in mass which upon drying becomes brittle and easily crumbles.

Species 2; Malaysia, Philippines and Australia.

1. *Siphonodon celastrineus* Griff., Calc. J. Nat. Hist. 4: 247, t. 14, 1844; Ding Hou, Fl. Mal. Ser. I, 6: 394, f. 24, a-f, 25, 1964. **Figure 101**

Trees, up to 30 m high. Leaves oblong, 16 x 6 cm, lucid, midrib prominent with pairs of obscure nerves, reticulations evident, obtuse or short-acute, base obtuse to rounded; petioles 1 cm long, canaliculated. Flowers white, subsessile, few-clustered at ends of obscurely branched or unbranched, 1-cm long, thick, axillary stalks, relatively small, falling off early and leaving raised circular scars. Fruits ellipsoid or obovoidly globose, 2-3 cm long, with sunken apex, pale green, glabrous, hard occasionally a trifle rugose; pedicels 5 mm long.

India, Burma, Thailand, Indochina and Malesia. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly in lowlands.

Com. name – *Matang-ulang* (Tag.).

Exsicc. – *Bulalacao & Ordoño CA 1693; Gates CA 1694; Hermoso CA 3180; Peña de la CA 8148*, Velasco CA 1691 (CAHP); Whitford BF 19672, 900742 (US).*

88. STAPHYLEACEAE

Trees or shrubs. Leaves opposite; stipules interpetiolar, 2 to each node; leaflets opposite, serrulate, shiny and subcoriaceous, stipelate. Panicles large, terminal and in upper leaf axils; flowers small; calyx deeply 5-partite, persistent, imbricate; petals nearly orbicular; stamens inserted outside lobed or crenulate, raised, large disc; filaments flattened; anthers short; ovaries sessile, 3-lobed; styles 3, distinct or combined; stigmas subcapitate; ovules 2 and together, or when more, in 2 rows. Fruits subglobose, indehiscent, leathery or chartaceous; seeds few to many, hard or crustaceous without aril.

Species 40, pantropic; 5 in the Philippines.

1. **TURPINIA** Ventenat, *nom.cons.*

1. *Turpinia pomifera* (Roxb.) DC., Prodr. 2: 3, 1825; v. d. Linden, Fl. Mal. I. 6: 58, 1960. – *Dalrympelea pomifera* Roxb., Hort. Beng. 17, 1814, *nom. nud.*, Pl. Corom. 3: 76, t.279, 1819. – *Turpinia ovalifolia* Elm., Leaflet. Philip. Bot. 2: 490, 1908. **Figure 102**

Trees medium-sized. Leaves 3-, 5-, 7-, 9-foliolate; leaflets elliptic-oblong, 16 x 6 cm, abruptly acute to acuminate, entire at obtusely rounded base, otherwise finely serrate; petiolules 1.25 cm long. Inflorescences erect, spreading, greenish white, shiny glabrous, equaling foliage, slenderly branched from near base; flowers pale white; pedicels short, minutely bract-subtended, less than 5 mm across. Fruits subglobose, 1.25 cm across, glabrous, greenish, top portion few-apiculate.

Continental Asia to Malesia. Throughout the Philippines, in primary forests at low and medium altitudes, up to 2200 m; in Mt. Makiling, Luzon, scattered, but sometimes locally abundant.

Com. name – *Anongo* (S.-L. Bis.).

Exsicc. – *Stern CA 12889*,* (CAHP); *Ponce 33458* (PNH); *Elmer 629883* (photograph of Lectotype, as *T. ovalifolia* Elm.); *Foxworthy's collector BS 21*, 1-0991605 (US).

89. ICACINACEAE

Trees, shrubs or large climbers, seldom herbs. Leaves alternate, rarely opposite, simple, estipulate. Flowers bisexual, rarely unisexual by abortion, actinomorphic, small, in paniculate cymes or cymose heads, terminal or axillary; calyx hypogynous, minute or wanting, 4- or 5-toothed; petals 5, rarely 4, mostly free, occasionally united; valvate or slightly imbricate, tips inwardly bent; stamens as many as and alternating with petals, anthers 2-celled, splitting longitudinally on inner or lateral sides; filaments subulate, glabrous or densely hairy toward top; disc when present, saucer-shaped or 5-lobed; carpels seldom 5, occasionally united into 2; ovaries 3- or 5-celled, each with 2 ovules or subcapitate. Fruits chiefly drupaceous, seldom wing-like, 1-celled with solitary seed.

Genera 30, species 200, pantropical; 11 genera and 30 species in the Philippines.

1. Shrubs or trees erect
 2. Fruits salmon-red, with persistent glandular ring; filaments bearded 1. *Stemonurus*
 2. Fruits purplish black, without ring; filaments beardless 2. *Gonocaryum*
1. Shrubs sprawling or scandent
 3. Leaves opposite; infrutescences spreading; drupes 2 cm long or less 3. *Iodes*
 3. Leaves alternate; infrutescences pistillate, capitate; drupes 5 cm long or more 4. *Phytocrene*

1. STEMONURUS Blume

Trees or shrubs. Leaves alternate, entire, petiolate. Inflorescences axillary or extra axillary with minute bracts; flowers unisexual, small, articulated in 2- to 3-chotomized cymes, few-flowered in pistillate and with more flowers in staminate; calyx short-campanulate, lightly dentate to almost entire; petals 4 or 5 forming a confluent tube, apices valvate with inflexed appendages, reflexed after anthesis; stamens exerted after anthesis in staminate, included in pistillate; pistils in staminate, small with single locule and two rudimentary ovules; pistils in pistillate cylindrical with single locule and two pendulous ovules. Fruits drupes, glandular ring persistent, excentric; seeds solitary with a raphe.

Species 12, Indo-Malesia; 2 in the Philippines.

1. *Stemonurus luzoniensis* (Merr.) Howard, J. Arn. Arb. 21: 468, 1940.
 – *Urandra luzoniensis* Merr., Philip. J. Sc. 3(Bot.): 242, 1908.
 – *Gomphandra luzoniensis* (Merr.) Merr., En. Philip. 2: 498, 1923.

Trees. Leaves alternate, coriaceous rather numerous, elliptic, entire, 10 x 6 cm, midrib pronounced below with 3-5 pairs of nerves, tip rounded, usually with short blunt point, obtusely rounded or subcuneate-strigose. Inflorescences olivaceous strigose, cymosely paniculate, axillary or terminal, 5-8 cm long, brachlets short and terminal; calyx broadly cup-shaped, glabrous; petals pale white, columnar in bud state; filaments bearded. Fruits 2 cm long, glabrous, subterete, bluntly narrowed at both ends, longitudinally striate when dry, apical or stigmatic portion rugulose, turning salmon-red.

Endemic. Philippines: Northern to Central Luzon, Mindoro, Marinduque and Palawan, in primary forests at low altitudes; in Mt. Makiling, Luzon, in the vicinity of Mudspring, about 300 m altitude.

Com. name – *Mabunot* (Tag.)

Exsicc. – *Gates CA 1698* (CAHP); *Bañes 33439* (PNH), *2212444* (US.)

2. GONOCARYUM Miquel

Trees or shrubs. Leaves alternate, coriaceous, petiolate. Flowers polygamous in long, axillary spikes or short, axillary racemes, dimorphous; sepals 5, distinct, imbricate; corolla much longer than calyx, gamopetalous, tubular, crowned with 5 acute spreading teeth; stamens 5, alternate with petals, filaments adnate to the latter, anthers oblong, bilocular, ovaries ellipsoid, seated upon glabrous annular disc, 1-celled; styles subulate; ovules 2, pendulous. Drupes dry or coriaceous, 4 or more, obscurely and longitudinally ridged, normally 2-celled, 1-celled by abortion, epicarp membranous or leathery, endocarp papery with few hairs; seeds solitary, obscurely compressed.

Species 4, Indo-Malaysia; 2 in the Philippines.

1. *Gonocaryum calleryanum* (Baill.) Becc., *Malesia* 1: 123. 1877; Li, *Woody Fl. Taiwan* 481, f. 185, 1963. – *Phlobocalymna calleryanum* Baill., *Adansonia* 9: 147, 1869.

Trees small. Leaves glabrous, shiny above, paler beneath, rotund or subelliptic, 8-10 x 5-7 cm, orbicular to broadly ovate, veins with about 3-6 pairs of ascending nerves, acute, cymosely columnar; filaments beardless. Fruits nut-like, smooth, turning purplish black, usually short-ellipsoid, up to 3 cm long.

Taiwan to the Philippines (Bakan Island and Luzon). In primary forests at low and medium altitudes; in Mt. Makiling, Luzon, in the vicinity of Mudspring.

Com. names – *Taingang-babui*, *Malapingan* (Tag.).

Exsicc. – *Cabebe* CA 1696; *Stern* CA 12111; *Bates* CA 1695 (CAHP); *Elmer* 18356, 1237723; *Rivera* 33463 (PNH), 2212543 (US); *Elmer* 2317, 854536 (US).

3. IODES Blume

Shrubs scandent, hairy. Branches with lateral, long, shortly bifid tendrils. Leaves opposite with subcordate-rounded base; penninerved. Inflorescences cymose, axillary or sublateral, lower peduncles often sterile and cirrhous; flowers unisexual, minute; pedicels thick; calyx small, cup-shaped, 5-lobed; corolla 5-lobed, valvate, long hairy outside; stamens hypogynous, alternating with petals; anthers basifixed, bilocular, introse, dehiscent longitudinally; pistils rudimentary; pistillate flowers with staminodes; ovaries sessile, unicellular with 2 collateral, pendulous ovules; stigmas sessile, discoid or 5-lobulate. Drupes surrounded by non-acrescent calyx with fleshy exocarp; stone 1-seeded.

Species 8, tropical Africa and in the Indo-Malaysian region; 1 in the Philippines.

1. *Iodes philippinensis* Merr., Philip. J. Sc. 3(Bot.): 241, 1908, En. Philip. 2: 492. 1923. – *I. ovalis* Baill. in DC. Prodr. 17: 22. 187, *quoad* Philip. non. Bl.

Plants sprawling with lianous stems. Main branches repeatedly branched, puberulous, often with tough tendril-like branchlets from axils. Leaves ovate or smaller ones broadly lanceolate, 10 x 6 cm, midrib with 3-5 pairs of ascendingly curved nerves, olivaceous-pubescent beneath, sharply acuminate; base rounded or occasionally slightly cordate, shortly petioled. Flowers in few cymose clusters from ends, slender, usually curved, axillary peduncles, similarly pubescent, small greenish white. Fruits hairy, subellipsoid, up to 1.5 cm long, candy-red with juicy skin; seeds blunt at both ends, compressed with few longitudinal costae.

Endemic. Philippines: Southern Luzon to Mindanao; in thickets at low altitudes; in Mt. Makiling, Luzon, mostly in thickets at low altitudes.

Com. name – *Tigbao* (P.Bis., S.-L. Bis.).

Exsicc. – *Pancho CA 20294* (CAHP); *BS 1709* (PNH), type of *I. philippinensis*.

4. PHYTOCRENE Wallich

Lianas. Leaves alternate, petioled, entire or lobed, 3- to 7-nerved. Flowers unisexual, axillary or lateral on old wood; staminate in small globose clusters borne on long, racemes pendulous spikes or panicles, involucrate; perianth of 4-5 free or united segments, valvate; stamens as many as perianth segments, alternating with them; filaments hypogynous; anthers bilocular, introrse; pistillate in large globose heads, without involucre; perianth as in staminate, persistent in fruit; ovaries glabrous, imperceptibly passing into thick, long-hairy styles; stigmas 2- to 4-lobed. Drupes many, forming large, globose, dense heads; stone hard, 1-celled, 1-seeded, covered by bristly or echinate subchartaceous exocarp, pitted.

Species 1, Indo-Malesia; 1 in the Philippines.

1. *Phytocrene macrophylla* (Bl.) Bl., Rumphia 4: 36. 1849; Sleumer, Fl. Mal. Ser. I, 7: 86, 1971. – *Gynocepalum macrophyllum* Bl., Bijdr. 483, 1825. – *Phytocrene blancoi* (Azaola) Merr., Philip. J. Sc. 2(Bot.): 432, 1907. – *Kadsura blancoi* Azaola in Blco., Fl. Filip. ed. 2, 594. 1845.

var. *macrophylla*

Figure 103

Climbers coarse. Branches flexible, roughened and frequently longitudinally striate, tips slightly pubescent. Leaves chartaceous, diverse in size, usually ovate, 18 x 12 cm, lateral nerves with 3-5 pairs of nerves, reticulations prominent,

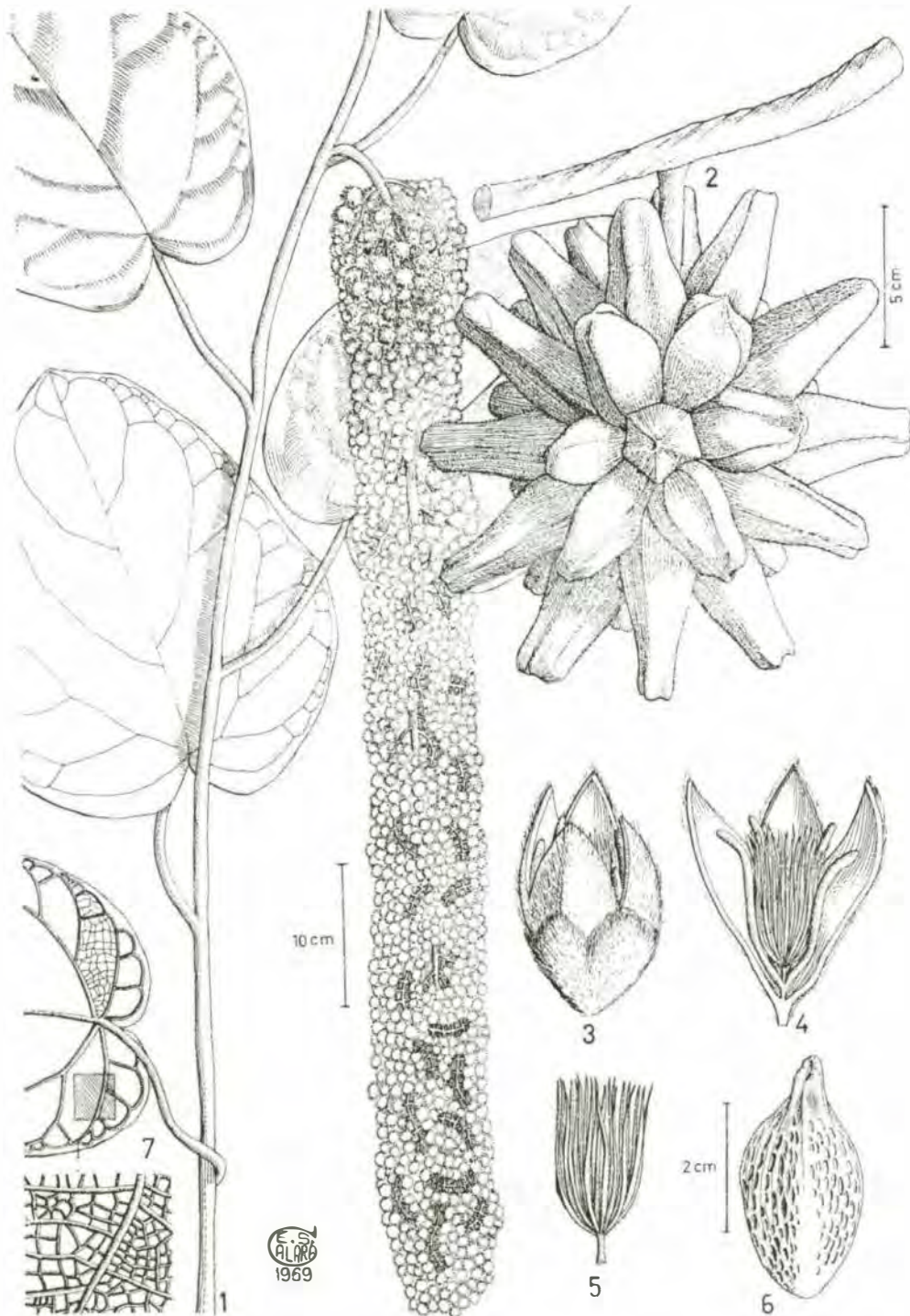


Figure 103. *Phytocrene macrophylla* var. *macrophylla*: 1. flowering branch; 2. fruits; 3. staminate flower; 4. staminate flower, vertical section; 5. hairs; 6. seed; 7. nether surface of leaf.

prominent, sharply acute, base cordate; petioles 5-15 cm long, sparsely hairy. Staminate inflorescences velvety dark brown-pubescent; pendulous from axils, 30-50 cm long with short lateral branches from rachis, forming a dense elongated cluster; pistillate in capitate laterally-attached heads. Fruits upon short thick stalks, yellowish, 7 x 3 cm, hispidly brown-pubescent; apical portion sterile, basal part with an almond-like seed.

Philippines: Central to southern Luzon, Palawan and Mindanao; in thickets and forest at low and medium altitudes, in Mt. Makiling, Luzon, often climbing on big trees in the lowlands up to 400 m. altitude.

Com. name – *Olo-olo* (Bag.).

Exsicc. – *Pancho* CA 9040, 9021, 10470* (CAHP); *McGregor* BS 23100, 1058820 (US).

90. RHAMNACEAE

Trees or shrubs, erect or scandent, unarmed or with stipular or ramal thorns. Leaves simple, alternate, seldom opposite or nearly so, 3- to 5- nerved; stipules small, deciduous, often transformed into prickles. Flowers bisexual or polygamous, minute, in axillary or terminal cymes, greenish; calyx 4- or 5-lobed; lobes triangular, erect or recurved, usually carinate within, valvate; petals 4 or 5, rarely absent, inserted on throat of calyx tube, cucullate or involute, shorter than calyx segments; stamens 4 or 5, inserted with petals and opposite them, frequently enclosed within their folds; anthers versatile, 2-celled, longitudinally dehiscent; disc fleshy, completely occupying calyx tube, entire or lobed, glabrous, rarely tomentose; ovaries superior, half inferior or inferior, 2- to 3- rarely 1-celled; styles short, simple, 2- to 4-cleft; ovules solitary, erect, anatropous. Fruits free or girded at base or middle by adhering calyx tube, capsular or drupaceous, 1- to 4-celled; seeds rarely exalbuminous; embryo large, erect.

Genera 55, species 500 of wide temperate and tropical distribution; 9 genera and 27 species in the Philippines.

1. Plants armed with sharp, straight or recurved prickles 1. *Ziziphus*
1. Plants unarmed
 2. Tendrils present; fruits with 3 short wings 2. *Gouania*
 2. Tendrils absent, fruits with 1 long wing 3. *Ventilago*

1. ZIZIPHUS* Miller

Trees or shrubs, frequently scandent and sprawling, usually with sharp, straight or recurved prickles. Leaves sometimes 2-ranked, alternate, entire or toothed, prominently 3-veined. Flowers in fascicles or sessile pedunculate cymes, axillary, small, perfect; calyx 5-lobed, lobes spreading or reflexed, tube broadly conical; petals as many as calyx lobes, rarely absent, deflexed; disc 5- to 10-lobulate, flat or pitted with free margin; stamens 5; ovaries sunken in and confluent at base with disc, usually 2-celled; styles 2, free, more or less united. Fruits dry or fleshy with bony or woody 1- to 4-celled stone containing so many seeds; seeds exalbuminous, plano-convex.

Species 45, in temperate and tropical regions of both hemispheres; 9 in the Philippines.

1. Shrubs scandent; cymes strigose or glabrate, scarcely exceeding petioles; fruits 1 cm long or shorter..... 1. *Z. cumingiana*
1. Trees; cymes brown-tomentose, half as long as leaves; fruits 1.25 cm, short, brown-tomentose 2. *Z. talanai*

1. *Ziziphus cumingiana* Merr., Philip. J. Sc. 1: Suppl. 206. 1906; En. Philip. 2: 522, 1923. **Figure 104**

Shrubs scandent with spiny stems and branches. Leaves in alternating distichous rows, ovate, 6 x 3 cm, mainly 3-nerved, outer pair of which with several secondary nerves along side, abruptly acute to acuminate, base obliquely rounded; petioles 5-8 mm long, glabrous or brown-pubescent. Cymes strigose or glabrate, scarcely exceeding petioles; flowers greenish with yellow tinge, few-fascicled; pedicels slender, subtended by setaceous acuminate bracts. Fruits hard, glabrous, obovoidly globose, 1 cm long or shorter, green, set upon a turbinate calyx rim.

Throughout the Philippines, in thickets and secondary forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly in secondary forests at low altitudes.

Com. name – *Maladuklap* (Tag.).

Exsicc. – *Pancho* CA 3272; *Lugod* CA 606*(CAHP); *Foxworthy's collector* BS 27, 1091617 (US).

2. *Ziziphus talanai* (Blco.) Merr., Sp. Blanc. 244, 1918; En. Philip. 2: 523. 1923. – *Rhamnus talanai* Blco., Fl. Filip. 171, 1837.

Trees erect, large. Young stems sharply spiny, when old covered with brown-checked bark, older branches spineless. Leaves ovately oblong or short-elliptic, 12 x 7 cm, stoutly 3-veined, outer veins with many ascending lateral

*This is the original spelling, not *Zizyphus*.

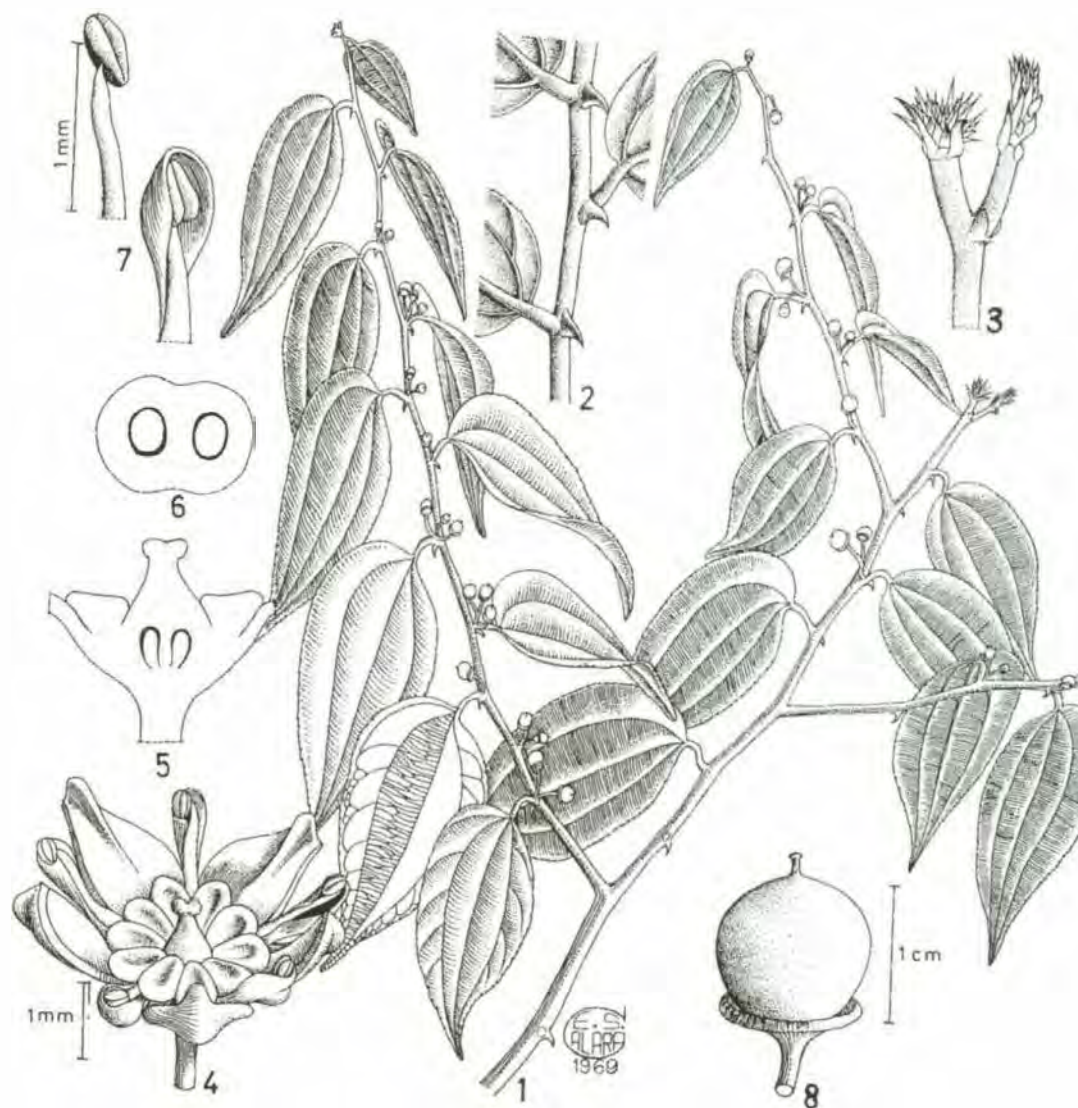


Figure 104. *Ziziphus cumingiana*: 1. fruiting branch; 2. portion of branchlet with stipular thorns; 3. tip of branchlet; 4. flower; 5. ovary, vertical section; 6. ovary, cross section; 7. stamens; 8. fruit.

nerves along outer side; midvein with 1-3 secondary pairs of nerves toward top, soft-pubescent on paler surface, bluntly acute, base obliquely rounded or truncate; petioles 1 cm long. Cymes one half as long as leaves, brown-tomentose; flowers white; pedicels subtended by bract vestiges. Fruits globose, 1.25 cm in diameter, short-brown-pubescent with small, flat calyx rim.

Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Balakat* (Tag., Pamp.).

Exsicc. – *Lugod* CA 7028 (CAHP).

2. *GOUANIA* Jacquin

Shrubs unarmed, erect or climbing with axillary tendrils. Leaves alternate, ovate or ovate-oblong, entire or serrulate, 3- to 5-nerved. Flowers bisexual, in axillary or terminal spikes; rachis often cirriferous, fasciculate in subsessile clusters, subtended by linear, fugacious bracts; calyx superior, 5-lobed, short tube obconic; petals 5, inserted below margin of disc, hooded; stamens as many, enfolded by petals; disc filling calyx tube, 5-angled or stellate; ovaries completely sunken in disc, 3-celled; styles 3-cleft. Fruits inferior, coriaceous, 3-winged, crowned by persistent limb of calyx, emarginate at apex with blunt stigmatic point, stout exocarp separating from central axis thereby exposing winged seeds.

Species 30-40, throughout the tropics but chiefly American; 2 in the Philippines.

1. *Gouania tiliaefolia* Lam., Encycl. 3: 5, 1789; Merr., En. Philip. 2: 526, 1923. – *G. microcarpa* Rolfe, J. Bot. 23: 211, 1885.

Shrubs scandent. Leaves frequently opposed by smooth, recurved, hairy tendrils, ovate, 4.5-10 cm; midvein with 3-5 much-ascending nerves on lateral nether side, minutely serrate toward sharply acute to acuminate apex, entire base cordate or rounded; petioles 5-25 mm long. Panicles profuse, terminal; basal branches subtended by reduced leaves, tawny-tomentose, main long branches with numerous very short branchlets; flowers dingy white, subsessilely clustered in capitate heads. Fruits short-stalked, glabrous, 5-8 mm across.

India to the Mascarene Islands, Indochina and Malaysia. Throughout the Philippines, in thickets at low and medium altitudes.

Com. name – *Litiran* (Tag.).

Exsicc. – *Pancho* CA 20343, 20393 (CAHP).

3. VENTILAGO Gaertner

Shrubs scandent. Leaves alternate, sub-bifarious. Flowers bisexual, small, in axillary cymes or terminal panicles, 5-merous, scattered in small fascicles; calyx bifid, spreading lobes ventrally keeled, tube obconic; petals triangular or cucullate, enveloping stamens, hooded or spatulate; stamens 5, adnate to base of petals; disc 5-lobed, margin free; ovaries 2-celled with short conical styles; stigmas 2, sunken in disc. Fruits samaroid, nut portion globose, girded at base or middle by adhering calyx tube, 1-celled, 1-seeded, prolonged above into linear to linearly oblong, brown-coriaceous wings; seeds solitary, small, exalbuminous.

Species 12, mostly paleotropical, few in tropical West Africa; 8 in the Philippines.

1. Leaves obscurely crenate; flowers densely clustered; fruits finely tomentose 1. *V. oblongifolia*
 1. Leaves entire; flowers loosely clustered; fruits glabrous..... 2. *V. dichotoma*

1. *Ventilago oblongifolia* Bl., Bijdr. 1144, 1827; Merr., En. Philip. 2: 521, 1923.

Tree climbers or large. Leaves oblong or ovately so, 12 x 4 cm; midrib pronounced with 5 pairs of lateral much-ascendingly curved nerves, obscurely crenate, acuminate but with blunt point, rounded at base; petioles 3-5 mm long. Inflorescences short-pubescent, terminal, of few to several spicate racemes, up to 15 cm long; flowers yellowish green, densely clustered, short-pedicelled. Fruits upon pubescent calyx torus, light brown wing similarly pubescent especially toward base, 3-4 x 0.6-1 cm, rounded at apex.

Java. Philippines: Luzon, Mindoro to Palawan; in thickets at low altitudes; in Mt. Makiling, Luzon, in open wooded areas at low elevations.

Com. name – *Pakpak-tutubi* (Tag.).

Exsicc. – *Velasco CA 1728; Villamil CA 1727 (CAHP); Villamil BF 21407, 903115 (US)*.

2. *Ventilago dichotoma* (Blco.) Merr., Publ. Gov. Lab. Philip. 27: 32, 1905; En. Philip. 2: 521, 1923. - *Enrila dichotoma* Blco., Fl. Filip. 709, 1837.

Shrubs liana-like. Leaves oblong, 10 x 3 cm; midrib with 7-10 pairs of ascendingly curved nerves, reticulate on both ends, entire, acuminate, obtuse or obtusely rounded at base; petioles 3-5 mm long. Inflorescences terminal, of several much-elongated, spicate racemes up to 15 cm in length, puberulent; flowers yellowish green, in loose clusters, distinctly pedicelled. Fruits short-

stalked, basal portion globose, 5-7 mm in diameter, one half enclosed by cup-like calyx; terminal or winged portion 4 x 1 cm, lighter brown, apex rounded, base as wide as basal seed portion, median conspicuous sides obscurely reticulate.

Endemic. Philippines: Luzon to Palawan; in thickets and forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-350 m.

Com. name – *Salapau* (Tag.).

Exsicc. – *Mabesa* BF 26838, 1376321; *Elmer* 17671, 1237247 (US).

91. VITACEAE

Trees, erect shrubs or vines, climbing by means of leaf-opposed tendrils. Stems and branches cylindrical, angled or compressed, rarely spiny. Leaves alternate, simple, toothed or lobed, digitately or pedately 3- to 9-foliolate or 1- to 3-pinnate. Flowers regular, bisexual or unisexual, usually cymose or corymbose, umbellately to paniculately or racemosely arranged; calyx small, entire or 4- or 5-toothed; petals 4 or 5, free or cohering, valvate; stamens as many, opposite petals, inserted at base of disc or between its lobes; anthers free or connate, extrorse; disc free or connate with stamens or ovary; ovaries 2- to 6-celled; styles short or none; ovules 1 or 2 in each cell. Fruits 1- to 6-celled berries; seeds with small embryo and copious endosperm.

Genera 12, species 500, mostly in the tropical and subtropical regions; 8 genera and 67 species in the Philippines.

- 1. Leaves simple.....1. *Cissus*
- 1. Leaves trifoliolate
 - 2. Flowers 5-merous 2. *Ampelocissus*
 - 2. Flowers 4-merous
 - 3. Stigmas entire 3. *Cayratia*
 - 3. Stigmas 4-lobed 4. *Tetrastigma*

1. CISSUS Linnaeus

Shrubs scandent or herbs creeping, tendrils simple or bifid at top, not ending in an adhesive disc. Stems and roots often with enlarged nodules. Leaves simple. Cymes mainly corymbose, usually leaf-opposed. Flowers bisexual, 4-merous; petals 4, thin, spreading in anthesis, rarely adnate and falling off as a whole; disc 4-lobed or saucer-shaped, adnate to base of ovary; styles filiform; stigmas inconspicuous, entire, each of 2-celled ovary with 2 ovules. Fruits fleshy 1- to 4-seeded berries; seeds ovoid or 3-angled, grooved on ventral sides.

Species 350, in the tropics of both hemispheres; 8 in the Philippines.

3. *Cissus simplex* Blco., Fl. Filip. 72, 1837; Merr., En. Philip. 3: 7, 1923.
– *C. pyrrhodasys* Miq., Fl. Ind. Bat. Suppl. 517, 1861-62.

Vines suffrutescent, twigs puberulent. Leaves 7-12 cm; terminal ones smaller, digitately 5-veined, usually ferruginous-pubescent on lower surface; margins cuspidately serrate, abruptly sharp-acute at apex, cordately ovate at base; petioles 3 cm long. Cymes peduncled in upper leaf axils, equaling leaves, rusty brown-pubescent, subumbellately clustered, short-pedicelled; petals finely hairy as calyx; ovaries nearly glabrous. Fruits globose, 1 cm in diameter, fleshy, purplish when ripe, with single large seed.

India through Malay Peninsula and New Guinea. Throughout the Philippines; widely scattered in thickets in dry places at low and medium altitudes.

Exsicc. – *Pancho CA 20461* (CAHP).

4. *Cissus adnata* Roxb., Fl. Ind. 405, 1820; Merr., En. Philip. 3: 6, 1923.

Climbers coarse, woody. Leaves ovate, 7-12 cm long, 5-veined from base; midvein with several pairs of nerves, subentire or finely serrate, much paler beneath, abruptly pointed, base truncate to shallowly cordate; petioles 3-8 cm long. Peduncles longer than petioles, subverticillately branched toward top, axillary or leaf opposed. Flowers yellowish green, short, slenderly pedicelled, similarly spreading, glabrous or puberulent; calyx short, truncate. Fruits juicy, purplish to nearly black when mature, globose to obovoid, 1 cm in diameter, with solitary seed.

India to Indochina, southward to Malaysia. Throughout the Philippines, along watercourses in wooded valleys.

Com. name – *Ayong-kabayo* (Tag.).

Exsicc. – *Brown BS 17932, 568358; Catalan BF 26828, 1376316; Mabesa BF 25394, 129669, 1375883* (US).

5. *Cissus repens* Lam., Encycl. 1: 31, 1733; Merr., En. Philip. 3: 7, 1923.

Vines suffrutescent. Stems readily breaking up at nodes when dry. Leaves broadly ovate, 7-12 cm long, terminal ones much-reduced with 5 pairs of lateral nerves, basal pair with secondary nerves along lower side; margins serrate, truncate or shallowly cordate at base; petioles 3-5 cm long. Cymes glabrous, scattered in uppermost leaf axils, upon peduncles not exceeding petioles, dichotomously branched; flowers pedicellate, umbellately scattered, often puberulous, small; calyx truncate, cupular or rim-like; petals twice as long as calyces; pistils glabrous. Fruits fleshy, purple, obovoid, apiculate, 6 mm long, acrid, with single seed.

India to southern China southward to Malesia. Throughout the Philippines, in thickets along watercourses.

Com. name – *Kalit-kalit* (Tag.).

Exsicc. – *Pancho CA 10033* (CAHP); *Elmer 18321, 1050076* (US).

2. **AMPELOCISSUS** J.E. Planchon, *nom. cons.*

Shrubs or herbs climbing or creeping. Roots often with turnip-like swelling. Leaves exceedingly variable in shape, simple or 3- or more-foliolate, opposite or tendril-opposed. Inflorescences on expanded panicles, rarely branched cymes or cymose panicles, cirrhiferous. Flowers bisexual or unisexual, calyx usually 5-lobed, lanceolate; petals as many as calyx lobes, expanded in anthesis; stamens on disc with 5-10 large glands; ovaries 2-celled, each cell with 2 ovules; styles short, conical, with usually 10 longitudinal furrows; stigmas inconspicuous, rarely extended; stamens adnate to disc and basal portion of petals. Berries 2- or 3-seeded; seeds fleshy, obovoidly trigonous, rounded on back, inner edge keeled.

Species 70, mainly in tropical Africa and Asia; 5 in the Philippines.

1. *Ampelocissus botryostachys* Planch. in DC., Mon. Phan. 5: 413, 1887; Merr., En. Philip. 3: 2, 1923.

Shrubs climbing, suffrutescent. Leaves opposite or alternating with tendrils or inflorescences, trifoliolate; petioles 3-5 cm long; leaflets 5-12 cm long, abruptly acute and sharply acuminate, lateral ones ovately oblong and round at base; terminal ones obovately so and broadly rounded at base, often subglaucous beneath, conspicuous midrib with 5 ascendingly curved nerves; petiolules 5-15 cm long. Paniculate racemes slenderly elongate, much-exceeding foliage, leaf-opposed; peduncles usually with tendrils; lateral branches many, glabrous or puberulent, short; flowers scattered throughout, yellowish, brown when dry, subsessile; calyx saucer-shaped; corolla much longer, broadly tubular in bud; anthers 4, free; pistils glabrous. Fruits juicy, 2- to 4-seeded, obovoidly globose, 1.25 cm long, purplish black when ripe.

Endemic. Philippines: Laguna, Quezon and Panay; in damp primary forests at low altitudes.

Com. name – *Ayong-balakbak* (Tag.).

Exsicc. – *Pancho CA 20431, 20460* (CAHP).

3. CAYRATIA A.L. Jussieu, *nom. cons.*

Climbers woody or subherbaceous; tendrils 1-3 times forked, sometimes ending in adhesive disc. Leaves 3- or 5- to 9-foliolate, opposite or alternating with tendrils. Inflorescences cymose or corymbose, axillary; flowers bisexual or unisexual, 4-merous; calyx thick, truncate; corolla lobes thinner, 4 segments spreading in anthesis, ultimately free or occasionally adnate; disc shallow, cup-shaped, subentire or 4-lobed, mostly adnate to base of ovary; styles slender; stigmas entire, minute; ovaries 2-celled, each cell biovulate. Fruits berry-like or succulent, 1- to 4-seeded; seeds with 1 or 2 deep ventral grooves.

Species 18, in southern and eastern Asia; 9 in the Philippines.

1. Inflorescences shorter than foliage, glabrous; leaflets ovately elongate to oblong..... 1. *C. geniculata*
 1. Inflorescences longer than foliage, soft-pubescent; leaflets ovate to suborbicular 2. *C. trifolia*

1. *Cayratia geniculata* (Bl.) Gagnep., Not. Syst. 1: 345, 1911; Merr., En. Philip. 3: 8, 1923. – *Cissus geniculata* Bl., Bijdr. 184, 1825. – *Columella geniculata* (Bl.) Merr., Philip. J. Sc. 11(Bot.): 132, 1916.

Vines climbing suffrutescent. Leaves trifoliolate; petioles 10 cm long; leaflets ovately elongate to oblong for terminal ones, 12 x 6 cm, midvein with 5 pairs of nerves, subentire or coarsely toothed, sharply and abruptly acute, inequilateral and truncately rounded at base; petiolules 1-3 cm long. Cymes axillary, shorter than foliage, long-pedunculate, 5-8 cm across, glabrate; flowers yellowish green, short but slenderly pedicelled; calyx rim-like; petals spreading. Fruits juicy, pink, usually with 3 large seeds, subglobose, 1.5 cm in diameter.

Indochina, Hainan, Malay Peninsula, Java, Borneo and the Moluccas. In most parts of the Philippines, in brushlands especially along watercourses.

Com. name – *Sampang* (Tag.).

Exsicc. – *McGregor BS 23189, 898116* (US).

2. *Cayratia trifolia* (L.) Domin, Bibl. Bot. 89: 371, 1927. – *Vitis trifolia* L., Sp. Pl. 203, 1753. – *Columella trifolia* (L.) Merr., Philip. J. Sc. 11 (Bot.): 134, 1916.

Figure 105

Vines scandent. Leaves trifoliolate; petioles 1-5 cm long; leaflets ovate to suborbicular, 3-5 x 2-3 cm, midrib with few obscure nerves, obscurely crenately toothed, lateral petiolules 5 cm long, terminal ones 2-3 times longer than lateral petiolules. Cymes axillary, slenderly pedunculate, exceeding foliage, short flowering branches soft-pubescent; flowers minute, greenish white, few-clustered

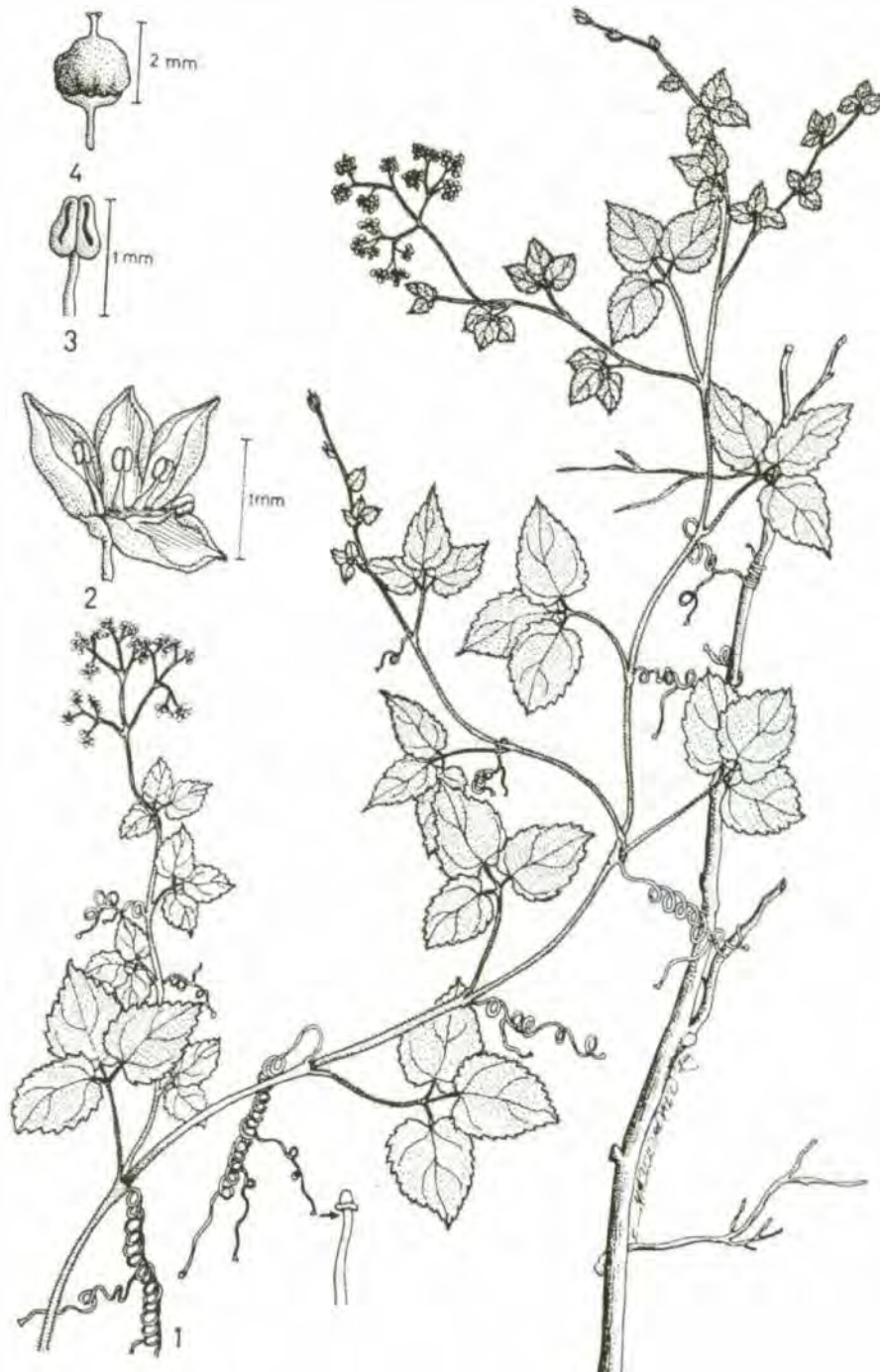


Figure 105. *Cayratia trifolia*: 1. flowering branch; 2. flower; 3. stamen; 4. fruit.

terminally and short-stalked; calyx annular. Fruits purplish black when mature, succulent, globose, 1 cm in diameter, with usually 3 stone-like seeds.

India to southern China through Malesia and the Caroline Islands. Throughout the Philippines, in thickets at low altitudes.

Com. name – *Alangingi* (Bis.).

Exsicc. – *Lugod CA 4759**; *Jarmin CA 1742*; *Ortega CA 3469* (CAHP); *Elmer 17821, 1237433* (US).

4. TETRASTIGMA (Miquel) Planchon

Shrubs climbing; tendrils entire or bifid without adhesive disc. Leaves palmately 1- to 3-foliolate or pedately 4- to 6-foliolate. Inflorescences axillary, seldom leaf-opposed, corymbose or cymose, usually puberulent; flowers bisexual or unisexual, small, 4-merous, numerous; calyx truncate, shallowly cup-shaped; petals 4, usually mucronate, thickened near apex, spreading in flower; glandular disc grown to ovary. rim scarcely free; styles very short, thick; stigmas 4-lobed, spreading; stamens 4 or 5, more or less free; ovaries 2-celled; cells 2-ovuled. Fruits fleshy 2- to 4- seeded berries; seeds ovoid or spherical, back convex with furrow along edge of inner face.

Species 45, tropical and subtropical Asia; 17 in the Philippines.

1. Leaves trifoliolate; petioles 2-5 cm long
 2. Inflorescences glabrate, 3 cm long 1. *T. loheri*
 2. Inflorescences pubescent, 8 cm long or more 2. *T. papillosum*
1. Leaves 5-foliolate; petioles 8 cm long or more..... 3. *T. harmandii*

1. *Tetrastigma loheri* Gagnep., Not. Syst. 1: 265, 1910; Merr., En. Philip. 3: 4, 1923. – *T. philippinense* Merr., Philip. J. Sc. 7(Bot.): 86, 1912.

Vines woody, climbing. Leaves trifoliolate; petioles 2-3 cm long; leaflets ovately lanceolate, 12 x 4 cm, midrib ridged beneath with lateral obscure nerves, entire or obscurely toothed toward acute apex, rounded at base. Inflorescences scattered in upper leaf axils, subglabrous, up to 3 cm long, paniculately cymose; short stalk subtended by broad, brown bracts; secondary stalks short, spreading; flowers upon 3-5 mm long pedicels; calyx subtruncate, short; corolla ovately oblong, 5 mm in length, reflexed; styles glabrous; stigmas sessile, subcapitate. Berries subellipsoid, 1 cm long, whitish with black seed.

Endemic. Throughout the Philippines, in thickets and forests at low and medium altitudes; in Mt. Maliling, Luzon, up to 1400 m.

Com. name – *Loher's ayu* (Tag.).

Exsicc. – *Blancaver CA 4790* (CAHP).

2. *Tetrastigma papillosum* (Bl.) Planch. in DC., Mon. Phan. 5: 429, 1887; Merr., En. Philip. 3: 4, 1923. – *Cissus papillosa* Bl., Bijdr. 183, 1825.

Climbers of trees, liana-like. Leaves trifoliolate; petioles 3-5 cm long; leaflets ovately elliptic, 7-12 x 3-5 cm, stout midvein with 5-7 pairs of nerves, crenately toothed, abruptly acute to subacuminate, inequilateral at rounded base. Inflorescences lax, pubescent, up to 10 cm long, short peduncles and main branches subtended by broad bracts; flowers whitish or pink, cymosely clustered toward ends of branchlets, short-pedicelled; calyx inconspicuous; petals pointed toward recurved apex. Fruits globose, averaging 7.5 mm in diameter, reddish to black.

Java, Borneo and New Guinea. In the Philippines, widely scattered in forests in the southern islands.

Com. name – *Mangiting* (Subl.).

Exsicc. – *Elmer 18064, 18382, 1050300, 1060297* (US).

3. *Tetrastigma harmandii* Planch. in DC., Mon. Phan. 5: 436, 1887; Merr. En. Philip. 3: 3, 1923. – *T. lanceolatum* Merr., Philip. J. Sc. 1: Suppl. 88, 1906, non Roxb.

Climbers of trees. Leaves 5-foliolate; petioles 10 cm long; leaflets elliptically oblong, 12 x 6 cm, midrib plain beneath with 5-8 lateral nerves, obscurely crenate or coarsely toothed, blunt-acute, obtuse to obtusely rounded at base, outer ones inequilateral; petiolules 3 cm long. Inflorescences cymosely paniculate, 3-5 cm long, axillary, olivaceous-pubescent, short peduncles and larger branches subtended by broad bracts; flowers short-stalked, yellowish or greenish white; calyx nearly obsolete; petals oblongish; stamens and pistils subglabrous. Infrutescences up to 10 cm across, glabrous; berries 2 cm wide with truncate base, otherwise globose, whitish or pinkish.

Indochina. In the Philippines, abundant at low altitudes.

Com. name – *Ayo* (Tag.).

Exsicc. – *Foxworthy's collector BS 24, 1091611; Elmer 18298, 18474, 1050298, 1050299* (US).

92. LEEACEAE

Shrubs or trees small to medium-sized, rarely herbs. Branches striate to sulcate, often herbaceous. Leaves large, odd-pinnate or decomposed, rarely simple; petioles dilated at base into sheathing stipules. Flowers bisexual, in leaf-opposed, corymbs compound, red, yellow or green; calyx 5-, rarely 4-lobed; petals as many as calyx lobes, connate at base and adhering to staminal tube, free parts revolute; stamens united at base into a 5-lobed

tube; filaments inserted between lobes of tube, inflexed; anthers free, exerted or connate and included in tube; ovaries inserted upon a disc, 3- to 6-celled; styles short; stigmas swollen; ovules solitary in each cell, erect. Berries 4- to 8-celled, 3- to 6-seeded, usually succulent, subglobose, flattened at top; seeds wedge-shaped or obscurely trigonous.

This family is distinguished from its closely related family, *i.e.* Vitaceae by the development of a complex staminodial tube and presence of one ovule in each locule of the ovary. The pollen grains are also distinctive [*cf.* C.E. Ridsdale, Fl. Mal. Ser. I, 7 (part 4):755, 1976].

Monogeneric, species 34; in Malesia extending to Queensland, Micronesia, Fiji and Sri Lanka to South China; 1 species widely distributed from tropical Africa to Madagascar; 11 in the Philippines.

LEEAE D. van Royen ex Linnaeus

Characteristics (Refer to family description).

- 1. Flowers red; leaflets finely and evenly serrate 1. *L. guineensis*
- 1. Flowers greenish white or yellowish green; leaflets otherwise
 - 2. Stems and branches spiny 2. *L. aculeata*
 - 2. Stems and branches not spiny
 - 3. Leaflets glandular beneath, subentire or distantly crenulate, abruptly acuminate 3. *L. quadrifida*
 - 3. Leaflets eglandular, coarsely dentate, long-acuminate 4. *L. philippinensis*

1. *Leea guineensis* G. Don, Gen. Hist. 1: 712, 1831; Ridsdale, Fl. Mal. I, 7 (part 4): 777, f.3, 1976. – *L. manillensis* Walp., Nov. Act. Ac. Caes. Leop.-Car. 19, Suppl. 1: 314, 1843; Merr., En. Philip. 3: 12, 1923. – *L. palawanensis* Elm., Leaflet. Philip. Bot. 5: 1851, 1913. **Figure 106**

Shrubs or trees small and crooked. Leaves 50-80 cm long, 3- to 4-pinnate, rachis and branches jointed, peduncles grooved on upper basal portion; leaflets opposite, elliptic to oblong or broadly obtuse, 5-12 x 4 cm, midvein with 5-10 pairs of much-curved nerves, finely and evenly serrate, acuminate, base narrowly or broadly obtuse; petiolules short. Inflorescences large, red, of dichotomous corymbose-cymes; many-flowered, up to 50 cm across; flowers 5-merous, 3 mm long, a few opening at a time; short pedicels and branches red, usually glabrate; petals pale yellow, tinged with red. Fruits dark red, depressed-globose, 3 mm in diameter, longitudinally 6-creased with sunken apex when dry; seeds 3-6.



Figure 106. *Leea guineensis*: 1. flowering branch; 2. leaflet; 3. portion inflorescence; 4. flower; 5. flower, vertical section; 6. stamen; 7. portion fruiting branch; 8. fruit; 9. seed, 2 views.

Tropical Africa, Madagascar, Bourbon, Mauritius, India (Madras to Assam), Burma, Thailand, Khmer, Laos, Andaman Islands, Malesia but absent in Borneo, to Taiwan and Micronesia (Palau). Throughout the Philippines, in thickets and *parang* formations; in Mt. Makiling, Luzon, common along trail to Mudspring.

Com. name – *Mali-mali* (Pamp., Tag.).

Exsicc. – *Hernaez CA 12473**; *Gates CA 1743*; *Peña de la CA 8189*; *Novero CA 7089*; *Espiritu CA 8225*; *Albayalde CA 9122* (CAHP); *Elmer 17561, 1237170*; *Serviñas BS 16920, 901684* (US).

2. *Leea aculeata* Bl. ex Spreng., Syst. Veg. 1 670, 1824; Bl., Bijdr. 197. 1825; Merr., Sp. Blanc. 247, 1918, En. Philip. 3: 10, 1923; Ridsdale, Fl. Mal. I, 7 (part 4): 773, f.3, 1976.

Shrubs or small trees, branches with straight spines. Leaves trifoliolate or decompose; leaflets opposite, terminal ones long-stalked and considerably larger, dentately serrate, except around base, oblong to subelliptic, 12 x 3-4 cm, midrib with 7 pairs of ascendingly curved nerves, acuminate, base broadly obtuse; petiolules short. Inflorescences corymbose, greenish white, 5-8 cm wide, subglabrous; peduncles slender; flowers short-pedicelled, thick calyx obscurely dentate; corolla whitish, coriaceous, twice as long as calyx, segments reflexed; anthers erect. Fruits subglobose, 1 cm across, yellowish green, obscurely 3- to 5-rugose when dry, with as many seeds. Small spines are found only on trunks and main branches..

Sumatra, Borneo, Java, the Moluccas and New Guinea (Fakfak). In most parts of the Philippines, widely scattered along streams in lower wooded regions; in Mt. Makiling, Luzon, mostly along creeks.

Com. name – *Amamali* (Sul.).

Exsicc. – *McGregor BS 23091, 105091, 1050816*; *Elmer 17673, 123249* (US).

3. *Leea quadrifida* Merr., Philip. J. Sc. 5 (Bot.):196, 1910; En. Philip. 3: 14, 1923; Ridsdale, Fl. Mal. I, 7 (part 4): 762, f.2, 1976.

Shrubs, up to 3 m high. Leaves pinnate, 40-60 cm long, rachis prominently sulcate; leaflets oblong, 15-20 x 5-6 cm, with 12 pairs of much-ascending pubescent nerves, glandular dotted beneath, subentire or distantly crenulate, abruptly acuminate, subauriculately rounded at base; petiolules 1 cm long. Inflorescences brown-pubescent in upper leaf axils, with 3-7 cm long primary branches, short-rebranched toward apex; flowers in congested clusters, greenish white, sessile; calyx slightly pubescent, 4-toothed; corolla becoming reflexed. Fruits yellowish green, 1.25 cm in diameter, 4-rugose when dry, sunken at apex.

Endemic. Originally discovered on the summit region of Mt. Makiling, Luzon; Philippines (northern to central Luzon, Bohol, Mindanao).

Com. name – *Alongmaman* (Ilk.).

Exsicc. – *Elmer 17765, 1237313* (US).

4. *Leea philippinensis* Merr., Philip. J. Sc. 1: Suppl. 89, 1906; En. Philip. 3:13, 1923. Ridsdale, Fl. Mal. I, 7(part 4): 765, f. 2, 1976. – *L. pauciflora* Elm., Leafl. Philip. Bot. 8: 3103, 1919.

Shrubs or small trees. Upper leaves simple, lower or larger ones doubly pinnate, thickly coriaceous, rachis terete; petiole channeled above, glabrous; leaflets ovately oblong to broadly lanceolate, 8-20 x 2-6 cm, midrib with 8-12 pairs of obscure nerves, coarsely dentate except basal portion, long-acuminate, base acute; petiolules 1 cm long. Cymes widely spreading, upon stout stalks, solitary or 3-clustered, opposite terminal leaf; branches glabrous, divaricate, few short ultimate ones usually brown-pubescent; flowers terminally clustered, subsessile, yellowish or whitish green; calyx stipe hairy, obscurely 4-toothed; corolla lobes oblong, glabrous; staminal tube notched. Fruits compressed-globose, 1.25 cm across, 4-seeded, turning brownish when mature.

Philippines (Luzon to Mindoro), Taiwan and Botel Tobago. In primary forests at low and medium altitudes; in Mt. Makiling, Luzon, common in the vicinity of Mudspring.

Com. name – *Kaliantan* (Tag.).

Exsicc. – *Hernaez CA 12398; Ela CA 10066; Manuel CA 9143; Gates CA1747; Lazaro CA 1746* (CAHP); *Foxworthy's collector BS 22, 1091608; McGregor BS 221816, 898308* (US).

93. ELAEOCARPACEAE

Trees or shrubs, sometimes epiphytic. Leaves simple, entire or toothed, alternate, often with domatia in nerve axils, stipulate. Flowers bisexual or unisexual, in racemes, panicles or cymes; sepals 4-5, free or connate; petals 4-5, free or connate, valvate or imbricate; stamens many, distinct, arising from a disc; anthers mostly 2-celled, dehiscing by 2 terminal pores; disc intrastaminal, often developed into an androphore; ovaries superior, 2- to many-celled; style 1, mostly lobed; ovules 2 to many in each cell, pendulous. Fruits a capsule, berry or drupe; seeds with straight embryo, endosperm copious.

Genera 9, species 275, throughout the tropical and subtropical areas of the world; 2 genera and 51 species in the Philippines.

1. Leaves distichously arranged; flowers few, together, supra-axillary; fruit a berry 1. *Muntingia*
 1. Leaves spirally arranged; flowers in few- to many-flowered racemes, axillary; fruit a drupe 2. *Elaeocarpus*

1. **MUNTINGIA** Linnaeus

Trees stellate, pubescent. Leaves toothed, inequilateral, distichous. Flowers white, solitary or in pairs; pedicels inserted above leaf axils; sepals 5, lanceolate, valvate; petals entire, obovate; stamens indefinite, free, inserted on an annular, subperigynous disc; ovaries 5- to 7-celled, ovoid, surrounded by a dense ring of white hairs; stigmas sessile, thick, sulcate-lobed. Fruits fleshy, globose, many-seeded berries.

A monotypic genus; in Mexico and South America; cultivated in many tropical countries.

1. *Muntingia calabura* L., Sp. Pl. 509, 1753; Merr., En. Philip. 3: 32, 1923.

Trees, 5-10 m high, viscid-pubescent with stellate hairs, branches spreading. Leaves distichous, oblong-ovate to broadly oblong-lanceolate, 8-13 cm long, acuminate, toothed, base inequilateral, one side rounded, other acute; stipules slender, hairy, short, deciduous. Flowers 2 cm in diameter, white, extra-axillary, solitary or in pairs; pedicels erect, 1.5-2.5 cm long; sepals 5, green, reflexed, lanceolate, long-acuminate, long; petals obovate, 1 cm long, deciduous, spreading; stamens many. Fruits globose, red, smooth, very fleshy, berries sweet, 1.5 cm in diameter, filled with numerous, small seeds.

Native of tropical America. Introduced and now naturalized throughout the Philippines, in the vicinity of human habitations, sometimes growing wild.

Com. name – Datiles (Tag., Bik.).

Exsicc. – *Estioko*, Jr CA 1763, 1765; *Aspiras* CA 1764; *Novero* CA 7084; *Champhaka* CA 8104; *Abes* CA 1766; *Desamero* CA 10823; *Orlido* CA 10824, 10825, 10826 (CAHP).

2. **ELAEOCARPUS** Linnaeus

Trees or shrubs. Leaves simple, stipulate. Flowers usually perfect, rarely polygamous, in axillary racemes or laterally clustered below foliage; sepals 5, distinct; petals 5, usually lacinate at apex, seldom entire, springing from outside of a cushion-shaped, often 5-lobed torus; stamens usually indefinite, never less than 10, arising from inside of torus, more or less in groups, opposite petals and alternating with glands of torus; anthers innate, linear, opening

by terminal pore; ovaries sessile, 2- to 5-celled, cells 2- to many-ovuled; styles columnar. Drupes with single, bony stone which is 3-, 5- or by abortion, 1-celled; seeds pendulous, 1 in each cell, with fleshy albumen.

Species 200 or more in the Old World tropics, a few in subtropical and subtemperate regions; 50 in the Philippines.

1. Leaves obovately oblong or obovate to oblanceolate
 2. Leaves obovate to oblanceolate; racemes axillary or crowded at tips of branchlets; petals glabrous except at pilose basal portion 1. *E. argenteus*
 2. Leaves obovately oblong; racemes lateral below foliage, petals appressed-hairy on exterior, finely fimbriated at apex 2. *E. monocera*
1. Leaves not obovate
 3. Flowers yellowish, at least 1 cm long; petals densely hairy 3. *E. macranthus*
 3. Flowers whitish, up to 7.5 mm long; petals glabrous at least above middle
 4. Foliage subelliptic to short-oblong
 5. Petioles up to 3 cm long; petals strigose below middle 4. *E. calomala*
 5. Petioles one half as long as 3 cm; petals glabrous 5. *E. cumingii*
 4. Foliage broadly lanceolate to linearly oblong
 6. Petioles 1-1.5 cm long, puberulous, gradually extended into blade 6. *E. ramiflorus*
 6. Petioles twice as long as 1-1.5 cm, glabrous, thickened at distal end 7. *E. pendulus*

1. *Elaeocarpus argenteus* Merr., Publ. Gov. Lab. Philip. 29: 26, 1905; En. Philip. 3:14, 1923. Figure 107

Trees small, stocky. Leaves numerous crowded, obovate to oblanceolate, 3-5 x 2-3 cm, with 5 pairs of prominent veins beneath, acute or rather blunt and slightly emarginate, base cuneate; petioles 1 cm long. Racemes equaling or exceeding leaves, axillary or crowded at tips of branchlets, erect or ascending, appressed-silvery-pubescent; flowers white, pendulous, subtended by lanceolate bracts; pedicels 5 mm long; sepals 5, lanceolate, glabrous on ventral side; petals nearly as long as pedicels, apex lacinate, glabrous except at pilose basal portion; stamens 30; filaments 1 mm long, sparingly hairy; ovaries ovoid, densely silvery-canescens, 2-celled; styles short. Fruits ovoidly ellipsoid, dark green, bluish purple when ripe; seeds longitudinally rugose.

Endemic. Philippines: (Luzon and Visayas); on high mountains; in Mt. Makiling, Luzon, common at the summit.

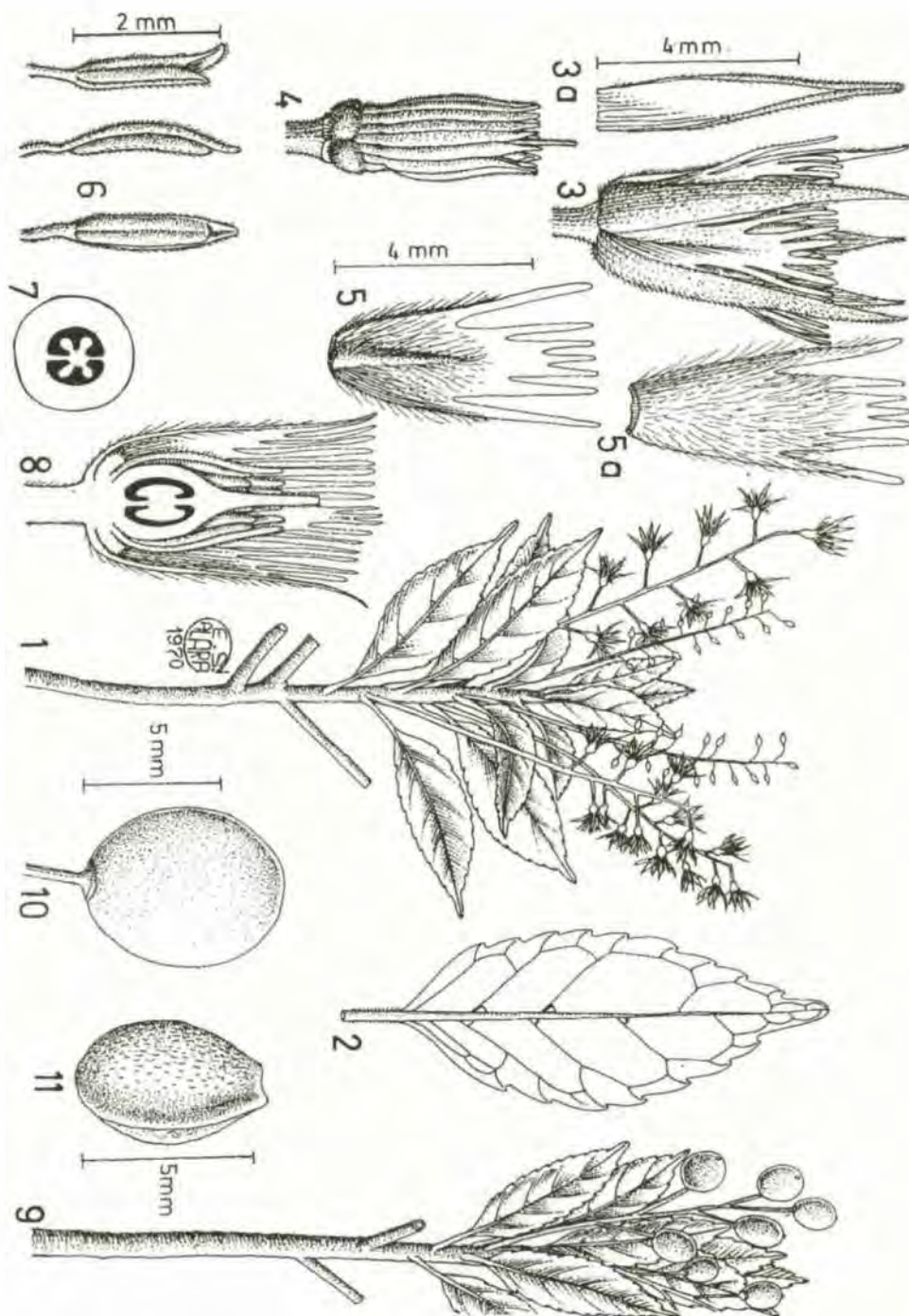


Figure 107. *Elaeocarpus argenteus*: 1. flowering branch, 2. leaf, dorsal view; 3. flower; 3a. sepal, ventral view; 4. flower, sepals and petals removed; 5. petal, ventral view; 5a. petal, dorsal view; 6. stamen, 3 views; 7. ovary, cross section; 8. ovary, vertical section; 9. fruiting branch; 10. fruit; 11. seed.

Com. name – *Bakani* (Sul.).

Exsicc. – *Pancho* CA 10976*; *Kanigorn* CA 12463; *Gates* CA 1749, 1750; *Orlido* CA 10648 (CAHP); *Elmer* 1050118, 1237687; *Brown* 568357; *Curran & Merritt* 709042 (US).

2. *Elaeocarpus monocera* Cav., Ic. 6: 1, t. 501, 1801; Merr., En. Philip. 3:18, 1923. – *E. megacarpus* Elm., Leaf. Philip. Bot. 7: 2627, 1915.

Trees tall, rather large. Leaves terminally clustered, obovately oblong, 25 x 10 cm, stout midrib with 15 pairs of nerves, serrately toothed except basal portion, rounded and short-acute at apex, base cuneate; petioles 1-2 cm long. Inflorescences lateral below foliage, 3-8 cm long, short-pubescent; flowers 1.5 cm long, yellowish white; pedicels short, bract-subtended; calyx lanceolate; petals appressed-hairy on exterior, lobed, finely fimbriated at apex; anthers short-stalked, cleft at apex, one of divisions tailed. Fruits ellipsoid or obovate, 6 x 4 cm, dull or dark green; meat very fibrous, exceedingly bitter.

Throughout the Philippines, in primary forests up to 1000 m; in Mt. Makiling, Luzon, in the mossy forest to the summit, 900-1109 m.

Com. name – *Tabian* (Neg.).

Exsicc. – *Villamil* CA 1751; *Gates* CA 1752 (CAHP); *Villamil* 902845, 1293672; *Elmer* 1050117, 1237639 (US).

3. *Elaeocarpus macranthus* Merr., Publ. Gov. Lab. Philip. 35: 38, 1906; En. Philip. 3: 17, 1923.

Trees. Leaves terminally crowded, oblong, 14 x 4 cm, midrib with about 10 pairs of nerves, subentire, subacuminate, abruptly acute or rounded at base; petioles 4-5 cm long, puberulent. Racemes in uppermost leaf axils, equaling foliage, brownish-pubescent; flowers yellowish; pedicels 1-1.5 cm long; sepals broadly lanceolate, 14 mm long, almost one third as wide, tapering toward acute apex, thick, glabrous within; petals slightly exceeding sepals, densely appressed-silky-pubescent on dorsal side, 3 lobes laciniately fringed; stamens indefinite with 2-mm long filaments and 4-5 mm long unequally placed anthers; ovaries pubescent; styles 3.5 mm long, glabrous at least toward distal end. Drupes globose to short-ellipsoid, 2.25 cm in diameter, 5-celled stone longitudinally 10-grooved; seeds solitary.

Throughout the Philippines, in primary forests from 200-1000 m; in Mt. Makiling, Luzon, in the vicinity of Mudspring up to the mossy forest, 300-900 m.

Com. name – *Bayukbok* (Tag.).

Exsicc. – *Elmer* 1050119 (US).

4. *Elaeocarpus calomala* (Blco.) Merr., Philip. J. Sc. 10(Bot.): 43, 1915; En. Philip. 3: 15, 1923. – *Vallea calomala* Blco., Fl. Filip. 439, 1837. – *Elaeocarpus philippinensis* Warb. in Perk., Fragm. Fl. Philip. 101, 1904; Merr., Proc. R. Soc. Queensl. 62 (4):54, 1952. **Figure 108**

Trees stocky. Leaves elliptic, 10 x 5 cm, prominent midrib with 5-7 lateral pairs of nerves, obscurely and crenately dentate, abruptly terminating into an acute point, base rounded or obtuse; petioles 3 cm long. Racemes axillary, ascending, 5-8 mm in length, puberulous; flowers pale white, scattered from near base, 5-8 mm long; pedicels slender, 1 cm long; sepals thick, densely pubescent along edges, lanceolate with large, lighter colored spots; lacerated petals strigose below middle especially toward margins; anthers split at apex. Fruits upon thickened and elongated stalks, oblong, 2 cm long, ringed at base with short-pubescent glands, yellowish red; seeds corrugated.

Endemic. Philippines: Luzon to Mindoro; in primary forests at low altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Kalomala* (Tag.).

Exsicc. – *Hernaez CA 27157** (CAHP); *Dequilia 2245761* (US).

5. *Elaeocarpus cumingii* Turcz., Bull. Soc. Nat. Mosc. 19: 491, 1846; Merr., En. Philip. 3: 15, 1923. – *E. versicolor* Elm., Leaf. Philip. Bot. 4: 1178, 1911.

Trees small. Leaves elliptically oblong, 8 x 4 cm, midrib with 5-7 pairs of ascending nerves, entire or obscurely crenate, obtuse at both ends subcuneate at base; petioles 1.5 cm long. Racemes slender, up to 12 cm long, divaricate from below foliage, puberulent; flowers whitish, scattered from base; pedicels subglabrous, 5-8 mm in length; sepals coriaceous, sharply pointed; petals glabrous, slenderly laciniate; anthers parted at apex. Fruits upon thickened pedicels, oblong, 2 cm long, subtended by glandular ring, yellowish to red.

Celebes. Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Hunggo* (Bik., Tag.).

Exsicc. – *Elmer 1050120* (US).

6. *Elaeocarpus ramiflorus* Merr., Philip. J. Sc. 10(Bot.): 43, 1915; En. Philip. 3: 19, 1923.

Trees tall. Leaves lanceolate, 10 x 3 cm, midrib puberulent when young with 12 pairs of lateral nerves with glandular axils, obscurely crenulate,



Figure 108. *Elaeocarpus calomala*: 1. flowering branch; 2. flower; 3. petal; 4. pistil; 5. stamen, 2 views; 6. fruiting branch; 7. seed; 8. ovary, cross section; 9. fruit.

acuminate, base acute, petioles 1.5 cm long, slightly pubescent. Racemes numerous. 6 cm long, lateral from below leaves or in axils of fallen leaves, appressed-gray-pubescent; flowers upon 6-mm long pedicel; sepals whitish, lanceolate. 5 mm long, sparingly appressed-pubescent, margins densely so; petals about as long as sepals, cut halfway into 9 -11 slender segments, black, marginal sides hairy toward base; stamens many; filaments hispid, very short; anthers linearly oblong, 2 mm long, cells unequal in length; ovaries villous, globose, surrounded by glandular rim.

Philippines: Luzon (Laguna and Sorsogon), in primary forests at 400-650 m; in Mt. Makiling, Luzon, at 200-450 m.

Com. name – *Malaropit* (Tag.)

Exsicc. – *Villamil* CA 1753 (CAHP), 1293671 (US).

7. *Elaeocarpus pendulus* Merr., Publ. Gov. Lab. Philip. 29: 27. 1905, En. Philip. 3: 19, 1923. – *E. maquilingensis* Elm., Leaf. Philip. Bot. 8: 3080, 1919.

Trees small. Leaves terminally crowded, 8 x 3.5 cm, midrib pronounced with 5 pairs of obscure nerves, margins rugose, distantly apiculate, caudately pointed: broadly obtuse at base; petioles 2-3 cm long. Inflorescences lateral, divaricately spreading below foliage, 3-7 cm long, occasionally branched, glabrous; pedicels 1 cm long, slender. Fruits dark green, ovoidly globose, equaling pedicels in dried, wrinkled state, subtended by yellowish rugose disc; seeds longitudinally rugose.

Throughout the Philippines, on ridges in the mossy forests, 1000-2000 m; in Mt. Makiling, Luzon, on exposed ridges in the mossy forest up to the summit, 900-1109 m.

Com. name – *Borosa* (Ig.).

Exsicc. – *Pancho* CA 20390 (CAHP).

94. TILIACEAE

Trees or shrubs, infrequently herbs. Leaves alternate, rarely opposite, simple, entire or lobed; stipules free, usually caducous. Inflorescences axillary or terminal, solitary, fascicled, umbellate, cymose or paniced; flowers unisexual or bisexual; sepals 3-5, free or connate, valvate; petals as many as sepals, rarely absent, imbricate or valvate; stamens usually numerous, springing from dilated torus or disc; filaments filiform, mostly free; anthers 2-celled; ovaries free, superior, 2- to 10-celled; styles columnar or divided into as many divisions as there are cells in ovary; stigmas usually distinct, rarely confluent or sessile; ovules few to many in each cell. Fruits fleshy or dry, dehiscent or indehiscent or 1- to 2-celled, sometimes with spurious partitions or 1-celled by abortion; seeds solitary or many, rarely without albumen, pendulous or at right angle to placenta.

Genera 50, species 400; in tropical parts of the world, few in the temperate regions; 8 genera and 49 species in the Philippines.

- 1. Undershrubs
 - 2. Capsules prickly1. *Triumfetta*
 - 2. Capsules not prickly..... 2. *Corchorus*
- 1. Trees
 - 3. Fruits 3- to 5-winged 3. *Colona*
 - 3. Fruits wingless
 - 4. Calyx segments free; fruits smooth
 - 5. Stigma obviously widened 4. *Grewia*
 - 5. Stigma not widened, minutely tridentate..... 5. *Microcos*
 - 4. Calyx campanulate; fruits longitudinally rugose..... 6. *Diplodiscus*

1. TRIUMFETTA Linnaeus

Herbs or undershrubs erect or prostrate. Leaves with stellate hairs, toothed, entire or lobed. Flowers yellow, in dense axillary cymes or fascicles; sepals 5, oblong, concave, free; petals 5-merous, sometimes apetalous, glandular and often clawed at base; stamens 5-40, arising from a fleshy, lobed and glandular torus; ovaries 2- to 5-celled but often with spurious partitions, each cell 2-ovuled; styles simple, filiform; stigmas 2- to 5-toothed. Capsules globose or oblong to linear, covered with short or long, often hooked spines, indehiscent or 3- to 6-ovuled; seeds 1 or 2 in each cell, pendulous, albuminous.

Species 150, of wide tropical distribution; 8 in the Philippines.

- 1. Spines of fruit glabrous; stamens 20-40..... 1. *T. bartramia*
- 1. Spines of fruit with reflexed hairs; stamens 5-15..... 2. *T. semitriloba*

- 1. *Triumfetta bartramia* L., Syst. ed. 10, 1044, 1759; Lay, Ann. Mo. Bot. Gard. 37: 382, 1950. **Figure 109**

Plants erect, suffrutescent, 0.5-1.5 m high. Main branches widely rebranched, reddish brown when dry, hairy when young. Leaves membranous, variable, much paler beneath, sparingly setose, usually orbicular or ovately rhomboid, 3- to 5-veined from base, 3-lobed, denticulate, gradually reduced toward distal end, oblong to ovately lanceolate, base rounded; petioles long and slender. Flowers 6 mm long, numerous in dense, axillary fascicles along slender branchlets. Fruits small, dry, globose, short-stalked, pubescent, brown in dry state, covered with hooked, glabrous spines.

Pantropic. Widely disseminated in wastelands throughout the Philippines; common weed.



Figure 109. *Triumfetta bartramia*: 1. habit; 2. fruit; 3. pistil; 4. stamen; 5. bract; 6. portion of stem, enlarged; 7. flower bud; 8. petal; 9. flower.

Com. name – *Kulut-kulutan* (Pang., Tag.).

Exsicc. – *Cabrera CA 4994** (CAHP); *Gabot 2212486* (US).

2. *Triumfetta semitriloba* Jacq., Select. Stirp. Amer. Hust. 147, 1763; Lay, Ann. Mo. Bot. Gard. 37: 373, 1950. Figure 110

Plants erect, somewhat shrubby, 1-2 m high. Twigs slender, stellately pubescent. Leaves membranous, paler beneath, 3-5 cm long, broadly ovate to obovate or upper ones oblong to broadly lanceolate and becoming reduced to mere bracts, base mostly broad and rounded or terminal ones obtuse or even acute, occasionally slightly 3-lobed in upper part, 3- or sometimes 5-veined from base, margins serrately toothed; petioles long, pubescent. Flowers in lax, axillary clusters along slender branchlets, buds oblong, up to 9 mm long; sepals apiculate. Fruits globose, 7-8 mm in diameter, pubescent, covered with hooked spines, the latter with scattered, retrorse, bristly hairs.

Pantropic. A common weed in abandoned fields throughout the Philippines.

Com. name – *Kulitan* (Tag.).

Exsicc. – *Champhaka CA 8105*; *Blancaver CA 4825**; *Manolo CA 10046*; *Estioko, Jr. CA 1768*; *Gates CA 1770* (CAHP).

2. CORCHORUS Linnaeus

Herbs or undershrubs erect or spreading, often suffrutescent, nearly glabrous or covered with stellate pubescence. Leaves frequently with 2 short, tail-like appendages at base. Flowers yellow, small, in leaf-opposed, 1- to several-flowered cymes; sepals 4 or 5; petals as many as sepals, eglandular; stamens free, indefinite or rarely twice as many as petals; ovaries 2- or 6-celled; styles short; stigmas cup-shaped. Capsules elongated, subglobose or slender, with or without a beak, smooth or rugose, loculicidally 3- to 6-valved, occasionally with transverse partitions; seeds numerous, albuminous, pendulous or horizontal.

Species 30 or more, widely disseminated throughout the tropics; 3 in the Philippines.

- | | |
|---|-------------------------|
| 1. Capsules globose, not beaked | 1. <i>C. capsularis</i> |
| 1. Capsules elongated, beaked | |
| 2. Capsules 6- to 8-winged, beak trifid | 2. <i>C. aestuans</i> |
| 2. Capsules 10-ribbed; beak entire | 3. <i>C. olitorius</i> |

1. *Corchorus capsularis* L., Sp. Pl. 529, 1753; Chakravarty, Bull. Bot. Soc. Beng. 51: 76, 1951. Figure 111

Herbs erect, suffrutescent, 1-2 m high. Stems usually purplish, glabrous, widely branched. Leaves membranous, ovately lanceolate or oblong, 5-12 cm



Figure 109. *Triumfetta bartramia*: 1. habit; 2. fruit; 3. pistil; 4. stamen; 5. bract; 6. portion of stem, enlarged; 7. flower bud; 8. petal; 9. flower.

Com. name – *Kulut-kulitan* (Pang., Tag.).

Exsicc. – *Cabrera CA 4994** (CAHP); *Gabot 2212486* (US).

2. *Triumfetta semitriloba* Jacq., Select. Stirp. Amer. Hust. 147, 1763; Lay, Ann. Mo. Bot. Gard. 37: 373, 1950. **Figure 110**

Plants erect, somewhat shrubby, 1-2 m high. Twigs slender, stellately pubescent. Leaves membranous, paler beneath, 3-5 cm long, broadly ovate to obovate or upper ones oblong to broadly lanceolate and becoming reduced to mere bracts, base mostly broad and rounded or terminal ones obtuse or even acute, occasionally slightly 3-lobed in upper part, 3- or sometimes 5-veined from base, margins serrately toothed; petioles long, pubescent. Flowers in lax, axillary clusters along slender branchlets, buds oblong, up to 9 mm long; sepals apiculate. Fruits globose, 7-8 mm in diameter, pubescent, covered with hooked spines, the latter with scattered, retrorse, bristly hairs.

Pantropic. A common weed in abandoned fields throughout the Philippines.

Com. name – *Kulitan* (Tag.).

Exsicc. – *Champhaka CA 8105*, *Blancaver CA 4825**, *Manolo CA 10046*; *Estioko, Jr. CA 1768*; *Gates CA 1770* (CAHP).

2. CORCHORUS Linnaeus

Herbs or undershrubs erect or spreading, often suffrutescent, nearly glabrous or covered with stellate pubescence. Leaves frequently with 2 short, tail-like appendages at base. Flowers yellow, small, in leaf-opposed, 1- to several-flowered cymes; sepals 4 or 5; petals as many as sepals, eglandular; stamens free, indefinite or rarely twice as many as petals; ovaries 2- or 6-celled, styles short; stigmas cup-shaped. Capsules elongated, subglobose or slender, with or without a beak, smooth or rugose, loculicidally 3- to 6-valved, occasionally with transverse partitions; seeds numerous, albuminous, pendulous or horizontal.

Species 30 or more, widely disseminated throughout the tropics; 3 in the Philippines.

1. Capsules globose, not beaked 1. *C. capsularis*
 1. Capsules elongated, beaked
 2. Capsules 6- to 8-winged, beak trifold 2. *C. aestuans*
 2. Capsules 10-ribbed; beak entire 3. *C. olitorius*

1. *Corchorus capsularis* L., Sp. Pl. 529, 1753; Chakravarty, Bull. Bot. Soc. Beng. 51: 76, 1951. **Figure 111**

Herbs erect, suffrutescent, 1-2 m high. Stems usually purplish, glabrous, widely branched. Leaves membranous, ovately lanceolate or oblong, 5-12 cm

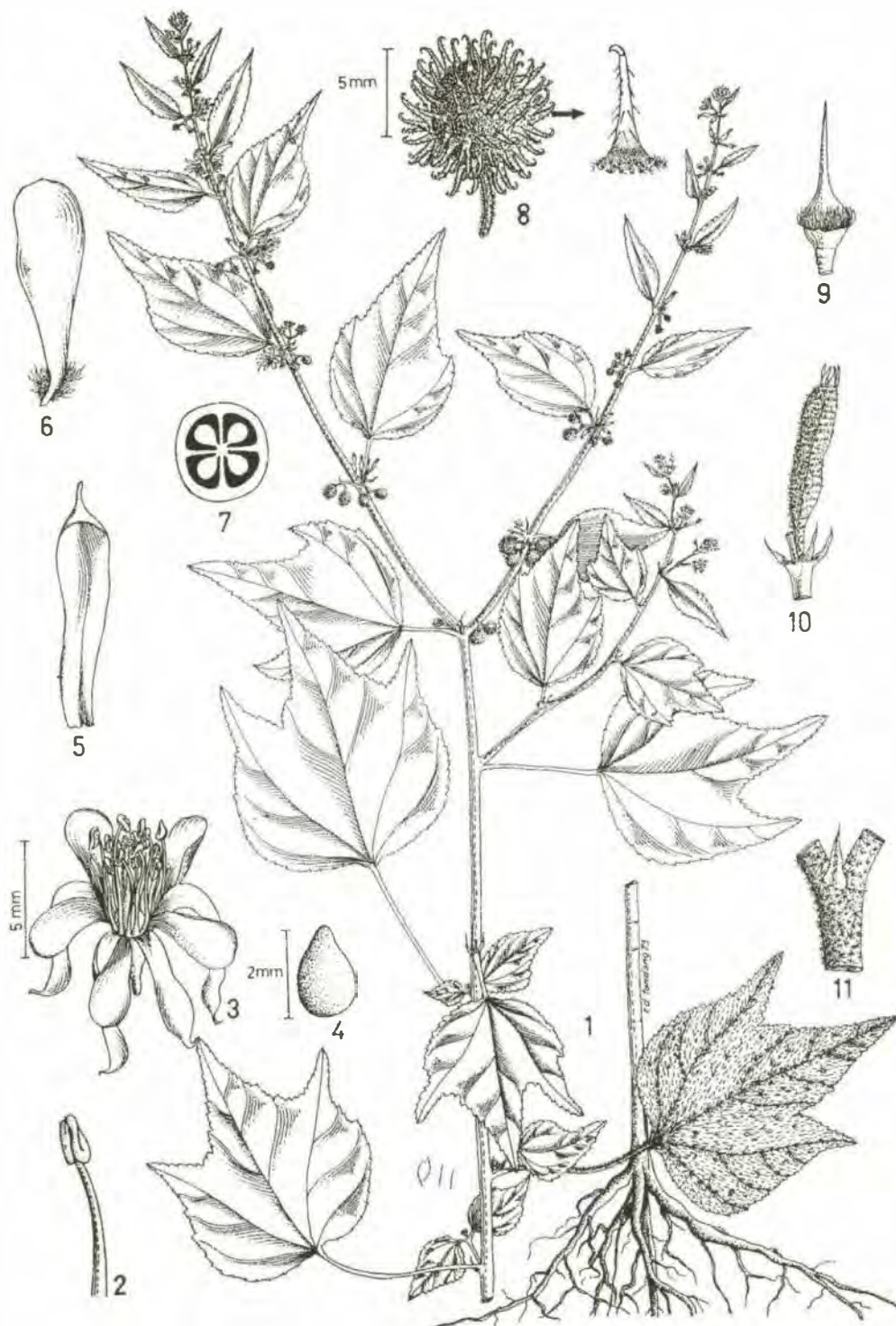


Figure 110. *Triumfetta semitriloba*: 1. habit; 2. stamen; 3. flower; 4. seed; 5. sepal with cucullate apex; 6. petal with ciliate claw; 7. ovary, cross section; 8. capsule; 9. pistil; 10. flower bud; 11. stem, enlarged to show stipule.

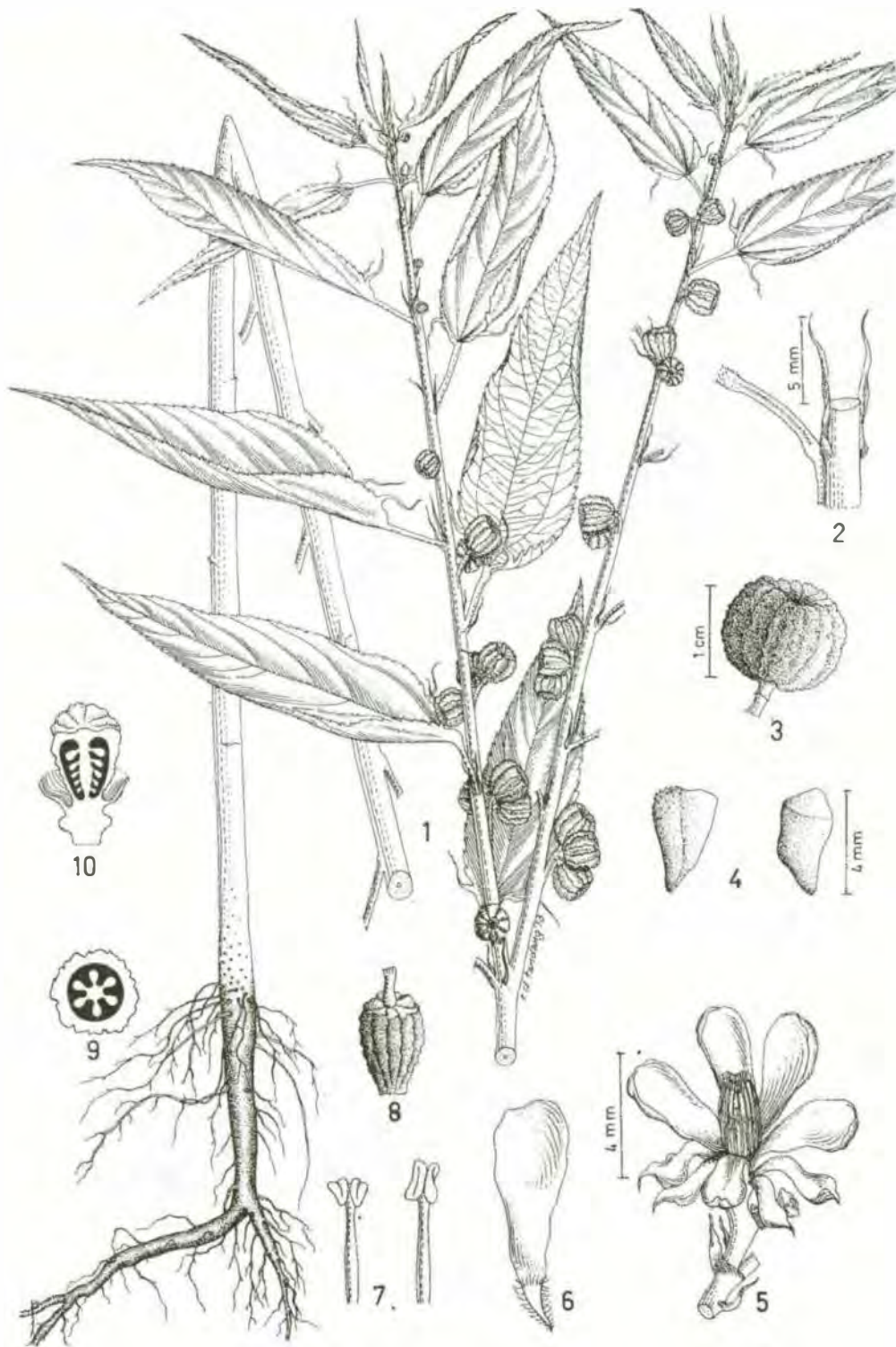


Figure 111. *Corchorus capsularis*: 1. habit; 2. portion of stem, enlarged to show stipules; 3. capsule; 4. seed, 2 views; 5. flower; 6. petal; 7. stamen, 2 views; 8. ovary; 9. ovary, cross section; 10. ovary, vertical section.

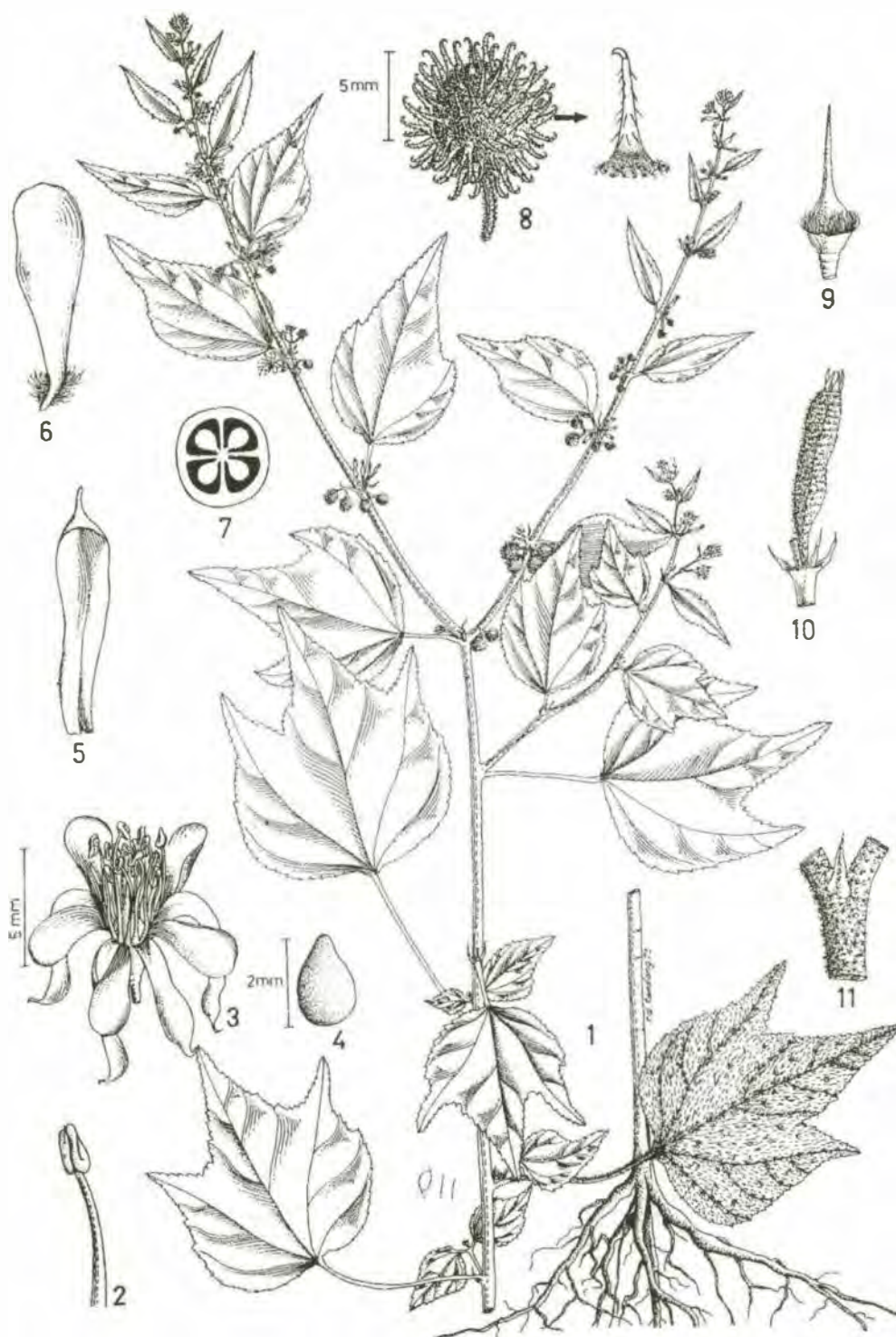


Figure 110. *Triumfetta semitriloba*: 1. habit; 2. stamen; 3. flower; 4. seed; 5. sepal with cucullate apex; 6. petal with ciliate claw; 7. ovary, cross section; 8. capsule; 9. pistil; 10. flower bud; 11. stem, enlarged to show stipule.

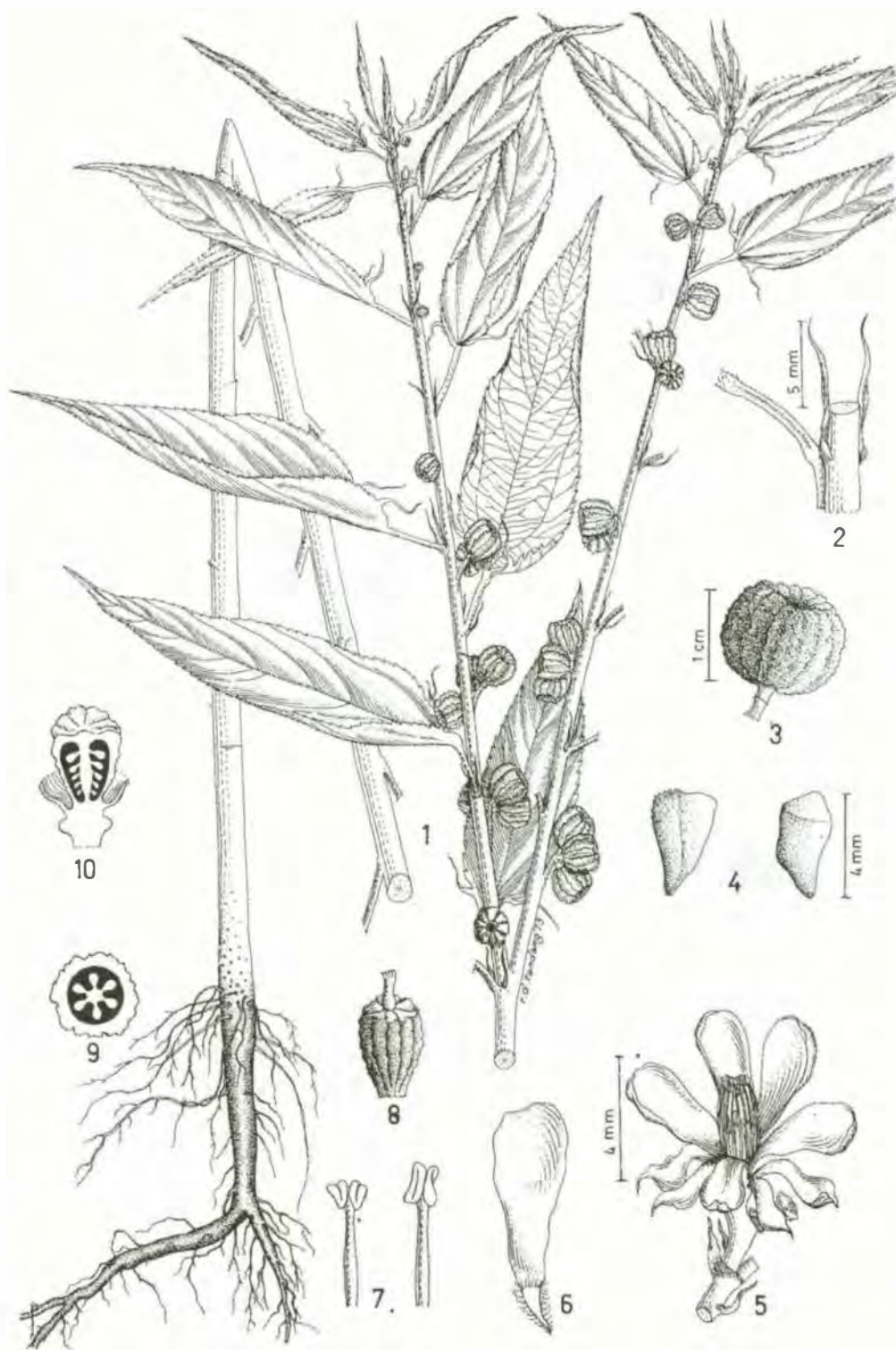


Figure 111. *Corchorus capsularis*: 1. habit; 2. portion of stem, enlarged to show stipules; 3. capsule; 4. seed, 2 views; 5. flower; 6. petal; 7. stamen, 2 views; 8. ovary; 9. ovary, cross section; 10. ovary, vertical section.

long, paler beneath, midrib with 5-7 pairs of much-ascending nerves, sharply serrate, slenderly acuminate, base rounded or subcuneate and ciliate-tailed; petioles 4 cm long or shorter; stipules setaceous, linear, 5-8 mm in length. Flowers few, 4 mm long; sepals often purple. Capsules globose to globose-ovoid, averaging 1 cm in diameter, longitudinally ridged, roughened or muricate, 5-valved, dehiscent from apex to base, valves without transverse septa.

Native of India. Spontaneous and well-scattered in open, low, wastelands in and near settlements throughout the Philippines; probably introduced at some early date.

Com. name – *Pasau-na-bilog* (Tag.).

Exsicc. – *Gates CA 1778** (CAHP).

2. *Corchorus aestuans* L., Syst. ed. 10. 1079, 1759. – *C. acutangulus* Lam., Encycl. 2: 104, 1786; Merr., En. Philip. 3: 23, 1923. **Figure 112**

Herbs low, suffrutescent, about 0.5 m high. Stems reddish brown, somewhat hairy. Leaves ovate or ovately oblong, 3-veined, finely and crenately toothed, acute or upper much-reduced ones acuminate, base rounded or slightly cordate and ciliate 2-tailed; petioles 0.5-2.5 cm long; stipules linear to subulate. Flowers as long as leaf stalks, usually 2 or 3. Capsules ascending, sessile, narrowly oblong or linear, 2-3 x 0.4-0.6 cm, prominently longitudinally 6- to 8-ridged or 3 of the angles winged, abruptly terminated into 3 or 4 erect or divergent beaks with obscure transverse marks.

Pantropic. Throughout the Philippines, in open wastelands at low and medium altitudes.

Com. name – *Saluyot* (Ilk., Tag.).

Exsicc. – *Gates CA 1776, 1777; Guantes CA 10751**; *Orlido CA 12976* (CAHP).

3. *Corchorus olitorius* L., Sp. Pl. 529, 1753; Merr., En. Philip. 3: 23, 1923. **Figure 113**

Herbs or undershrubs erect, often woody at base, 0.5-2.5 m high. Leaves ovate or ovately lanceolate, 5-12 cm long, often with clusters of small ones near axils, 3- to 5-veined, margins serrately toothed, 2 lower serratures extended into long, sharp points, acuminate, broadly rounded or subcordate at base; petioles 3-5 cm long, pilose; stipules with lacinate appendages. Peduncles 1- to 3-flowered, shorter than leaf stalks. Flowers 6 mm long; petals spatulate, longer than sepals. Capsules elongated, obscurely 10-costate, much-ascending, sessile, cylindrical, 3-5 cm long, 3- or 6-valved, gradually short-beaked, valves with transverse partitions between seeds.

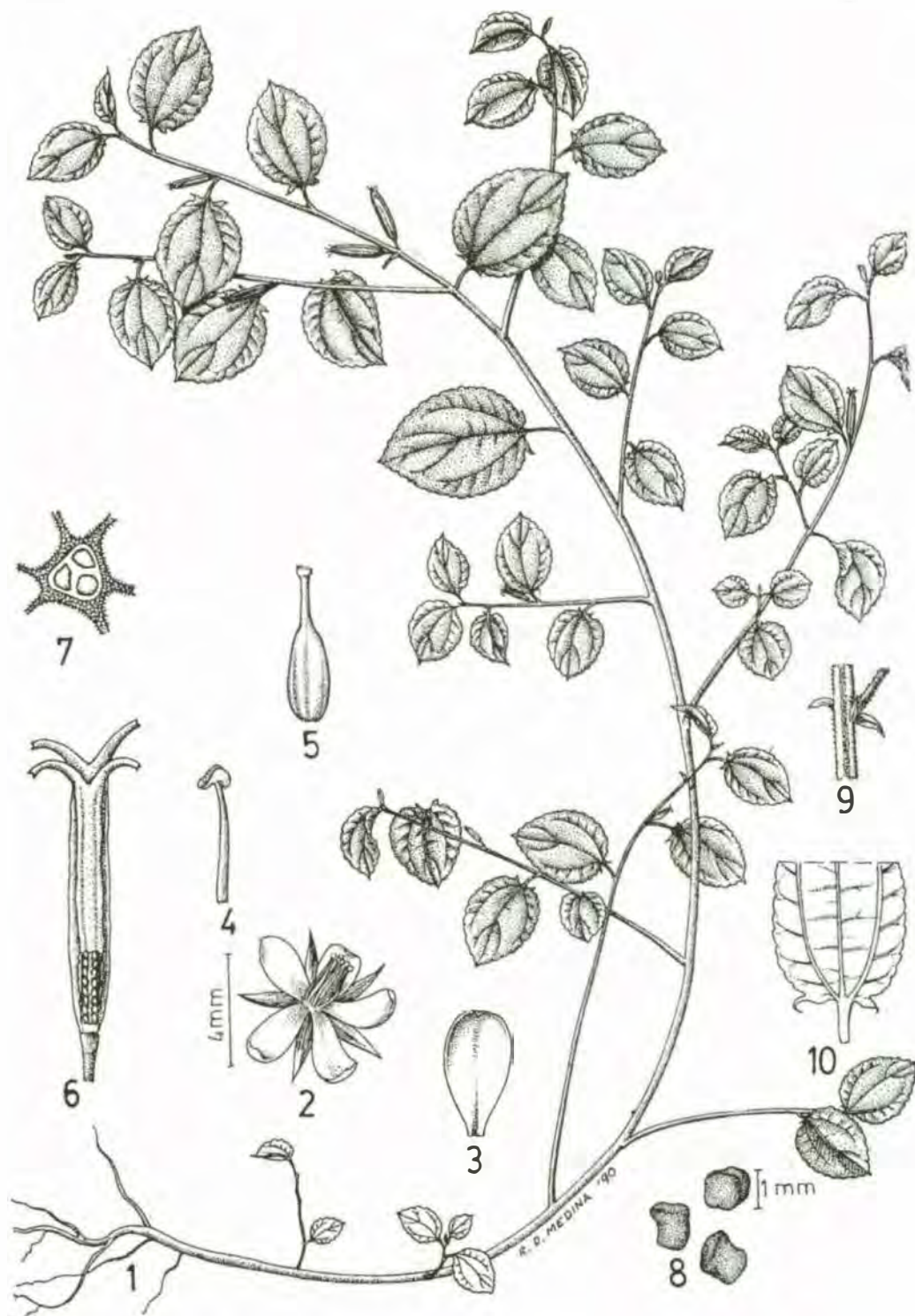


Figure 112. *Corchorus aestuans*: 1. habit; 2. flower; 3. petal; 4. stamen; 5. pistil; 6. capsule, vertical section; 7. capsule, cross section; 8. seed, 2 views; 9. portion of stem, enlarged to show band of hairs; 10. basal portion of leaf, enlarged.

long, paler beneath, midrib with 5-7 pairs of much-ascending nerves, sharply serrate, slenderly acuminate, base rounded or subcuneate and ciliate-tailed; petioles 4 cm long or shorter; stipules setaceous, linear, 5-8 mm in length. Flowers few, 4 mm long; sepals often purple. Capsules globose to globose-ovoid, averaging 1 cm in diameter, longitudinally ridged, roughened or muricate, 5-valved, dehiscent from apex to base, valves without transverse septa.

Native of India. Spontaneous and well-scattered in open, low, wastelands in and near settlements throughout the Philippines; probably introduced at some early date.

Com. name – *Pasau-na-bilog* (Tag.).

Exsicc. – *Gates CA 1778** (CAHP).

2. *Corchorus aestuans* L., Syst. ed. 10. 1079, 1759. – *C. acutangulus* Lam., Encycl. 2: 104, 1786; Merr., En. Philip. 3: 23, 1923. **Figure 112**

Herbs low, suffrutescent, about 0.5 m high. Stems reddish brown, somewhat hairy. Leaves ovate or ovately oblong, 3-veined, finely and crenately toothed, acute or upper much-reduced ones acuminate, base rounded or slightly cordate and ciliate 2-tailed; petioles 0.5-2.5 cm long; stipules linear to subulate. Flowers as long as leaf stalks, usually 2 or 3. Capsules ascending, subsessile, narrowly oblong or linear, 2-3 x 0.4-0.6 cm, prominently longitudinally 6- to 8-ridged or 3 of the angles winged, abruptly terminated into 3 or 4 erect or divergent beaks with obscure transverse marks.

Pantropic. Throughout the Philippines, in open wastelands at low and medium altitudes.

Com. name – *Saluyot* (Ilk., Tag.).

Exsicc. – *Gates CA 1776, 1777; Guantes CA 10751**; *Orlido CA 12976* (CAHP).

3. *Corchorus olitorius* L., Sp. Pl. 529, 1753; Merr., En. Philip. 3: 23, 1923. **Figure 113**

Herbs or undershrubs erect, often woody at base, 0.5-2.5 m high. Leaves ovate or ovately lanceolate, 5-12 cm long, often with clusters of small ones near axils, 3- to 5-veined, margins serrately toothed, 2 lower serratures extended into long, sharp points, acuminate, broadly rounded or subcordate at base; petioles 3-5 cm long, pilose; stipules with lacinate appendages. Peduncles 1- to 3-flowered, shorter than leaf stalks. Flowers 6 mm long; petals spatulate, longer than sepals. Capsules elongated, obscurely 10-costate, much-ascending, subsessile, cylindric, 3-5 cm long, 3- or 6-valved, gradually short-beaked, valves with transverse partitions between seeds.

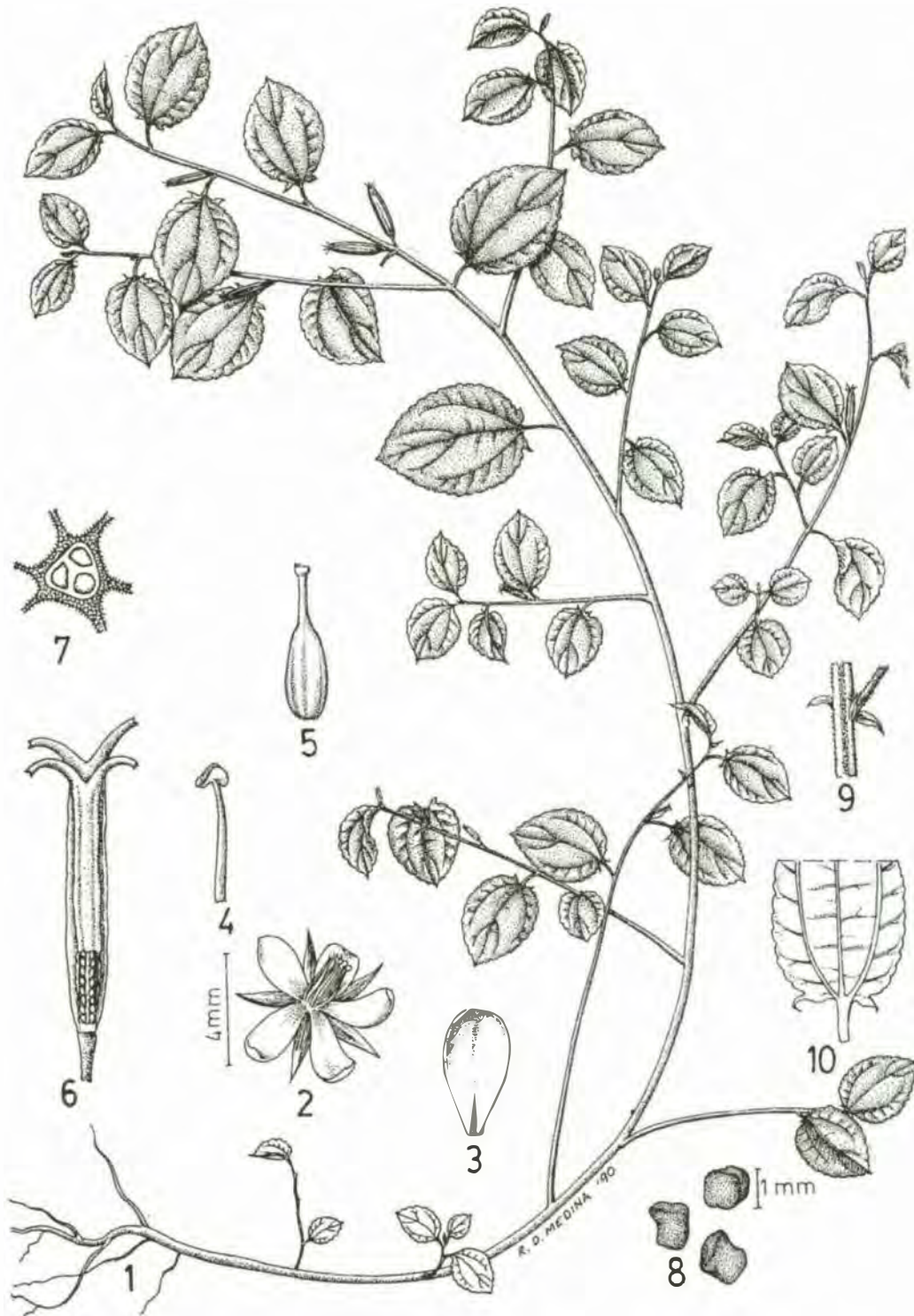


Figure 112. *Corchorus aestuans*: 1. habit; 2. flower; 3. petal; 4. stamen; 5. pistil; 6. capsule, vertical section; 7. capsule, cross section; 8. seed, 2 views; 9. portion of stem, enlarged to show band of hairs; 10. basal portion of leaf, enlarged.

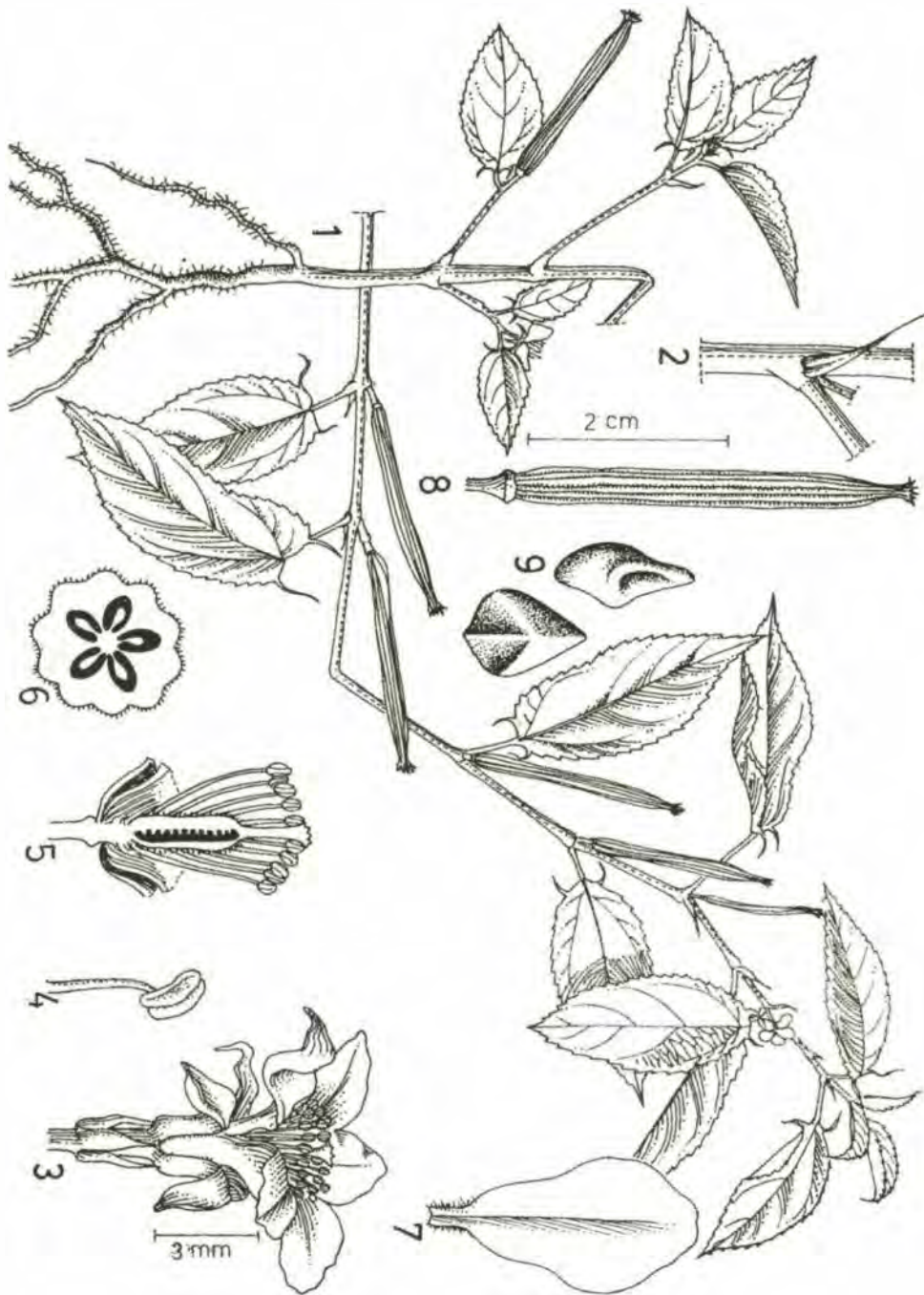


Figure 113. *Corchorus olitorius*: 1. habit; 2. portion of stem with stipule; 3. flower; 4. stamen; 5. ovary, vertical section; 6. ovary, cross section; 7. petal with hairy base; 8. fruit; 9. seed, 2 views.

Native of India. Widely distributed weed throughout the Philippines; in open, usually damp or wet areas; probably introduced in prehistoric times.

Com. name – *Malasaluyot* (Tag.).

Exsicc. – *Gates CA 1779**; *Orlido CA 22247* (CAHP).

3. COLONA Cavanilles

Trees. Leaves distichous, palmately nerved, finely dentate, inequilateral. Flowers axillary, terminal, cymose, often in many-flowered terminal panicles, bisexual; cymules 3-flowered; involucre bracts 3, caducous; sepals 5, free; petals 5, with gland inside at base, gland surrounded by whorl of hairs; upper margin of receptacle slightly lobed, hairy; disc absent; stamens numerous, all fertile; anthers dorsifixed, oval, laterally dehiscent; ovaries 3- to 4-celled, densely stellately pubescent, each cell with 2 rows of 1-2 ovules. Fruits globose, 3- to 4-winged, 1- to 4-seeded.

Species 18 or more, tropical Asia; 14 in the Philippines.

1. *Colona serratifolia* Cav., *lc. 4: 47. t. 370, 1797.* – *Columbia serratifolia* (Cav.) DC., *Prodr. 1: 512, 1824; Merr., En. Philip. 3: 29, 1923.* **Figure 114**

Shrubs or widely spreading trees, up to 15 m or more high. Leaves ovately oblong or lanceolate, 10-20 cm long, coarsely or finely serrate, hirsute beneath, acuminate, base very oblique. Panicles 10-30 cm long; flowers clustered, 5-7 mm long; sepals pubescent; petals dull pink, yellowish red toward base. Capsules 1 cm long, broader than long, 3- or 4-winged, light and dry.

Throughout the Philippines, in thickets and woods of *parang* formation.

Com. name – *Anilao* (Bik., C. Bis., Mag., Tag., P. Bis., S.-L. Bis., Sul.).

Exsicc. – *Cabrera CA 4850; Estioko, Jr. CA 1760*, 1761; Orlido CA 10369, 12385; Quiban CA 4590; Gates CA 1762, 12422* (CAHP); *Mendoza 2125812; McGregor 1238983; Elmer 1050073* (US).

4. GREWIA Linnaeus

Trees or erect shrubs, sometimes scandent, stellately pubescent. Leaves 1- to 9-nerved, mostly 3-nerved, similarly hairy, toothed or entire. Inflorescences paniculate, cymose, fascicled or umbelled; sepals 5, free; petals 5, glandular at base, sometimes wanting; stamens indefinite on a raised torus; ovaries 2- or 4-celled, each cell with 2 or more ovules; styles subulate; stigmas very short-lobed. Drupes fleshy or fibrous, entire or 2- to 4-celled; pyrenes 1-4, each 1- to 2- or several-seeded, when 2-seeded then with false partitions between seeds.



Figure 114. *Colona serratifolia*: 1. flowering and fruiting branch; 2. petal showing gland at base; 3. ovary, cross section; 4. ovary, vertical section; 5. flower; 6. ovary; 7. seed; 8. capsule.

Species 70, more, throughout the tropics of the Old World; 14 in the Philippines.

1. Peduncles longer than petioles, 2- to 5-flowered 1. *G. multiflora*
 1. Peduncles equaling petioles, 3-flowered 2. *G. rolfei*

1. *Grewia multiflora* Juss., An. Mus. Hist. Nat. Paris 4: 89, t. 47, f. 1. 1804; Merr., En. Philip. 3: 26, 1923.

Shrubs or small trees. Branches slender, sparsely pubescent when young. Leaves ovately oblong or subelliptic, 4-14 x 2.5-5 cm, 3-veined, margins serrate, acute to acuminate, base somewhat inequilateral, obtusely rounded; stipules subulate. Peduncles longer than petioles, 2- to 5-flowered; pedicels umbellately spreading; buds globose or ovoid, flowers yellowish green, 1 cm across; sepals pubescent outside, much longer than petals, coriaceous; petals entire, glabrous, easily falling off. Fruits obovoid or ellipsoid, 6 mm long, frequently didymous in dry state, glabrate and purplish black when old; stone 1-seeded.

Malay Peninsula and New Guinea. Throughout the Philippines, in shrubberies and woods in hilly areas.

Com. name – *Danglin* (Pamp., Ilk., Tag.).

Exsicc. – *Pancho* CA 1773, 10799, 10800; *Baker* CA 1771; *Jarmin* CA1772 (CAHP); *Rañeses* 2212498; *Ogden, Jr.* 2212518; *Bañaga* 2212455; *Olegario* 2212427; *Foxworthy's collector* 1091558 (US).

2. *Grewia rolfei* Merr., Philip. J. Sc. 7 (Bot.): 302, 1912; En. Philip. 3: 27, 1923.

Trees small. Leaves ovately oblong, 5-12 x 3.5 cm, with 3 pairs of nerves, the basal pair reaching above middle of blade, nerves short-stellately pubescent, denticulate at acuminate apex, rounded at inequilateral base; petioles 5-10 mm long. Peduncles equaling petioles, numerous in leaf axils, 3-flowered, short-pubescent; pedicels shorter, umbellately spreading, subtended by whorl of bracteoles; sepals narrowly oblong, pubescent, becoming reflexed; petals membranous, one half as long as sepals; stamens indefinite; ovaries densely villous. Fruits usually in pairs, connate at base, obscurely didymous, 5-8 mm long, short-stellate when young.

Philippines: Luzon, Mindanao (Bukidnon, in thickets at low altitudes; in Mt. Makiling, Luzon, in the *parang* vegetation).

Com. name – *Maladanglin* (Tag.).

Exsicc. – *Curran* 714188 (US).

5. **MICROCOS** Linnaeus

Trees or erect shrubs, often scandent. Leaves entire or shallowly crenate. Flowers in 1 to several, 3-flowered cymes combined into axillary or terminal panicles, bisexual, small; pedicels short; bracts often 3-fid, involucre; perianth 5-merous or often apetalous; stamens 5 to many; ovaries 1- to 3-celled; ovules 2-8 in each cell; styles narrowed toward apex; stigmas not widened, inconspicuously lobed. Fruits globose or pyriform, not lobed; seeds exalate, endosperm present.

Species 50; tropical Africa, Asia to Australia; 3 in the Philippines.

1. *Microcos stylocarpa* (Warb.) Burret, Notizbl. Berl.-Dahl. 9: 780, 1827; – *Grewia stylocarpa* Warb. in Perk., Fragm. Fl. Philip. 1: 104, 1904.

Trees medium-sized. Leaves broadly lanceolate to oblong, 12-18 x 5 cm, midrib with 4-6 pairs of ascendingly curved nerves, paler beneath, reticulations evident, entire, slenderly acuminate, obtuse or obtusely rounded at base; petioles 1.5 cm long. Panicles laxly rebranched, finely pubescent, flower-bearing stalks as long as petioles; involucre thick, caducous; flowers yellowish white, few within each involucre, short-stalked, turbinate, grayish tomentose; petals very small, membranous, glabrate; stamens many, not exceeding calyx, glabrate; ovaries brown-ciliate. Fruits obovoid, 2 cm long, basal portion stipitate, when dry yellow; pericarp fleshy.

Borneo. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, scattered but locally numerous at low and medium altitudes.

Com. name – *Kamuling* (Tag.).

Exsicc. – Estrada CA 4589; Dimaculangan CA 3090; Gates CA 1774, 1775; Banaag CA 2874 (CAHP); Elmer 854539; Robinson & Brown 902272; McGregor 898132 (US).

6. **DIPLODISCUS** Turczaninow

Trees. Leaves alternate, short-petioled, entire, chartaceous. Inflorescences terminal in leafy panicles; flowers bisexual, 5-merous; calyx campanulate, 3- to 5-lobed; stamens numerous, free, grown to elevated receptacle, innermost 5 transformed to linear staminodia; anthers spherical, thecae confluent; ovaries 5-celled with 2 pendulous ovules in each cell; styles simple, 5-parted. Fruits 1- to 3-celled capsules, each cell 1-seeded.

Six species in Malay Peninsula and Borneo; 2 in the Philippines.

1. *Diplodiscus paniculatus* Turcz., Bull. Soc. (Imp.) Nat. Mosc. 31: 325, 1858; Kosterm., Reinwardtia 5: 257, 1960.

Trees. Branchlets densely stellate-pubescent, later glabrous. Leaves oblong, 8 x 2 cm, often variable, pronounced midrib with 5-7 ascendingly curved nerves, shiny above, grayish beneath with ciliate scales, obtuse to short-acute, base obtuse to rounded, frequently inequilateral; petioles 1.25 cm long, scaly. Panicles sometimes widely branched, yellowish gray-lepidote; flowers cymosely clustered toward ends of branchlets, yellowish white, fragrant, short-pedicelled; ovaries scale-covered; styles free toward top. Fruits brown-scaly, ridged longitudinally, hard, subglobose, 2 cm across.

Endemic. Throughout the Philippines, in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, common, mostly in lowland areas.

Com. name – *Balobo* (Lan., Mag., Mbo., Tag.).

Exsicc. – *Galinato* CA 106516, 106518, 106519; *Gates* CA 1731, 1783; *Espiritu* CA 6091; *Plata* CA 890; *Orlido* CA 10368; *Ela* CA 3165 (CAHP); *Sulit* 2376304; *Mabanag* 2376119 (US).

95. MALVACEAE

Herbs, shrubs or trees, rarely scandent. Branches usually with mucilaginous juice and tenacious inner bark. Leaves alternate, simple, entire to deeply parted, mostly palmately nerved or at least plinerved at base, herbaceous parts often stellately pubescent; stipules free, sometimes caducous. Bracteoles 3 or more, whorled at base of calyx or entirely wanting; flowers axillary or terminal, solitary or paniced, regular, bisexual; sepals 5, free or connate; petals 5; stamens many, seldom few, monadelphous, more or less adnate to base of petals; anthers various; ovaries 2- to many-celled, entire or lobed, of 2-5 or more carpels arranged in whorl around a central axis. Fruits of dry cocci separating from axis or capsular and loculicidal; seeds reniform or obovoid, either glabrous, hairy or woolly.

Genera 50 with 1000 species, of wide tropical and temperate distribution; 11 genera and 50 species in the Philippines.

1. Fruits capsular
 2. Stigmas coherent in a clavate mass
 3. Bracteoles small 1. *Thespesia*
 3. Bracteoles very large 2. *Gossypium*
 2. Stigmas spreading or nearly so
 4. Calyx splitting on one side during anthesis, minutely 5-toothed at apex, adnate to corolla and falling off later after flowering 3. *Abelmoschus*

4. Calyx not (or rarely) splitting on one side during anthesis, 5-parted, not adnate to corolla, persisting after flowering 4. *Hibiscus*
1. Fruits composed of carpels arranged about an axis
5. Styles or branches of stigmas twice as many as carpels
6. Flowers in heads with involucre; epicalyx absent 5. *Malachra*
6. Flowers usually axillary, solitary, occasionally in axillary clusters; epicalyx present
7. Flowers pink; petals never auriculate; fruits covered with terminally hooked spines; common weed 6. *Urena*
7. Flowers deep red; petals auricled at base; fruits smooth; cultivated 7. *Malvaviscus*
5. Styles or stigmatic branches as many as carpels
8. Leaves cordately ovate 8. *Abutilon*
8. Leaves oblong, never cordate
9. Carpels with 3 spines; ovules ascending 9. *Malvastrum*
9. Carpels with 2 awns or awnless; ovules pendulous 10. *Sida*

1. **THESPESIA** Solander ex Correa, *nom. cons.*

Shrubs or trees. Leaves entire or lobed. Inflorescences axillary; flowers large, solitary or in few-flowered peduncles; bracteoles 3-15 arising from thickened end of peduncle, deciduous, small; calyx truncate, minutely 5-toothed; corolla convolute, yellow with large purple spot at base; staminal tube 5-toothed at apex; ovaries 4- or 5-celled; styles club-shaped, 5-furrowed, entire or 5-toothed; stigmas coherent in a clavate mass; ovules few in each cell. Capsules loculicidal or scarcely dehiscent; seeds glabrous or tomentose.

Species 15, paleotropic; 2 in the Philippines.

1. Leaves 3-veined, stellate-pubescent beneath, larger ones 3-lobulate 1. *T. lampas*
1. Leaves 7-veined; scurfy-pubescent beneath, never lobulate 2. *T. populnea*

1. *Thespesia lampas* (Cav.) Dalz. & Gibbs, Bomb. Fl. 19, 1861; Fryell, Austr. J. Bot. 13: 96, 1965; Borss., Blumea 14: 116, 1966. – *Hibiscus lampas* Cav., Diss. 3: 154, t. 56, f. 2, 1787.

Shrubs erect, 2-3 m high. Leaves ovate, 10-20 cm long, 3-veined, subentire or somewhat 3-lobed, glabrous on upper surface, stellate-pubescent beneath, lobules acute to subacuminate, base broad, shallowly cordate with a pair of glands; petioles 3-5 cm long, downy; stipules subulate. Peduncles mostly axillary forming a somewhat 3-flowered panicle; bracteoles 4-8, subulate; sepals subulate, connate below middle; corolla campanulate. Capsules ovoid, villous when young, 3 cm long, 4- or 5-valved; seeds glabrescent.

Eastern Africa, southeastern Asia to Malesia. Throughout the Philippines, in thickets and open places at low and medium altitudes.

Com. name – *Bulak-bulak* (Tag.).

Exsicc. – *Coronel CA 2868* (CAHP).

2. *Thespesia populnea* (L.) Soland. ex Corr., Ann. Mus. Hist. Nat. Paris 9: 290, 1807; Li, Woody Fl. Taiwan 551, f. 214, 1963; Fryxell, Austr. J. Bot. 11: 98, 1965. – *Hibiscus populneus* L., Sp. Pl. 2: 694, 1753.

Trees crooked, about 10 m high. Branchlets with small, brownish, peltate scales. Leaves entire, ovate, 8-15 cm long, 7-veined, nether side scurfy, acute to sharply acuminate, broadly rounded to cordate at base, with glands between nerves at base; petioles 5-8 cm long. Flowers axillary, solitary, long-stalked with lanceolate bracts; calyx truncate, 1.5 cm across; petals strongly imbricate, turning dull purple with age; staminal tube toothed at top, free filamentous portion ascending. Capsules depressed-globose, 2-3 cm in diameter; seeds pilose or powdery on surface.

Circumtropical, generally along seashores.

Com. name – *Banago* (P. Bis., Tag.).

Exsicc. – *Gruèzo WM24003* (CAHP).

2. GOSSYPIUM Linnaeus

Annual or perennial herbs or erect shrubs, rarely low trees, nearly all parts dotted with black oil glands. Leaves chiefly palmate, 3- to several-lobed. Flowers upon axillary, usually jointed peduncles, yellow, often with purple spot at base, large; bracteoles 3, free or shortly connate, usually foliaceous, entire or laciniately lobed; calyx cup-shaped, truncate or slightly 5-toothed; corolla campanulate; petals convolute or spreading; staminal tube 5-toothed at apex, ultimately with numerous free filaments; ovaries 5-celled; styles clavate, 5-grooved at apex, stigmas as many as staminal tubes; ovules many in each cell. Capsules loculicidally 3- to 5-ovuled; seeds densely clothed with fuzzy matrix or woolly hairs or both.

Species 35, tropics of both hemispheres, many cultivated and introduced into most tropical countries of the Old World.

1. *Gossypium hirsutum* L., Sp. Pl. ed. 2, 975, 1763; Borss., Blumea 14: 124, 1966; Fryxell, Taxon 18: 585, 1969.

Herbs erect, branched, suffrutescent, 0.5-1.5 m high, younger parts sparingly villous or stellate-villous. Leaves broadly ovate, 5-12 cm long, upper ones usually entire, lower ones 3-lobed at upper half; lobes broadly ovate, triangular-acuminate, lower surface conspicuously black-punctate, base cordate. Flowers yellow turning pinkish with age; bracteoles free, green, base deeply cordate, margins fimbriate-cleft; calyx 5-toothed; corolla 4 cm long. Fruits ovoid, 3.5 cm long, beaked, 3- or 4-celled. Seeds free from each other, densely covered with fine fuzz in addition to floss.

Widely distributed in tropical and warm countries. Recently introduced in the Philippines; cultivated.

Com. name – *Bulak* (Tag.), Cotton (Engl.).

Exsicc. – *Pancho CA 20356, 20429* (CAHP).

3. ABELMOSCHUS Medicus

Usually annual herbs coarse, erect, branched, more or less hairy. Leaves subentire or variously lobed, large. Flowers axillary; bracteoles 5 or more; calyx spathe-like, split down one side and falling off after flowering; petals 5, connate at base with staminal tube which is toothed at apex and bearing many anthers; ovaries 5-celled; cells many-ovuled; styles 5, connate below. Capsules loculicidally 5-valved.

Species 15 or more, of wide tropical distribution; 7 in the Philippines.

1. Peduncles about as long as petioles; capsules 7 cm long or shorter; seeds with a musky odor..... 1. *A. moschatus*
1. Peduncles much shorter than petioles; capsules 10-20 cm long; cultivated 2. *A. esculentus*

1. ***Abelmoschus moschatus*** Medic., Malv. 46, 1737. – *Hibiscus abelmoschus* L., Sp. Pl. 2: 696, 1753.

var. *moschatus*

Herbs erect, branched, hispid-hairy, 1 m high or less. Leaves orbicular-ovate to ovate, 6-15 cm long, variously angled or lobed, angles or lobes usually 3 or 5, rarely more, usually broad, base cordate, apex acuminate, margins toothed. Peduncles about as long as petioles; bracteoles linear, usually 8, 1.5 cm long; calyx 2-3 cm long, split down on one side, toothed at apex; corolla yellow, purple at base inside, 10 cm in diameter. Capsules oblong-ovoid, 5-7 cm long, hispid-hairy. Seeds musky.

India, southern China, Indochina, Malesia and the Pacific Islands. Throughout the Philippines, in wastelands.

Com. name – *Kalupi* (Tag.).

Exsicc. – *McGregor 898241* (US).

2. ***Abelmoschus esculentus*** (L.) Moench, Meth. Pl. 617, 1794; Borss., Blumea 14(1):100, 1966. – *Hibiscus esculentus* L., Sp. Pl. 2: 696. 1753.

Herbs erect, branched, hairy, 0.6-1.5 m high. Leaves orbicular or orbicular-ovate, 25 cm long or less, base cordate, margins 3- or 5-lobed, lobes broadly ovate to oblong, coarsely toothed; petioles equaling or longer than leaves. Flowers axillary, solitary; pedicels 2 cm long; bracteoles 8 or 10, linear, deciduous; calyx hairy, 3 cm long; corolla large, yellow, deep-purple at base inside. Capsules 10-20 cm long, narrowly oblong.

Probably native of India, now cultivated as a vegetable in most tropical and subtropical countries. Throughout the Philippines.

Com. name – *Okra* (Tag.); *Lady finger* (Engl.).

Exsicc. – *Lugod CA 8408* (CAHP).

4. HIBISCUS Linnaeus

Herbs erect or subscandent, shrubs or trees. Branches hairy or smooth, seldom spiny. Leaves entire, toothed or palmately 5- to 11-nerved. Inflorescences axillary; bracteoles 5 or more, rarely wanting, free or connate at base; calyx lobulate, sometimes spathaceous and circumsciss; petals united at base with staminal tube, the latter truncate and 5-toothed at top; filaments numerous, ascending; anthers reniform, 1-celled; ovaries 5-celled, each cell with 3 or more ovules and opposite sepals; styles 5, united below; stigmas capitate. Capsules loculicidal, occasionally falsely partitioned, then spuriously 10-celled; seeds glabrous, hairy or woolly.

Species 400, in the tropical regions of both hemispheres; 11 in the Philippines.

1. Trees

2. Flowers white with alternate pink bases; capsules 3 cm long, subellipsoid; seeds shaggy..... 1. *H. glabrescens*

2. Flowers yellow with dark purple at base; capsules 15 cm long, ovoid; seeds glandular-dotted 2. *H. tiliaceus*

1. Shrubs

3. Flowers yellow or white with purple center

4. Bracteoles with an appendage; stems, petioles and pedicel prickly 3. *H. surattensis*

- 4. Bracteoles without an appendage; stems not prickly or slightly prickly by stiff, sharp hairs
 - 5. Leaves palmatilobed to parted; calyx with white arachnoid tomentum, mostly not becoming fleshy after flowering 4. *H. cannabinus*
 - 5. Leaves palmatifid to partite; calyx without white arachnoid tomentum, mostly becoming fleshy after flowering... 5. *H. sabdariffa*
- 3. Flowers pink, red or occasionally white
 - 6. Plants pubescent 6. *H. mutabilis*
 - 6. Plants glabrous
 - 7. Petals entire; staminal column slightly longer than petals 7. *H. rosa-sinensis*
 - 7. Petals deeply incised; staminal column twice as long as petals 8. *H. schizopetalus*

1. ***Hibiscus glabrescens*** (Warb. ex Perk.) Gruèzo, **comb. nov.** Basionym: *Bombycidendron glabrescens* Warb. ex Perk., *Fragm. Fl. Philip.* 16, 1883. – *Hibiscus camphylosiphon* Turcz. var. *glabrescens* (Warb. ex Perk.) Borss., *Blumea* 14(1): 56, 1966. – *Bombycidendron vidalianum* (Naves) Merr. & Rolfe, *Philip. J. Sc.* 3 (Bot.): 112, 1908. – *Hibiscus vidalianus* Naves in Blco., *Fl. Filip. t.* 333, 1877-83; Vidal, *Sinopsis. t.* 16, f.C, 1883, descr. **Figure 115**

Trees tall. Leaves oblong, 15 x 5 cm, midrib with 9-12 pairs of prominent ascending nerves, much paler green beneath, gradually long-acuminate, base truncately rounded; petioles 1.5 cm long, puberulent. Buds erect; involucre united at truncate base, lanceolate segments curved upwardly, persistent; calyx thick, acutely lobed, velvety on inner side, becoming twice as large when in fruit; petals white with alternating pink base, broadest and rounded across top, soon falling off; anthers bilobed at base, filaments short. Capsules subellipsoid, 3 cm long, splitting open at apex into sharply pointed carpels; seeds shaggy.

Endemic. Philippines: Luzon to Mindoro and Palawan, in secondary forests at low and medium altitudes up to 1200 m. Cultivated in Sumatra and Malaysia; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Vidal's lanutan* (Tag.).

Exsicc. – Reyes CA 8902*; Gates CA 1789; Velasco CA 1790, 1791 (CAHP); Villamil 1375258 (US).

2. ***Hibiscus tiliaceus*** L., *Sp. Pl.* 2: 694, 1753; Li, *Woody Fl. Taiwan* 545, f.211, 1963; Smith, *Ann. Mo. Bot. Gard.* 52: 502, 1965; Borss., *Blumea* 14(1): 29, 1966.

Trees suberect, up to 12 m high. twigs sometimes subglabrous. Leaves suborbicular and deeply cordate, lobulate portion rounded, entire or nearly



Figure 115. *Hibiscus glabrescens*: 1. flowering branch; 2. petal; 3. flower, corolla removed; 4. ovary, vertical section; 5. ovary, cross section; 6. stamen; 7. capsule; 8. seed.

so, 10-15 cm across, stoutly 5- to 7-veined from base, glabrous and shiny on upper surface, grayish pubescent on nether surface; petioles as long as blades; stipules broad, caducous. Peduncles terminal, few-flowered, branches subtended by stipule-like bracts; bracteoles 9- to 10-toothed; sepals oblong, 2 cm long, pubescent, acuminate; petals thin, yellow, dark purple at base, turning reddish yellow when old, obovately rounded, 5 cm across. Capsules ovoid, 1.5 cm long, brown-pubescent. 5-valved but falsely 10-celled; seeds glandular-dotted, subreniform.

Pantropic, along seashores. Throughout the Philippines, along tidal streams; occasionally planted.

Com. name – *Malabago* (Bik., Tag.).

Exsicc. – *Baes CA 2925; Ocfemia CA 3413* (CAHP).

3. *Hibiscus surattensis* L., Sp. Pl. 2: 696, 1753; Borss., Blumea 14(1): 57, 1966.

Figure 116

Shrubs subscaudent. Stems aculeate with long-recurved hairs. Leaves orbicular to cross-oval, 5-10 x 8-15 cm, larger ones 5- to 7-partite with linear-lanceolate segments, often aculeate on nerves beneath; stipules semi-cordate, 1-2.5 cm long. Pedicels 4-12 cm, articulate; bracteoles 9-12, linear, 1.5-2.5 cm, patent at base, upcurved, knee-shaped below middle, dorsal side with oblong-lanceolate appendage; corolla 2.5-4 cm long, bright yellow, mostly with dark purple center. Fruits with dense, sharp setae.

Tropical Africa, Asia and Malesia except New Guinea. Throughout the Philippines, in open grasslands at low and medium altitudes; a weed in coconut plantations.

Com. name – *Sagmit, Sapinit* (Tag.).

Exsicc. – *Orlido CA 10257** (CAHP).

4. *Hibiscus cannabinus* L., Syst. ed. 10, 1149, 1759; Borss., Blumea 14(1): 63, 1966.

Herbs erect, slightly branched or unbranched suffrutescent, 2-3.5 m high. Stems with scattered small prickles. Leaves broadly ovate-orbicular, 6-15 cm long, glabrous or sparsely hairy; lobes 3-5, oblong, lanceolate or linear. Calyx after anthesis not becoming thick-fleshy, 2-2.5 cm long, not or hardly longer than fruit; bracteoles of epicalyx 7-10, adnate to calyx, their free apices 7-10 mm long; corolla widely open, yellow or white with purple center. Fruits densely appressed-bristly, pedicels 0.5-0.75 cm, inarticulate.

Tropical Africa. Pantropic in cultivation. Philippines: Luzon (Manila, Pangasinan, Bontoc) and Mindanao (Surigao); occasionally planted for ornamental purpose but scarcely naturalized.

Com. name – *Alas doce* (Sp.).



Figure 116. *Hibiscus surattensis*: 1. flowering and fruiting branch; 2. ovary, cross section; 3. bracts, opened; 4. seed, 2 views; 5. leaf.

5. *Hibiscus sabdariffa* L., Sp. Pl. 2: 695, 1753; Borss., Blumea 14(1): 64, 1966.

Herbs suffrutescent, up to 3 m high. Stems smooth or covered with aculeate warts. Leaves broadly ovate-orbicular, 6-15 cm long, lobulate, lobes 3-5, oblong-lanceolate-linear. Calyx after anthesis becoming thick-fleshy, 2.5-5.5 cm long, longer than fruit, sparsely pilose, without tomentum; bracteoles of epicalyx 8-12, basally connate, adnate to base of calyx tube; corolla 3-5 cm long, pale yellow with bright yellow or purple center. Fruits sparsely to densely appressed-pilose; pedicels 1-1.75 cm long, articulate.

Tropical America. Pantropic in cultivation. In the Philippines, planted sporadically for its edible calyces and for ornamental purpose.

Com. name – Roselle (Engl.).

Exsicc. – *Hernaez CA 12467; Gates CA 1797 (CAHP)*.

6. *Hibiscus mutabilis* L., Sp. Pl. 2: 694, 1753; S.Y. Hu, Malvac. in Fl. China Fam. 153, 49, 1955.

Shrubs erect, branched, 2-4 m high, stems soft, terete, branches densely covered with short, grayish, stellate hairs. Leaves broadly ovate to orbicularly ovate, larger ones cordate at base, 3- to 5-bluntly lobed above middle, obscurely dentate; blade 7-15 cm across or larger, much paler beneath and soft-stellate. 5- to 7-veined from base; petioles densely stellate. Pedicels of solitary flowers nearly as long as petioles, similar in vesture; bracteoles 7-10, linear, ascending, pubescent, almost free; calyx 3.5 cm long or twice as long as involucral bracts, stellate, 5 ovately oblong lobes connate below; corolla 10 cm long and as wide across top, single or double, opening pale pink and turning darker as day advances. Some forms have pure white corolla.

Native of southern China. Early introduced and widely distributed in the Philippines, but nowhere in cultivation.

Com. name – *Amapola* (Tag.).

Exsicc. – *Reyes CA 27864 (CAHP)*.

7. *Hibiscus rosa-sinensis* L., Sp. Pl. 2: 694, 1753; Borss., Blumea 14(1):72, 1966.

Shrubs erect. Branches many, young portion glabrous. Leaves ovate, 7-12 cm long or longer, 3- to 5-veined from base, middle one, more prominent with few lateral pairs above middle, coarsely toothed, acuminate, base obtuse to broadly rounded, entire; petioles 2-5 cm long; stipules setaceous, green. Flowers solitary in uppermost leaf axils, simple or double, 10 cm long and nearly as broad across top, funnel-shaped, upon slender stalks; involucral bracts 6, lanceolate, green, length less than half of calyx; calyx green, glabrous,

2 cm in length, lobes ovate; petals red but deeper colored toward base, sometimes orange, yellow, white, pink, *etc.*, obovate, imbricate; staminal tube slender, exceeding corolla; filaments slender, free toward top; stigmas capitate, dark red, upon radiating branches.

Probably a native of southeastern Asia; now cultivated in all tropical countries. Throughout the Philippines, planted for ornamental purpose and as hedge plant.

Com. name – *Gumamela* (Bik., Pamp., Tag.).

Exsicc. – *Steiner CA 10137; Prieto CA 1794; Magnaye CA 1795; Blancaver CA 4778; Alviar CA 1796* (CAHP).

8. *Hibiscus schizopetalus* (Mast.) Hook. *f. in Curtis Bot. Mag. III, 36: t.6524, 1880; Borss., Blumea 14(1): 73, 1966.* – *H. rosa-sinensis* L. var. *schizopetalus* Mast., *Gard. Chron. 272, f.45, 1879.*

Shrubs suberect, up to 3 m high, branchlets somewhat drooping. Leaves diverse in size, usually ovately oblong, 5-7 cm long, midrib with 3 or 4 pairs of lateral ascending nerves, obscurely dentate, acuminate, base obtusely rounded, entire; petioles 1-3 cm long. Flowers axillary, solitary, usually toward ends of branchlets, drooping; pedicels slender, much-ascending foliage, 8 cm long; bracteoles minute; calyx green, 1.5 cm long, spathe-like; petals pale red except at clawed base, recurved, 5 cm long, divided into numerous lacinate segments; staminal tube slender, long-exserted, pendulous; filaments free, crowded toward top; capitate stigmas upon slender branches, sometimes rebranched.

Possibly a native of tropical Africa; now cultivated in most tropical countries.

Widely planted in the Philippines, planted for ornamental purpose, but nowhere spontaneous.

Com. name – *Gumamela de araña* (Tag.).

Exsicc.– *Foxworthy CA 1798; Gutierrez CA 1799, 1800; Barroga CA 4805* (CAHP).

5. MALACHRA Linnaeus

Annual herbs erect, branched, coarse, hairy. Flowers in axillary fascicles, usually intermixed with bracteoles; calyx tube cup-shaped, lobes 5; petals 5 free, above, coherent below and connate with base of staminal tube which is truncate or 5-toothed; filaments numerous; carpels 5, 1-ovuled; styles 10; ripe carpels indehiscent, separating from axis, smooth.

Species 8, in tropical America; 2 in the Philippines.

1. Leaves obscurely and shallowly lobed; corolla usually yellow..... 1. *M. capitata*
 1. Leaves deeply palmate with 5 narrow lobes; corolla white, finally red
 2. *M. fasciata* var. *lineariloba*

1. *Malachra capitata* (L.) L., Syst. ed. 12: 458, 1767; Borss., Blumea 14(1): 146, 1966. – *Sida capitata* L., Sp. Pl. 2: 658, 1753. **Figure 117**

Herbs coarse, erect, simple or branched, coarsely hairy 0.5-2 m high. Leaves suborbicular, 5-15 cm in diameter, obscurely and shallowly lobed, finely toothed, base somewhat cordate; stipules linear. Flowers in axillary and terminal heads, bracteoles foliaceous, up to 1.5 cm long; calyx lobes short, slenderly acuminate; petals yellow, imbricate, 1 cm long.

Native of tropical America; now widely distributed in tropical countries. Throughout the Philippines, in wastelands.

Com. name – *Bakembakes* (Ilk.).

Exsicc. – *Velasco CA 1803, 1804** (CAHP).

2. *Malachra fasciata* Jacq. **var. lineariloba** (Turcz.) Guerke in Engl., Bot. Jahrb. 16: 1893; Merr., En Philip. 3: 36, 1923. – *M. lineariloba* Turcz., Bull. Soc. (Imp.) Nat. Soc. 31: 206, 1858. **Figure 118**

Herbs stout, erect, more or less branched, hirsute, 0.5-1 m high. Leaves 10-15 cm long, split nearly to base into 5 linear or oblong-linear lobes, 5-15 mm wide, outer ones much shorter than inner, base obtuse or rounded. Flowers fascicled, axillary or on short axillary branches, each fascicle more or less enclosed by leafy bracts, bracts with basal, elongate, linear lobes; corolla white, finally red, 1 cm long.

Native of tropical America. Widely distributed in the Philippines in open wastelands.

Com. name – *Paang-baliuis* (Pang.).

Exsicc. – *Jarmin CA 1805, 1805-A** (CAHP).

6. URENA Linnaeus

Herbs or undershrubs erect, branched, more or less covered with stellate hairs beneath. Leaves palmately lobed or rarely angled, larger long-petioled, lighter beneath. Flowers cymose, axillary, solitary or few-clustered, pink; bracteoles 5, shortly cuneate at base; calyx 5-parted; petals 5, connate below and adnate to staminal tube, often tomentose on back; staminal tube truncate or minutely toothed; anthers many, nearly sessile; ovaries 5-celled, each cell uni-ovulate, opposite petals; stigmas capitate, upon 10 branches. Carpels 5, glabrate or slightly tomentose, covered with hooked bristles or nearly smooth, indehiscent; seeds ascending, grayish brown, smooth, broadly rounded at dorsal side.

A pantropical, monotypic genus.

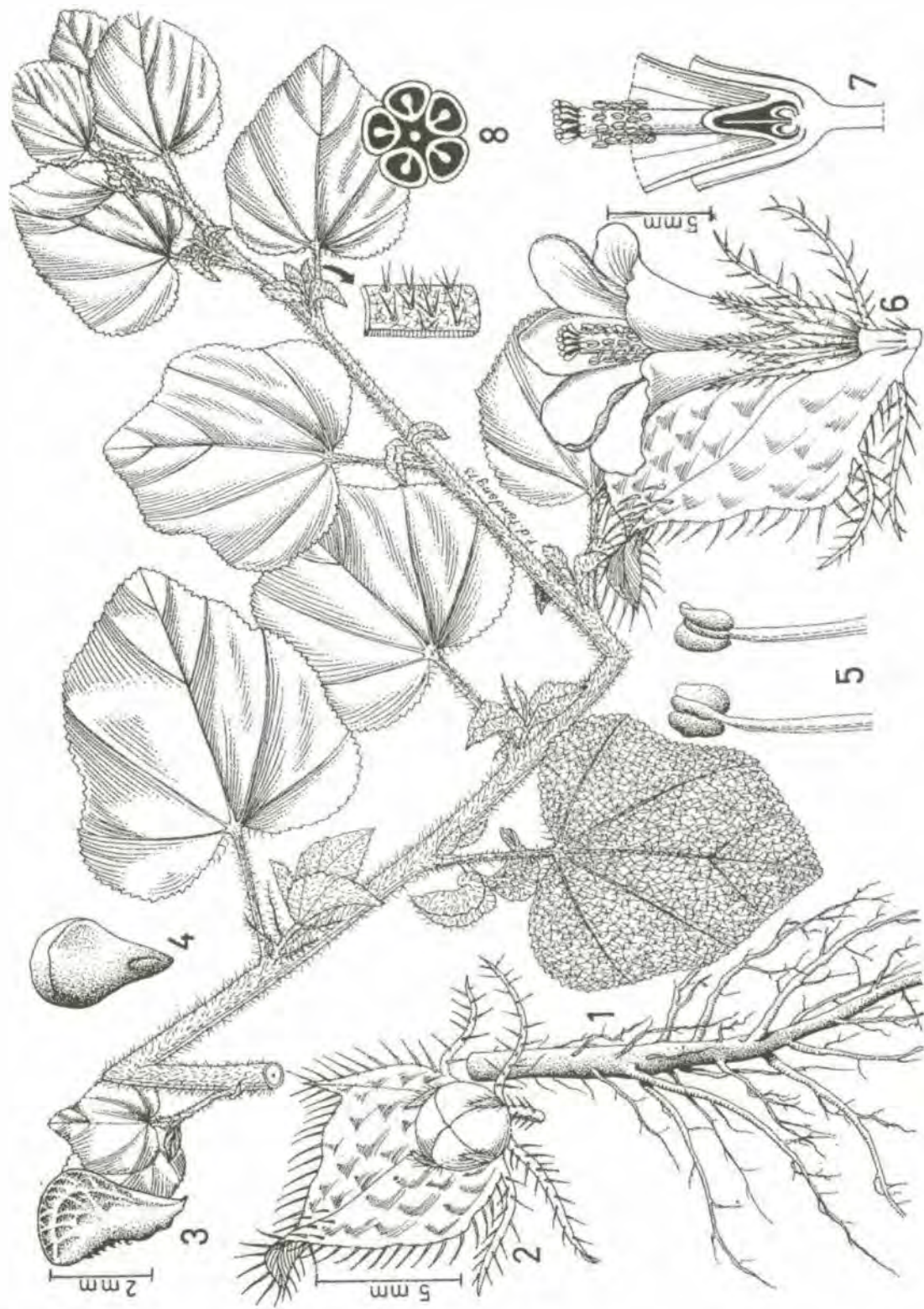


Figure 117. *Malachra capitata*: 1. habit; 2. fruit with foliaceous bracteole; 3. mericarp; 4. seed; 5. stamen, 2 views; 6. flower; 7. flower, vertical section; 8. ovary, cross section.

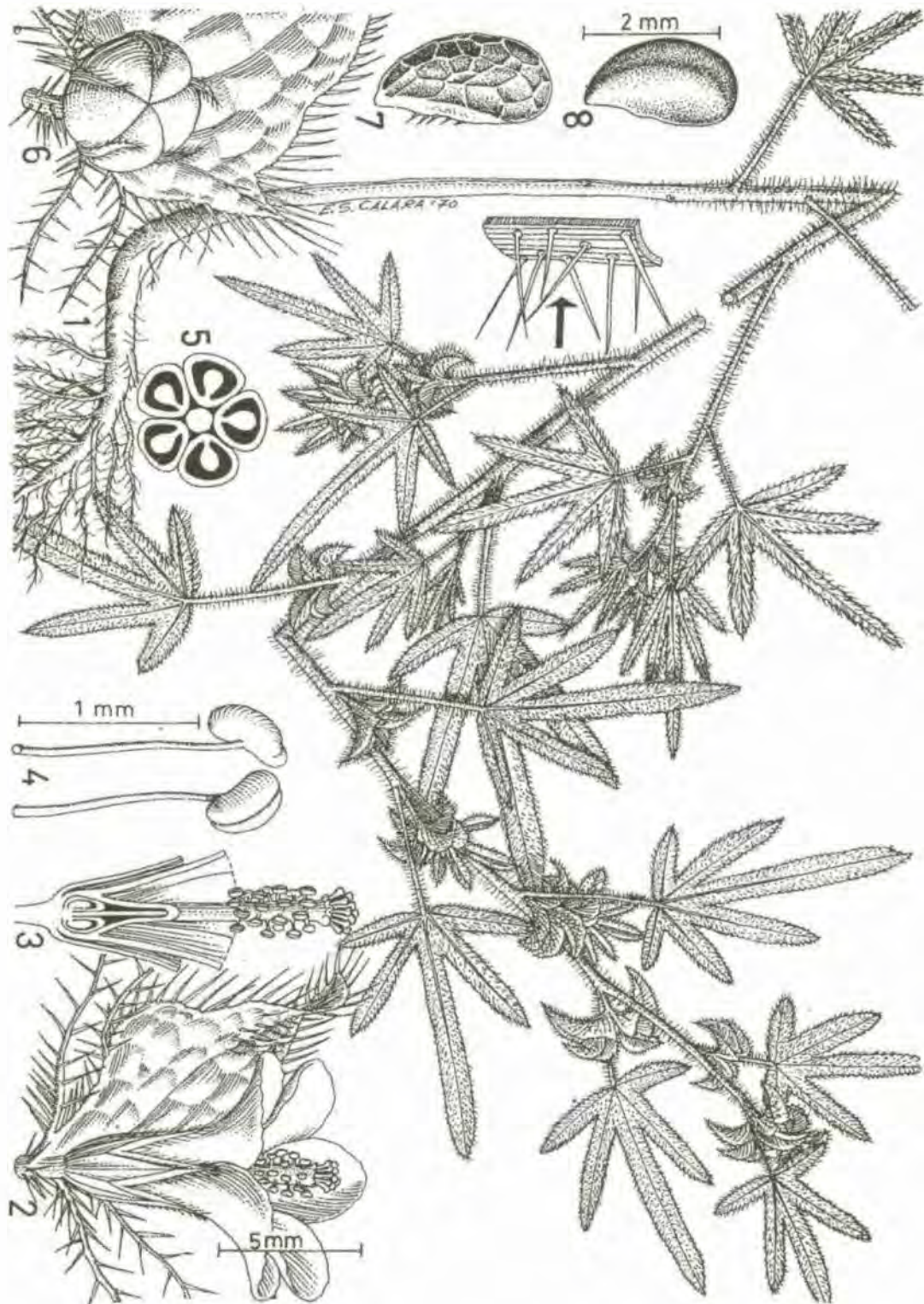


Figure 118. *Malachra fasciata* var. *lineariloba*: 1. habit; 2. flower; 3. flower, vertical section; 4. stamen, 2 views; 5. ovary, cross section; 6. capsule with foliaceous bracteole; 7. mericarp; 8. seed.

1. *Urena lobata* L., Sp. Pl. 2: 692, 1753; Borss., Blumea 14 (1): 138, f. 7-e, f. 20 (right), 1966.

ssp. *lobata* var. *lobata*

Figure 119

Undershrubs erect, 0.5-2 m high. Branches divaricate, twigs yellowish brown-tomentose. Leaves exceedingly variable, ovate to suborbicular, 3-9 cm long, larger ones angularly lobed or incised, sinuses usually broad, much-reduced ones not lobed, 5-veined from base, margins apiculate, base broadly rounded or shallowly cordate. Flowers solitary or few-clustered in terminal leaf axils, pale pink with deeper red bases, 1.75 cm in diameter, short-stalked; bracteoles deeply segmented, nearly as long as thinner calyx; corolla united below middle, lobes obovately rounded, imbricate. Fruits dry, depressed, roundly 5-lobulate, 7.5 mm across, covered with terminally hooked spines.

Pantropic weed. Throughout the Philippines, in all waste or abandoned lands.

Com. name – *Mangkit* (Tag.).

Exsicc. – *Stern CA 10092**; *Agne CA 1818*; *Gates CA 1819* (CAHP).

7. MALVAVISCUS P.C. Fabricius

Shrubs erect or scandent or small trees. Branches and branchlets more or less hispid, pilose or subglabrous. Leaves variously lobed, similar in vesture. Flowers red, peduncle, solitary or few-clustered, axillary but usually at ends of twigs; involucre bracts linear, nearly as long as sepals; calyx lobes ciliate; corolla much-exserted, campanulate, imbricate; staminal column slenderly elongate, antheriferous toward top; ovaries 5-celled, each cell with one ovule; style branches 10. Fruits subglobose, somewhat fleshy, tardily separating into 5 indehiscent carpels.

Species 3 and several botanical varieties; one variety in the Philippines.

1. *Malvaviscus arboreus* Cav. var. *penduliflorus* (DC.) Schery, Ann. Mo. Bot. Gard. 29: 223, 1942. – *M. pilosus* DC., Prod. 1:145, 1824. – *M. penduliflorus* Moc. & Sesse ex DC., *loc. cit.*

Shrubs suberect, up to 2 m high. Young branches beset with stellately scattered hairs. Leaves diverse in size, usually ovate, 6-10 cm long, 5- to 7-veined from base, margins subentire or crenately toothed, acute to subacuminate, base broadly rounded or truncate; petioles 1-5 cm long. Flowers in upper leaf axils, blood red, erect; bracteoles 7, green, equaling calyx, linearly oblong, connate at base, ciliate along edges; calyx green, 1 cm long;

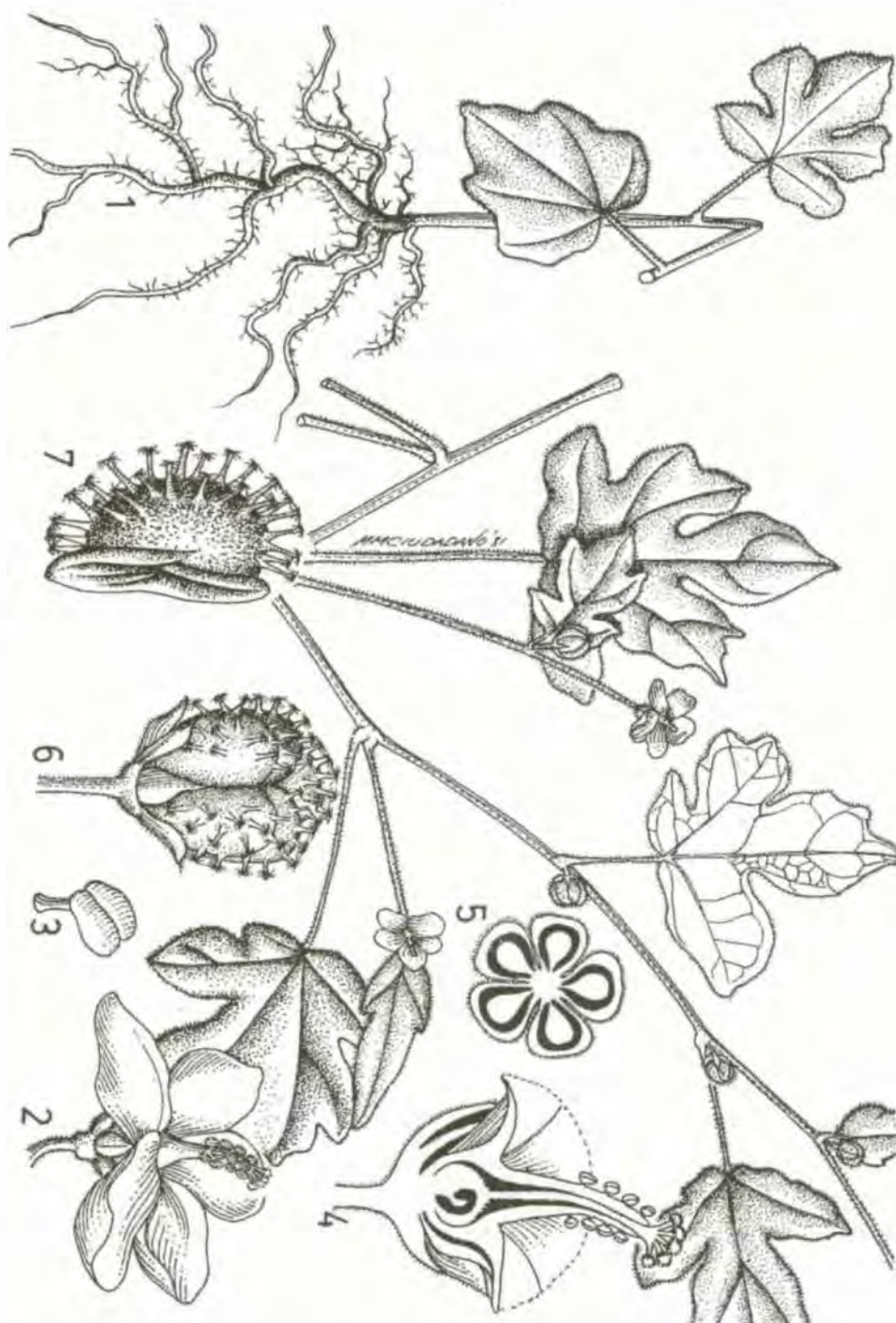


Figure 119. *Urena lobata* ssp. *lobata* var. *lobata*. 1. habit; 2. flower; 3. stamen; 4. ovary, vertical section; 5. ovary, cross section; 6. fruit; 7. carpel, detached.

corolla 2.5 cm long, lobes strongly imbricate; staminal column long, slender; anthers with short filaments; stigmas conglomerated. Fruits smooth, obovoid; longitudinally costate, grooved, surrounded by bracts and calyx.

Native of the West Indies, Central Mexico to Colombia. Cultivated in most towns in the Philippines.

Com. name – *Binatang-hambog* (Tag.).

Exsicc. – *Lugod* CA 8231; *Orlido* CA 4715; *Hernaez* CA 12387 (CAHP).

8. ABUTILON Miller

Herbs or undershrubs erect, suffrutescent, seldom trees. Branches usually stellately gray-pubescent. Leaves cordate, ovate, mostly angularly lobed, pubescent. Flowers axillary or terminal, ebracteolate, usually solitary, yellow; calyx tubular below, cleft into 5 valvate segments; petals 5, connate below and adnate to staminal tube later divided into numerous filaments; ovaries 5 to many, each cell with 3-9 ovules; styles as many as ovaries, filiform or club-shaped, papillose at stigmatic end. Carpels finely separating from axis, rounded at apex of individual parts extended into a beak.

Species 150, in tropical and subtropical regions of both hemispheres; 3 in the Philippines.

1. *Abutilon indicum* (L.) Sweet, Hort. Brit. 54, 1826.; Li, Woody Fl. Taiwan 543, f. 210, 1963; Borss., Blumea 14(1): 171, f. 19d, 1966. – *Sida indica* L. in Torner Cent. Pl. 2: 26. 1756.

Perennial plants, branched, suffrutescent, 0.5-2 m high. Leaves ovately orbicular, 5-12 cm long, 5- to 7-veined from base, subentire or irregularly toothed, soft, ash-gray-pubescent on both surfaces, short or slenderly acuminate, deeply cordate at base; petioles 3-8 cm long, pubescent. Flowers axillary, solitary, long ascending peduncles jointed near tip, soft-pubescent; calyx green, broadly toothed, otherwise cupular; corolla 2 cm long. Capsules 1.5 cm long and somewhat wider, dry, composed of 15-20 closely set, pubescent, shortly awned carpels.

Pantropic. Throughout the Philippines; in thickets and wastelands in and about settled areas.

Com. name – *Malvas* (Sp.).

Exsicc. – *Sulit, Jr.* CA 10743, 10744; *Velasco* CA 1786; *Estioko, Jr.* CA 1787, 1788; *Orlido* CA 10645, 10646, 12970, 12971 (CAHP).

9. **MALVASTRUM** A. Gray, *nom. cons.*

Herbs erect or prostrate, suffrutescent. Leaves toothed, entire or divided. Flowers pedicelled or sessile, axillary or terminal, occasionally forming subpanicles, yellow; calyx cup-shaped, subtended by 1- to 3-segmented involucre or not; petals longer than sepals; staminal tube with numerous anthers and with no sterile tooth; ovaries 5- or more-celled, each with solitary, erect or ascending ovule; styles as many as carpels, arms capitate, papillose at stigmatic end. Ripe carpels separating from short central torus, indehiscent, 1-seeded, usually beaked.

Species 3 or more, chiefly in tropical and subtropical America, some in South Africa; 1 in the Philippines.

1. *Malvastrum coromandelianum* (L.) Garcke, *Bonplandia* 5: 295, 1857; Li, *Woody Fl. Taiwan* 547, f.212, 1963; Borss., *Blumea* 14(1): 152, 1966.
– *Malva coromandeliana* L., *Sp. Pl.* 2: 637, 1753. **Figure 120**

Herbs erect, 1 m high or less, suffrutescent, young portion of stem strigose. Leaves ovately oblong to lanceolate or smaller ones oblong, 2-5 x 1-3 cm, irregularly toothed, obtuse, base usually rounded; petioles 3 cm long, strigose. Flowers axillary and terminal; pedicels strigose, shorter than petioles; calyx green, strigose, 7 mm long, broad, lanceolate lobes acuminate; petals a trifle longer than calyx. Fruits consisting of 8-12 carpels, reniform, 2-3 mm long, compressed, hirsute, with 3 short straight awns.

Native of tropical America. Throughout the Philippines, a common and abundantly distributed weed in wastelands.

Com. name – *Babara* (Ilk.).

Exsicc. – *Orlido* CA 10858, 10859*; *Gates* CA 106534; *Ocampo* CA 106536; *Lugod* CA 4745; *Estioko, Jr.* CA 1806 (CAHP).

10. **SIDA** Linnaeus

Herbs or undershrubs erect, branched, rarely trailing. Stems glabrate or branches more or less stellately pubescent. Leaves toothed, subentire, simple, occasionally somewhat lobed. Flowers axillary, solitary or cymosely clustered at distal ends of branches; involucre absent; calyx lobes valvate; petals yellow, free above, otherwise connate, basal portion adnate to staminal tube; stamens numerous, free toward top; carpels 5 or more, each with solitary pendulous ovule; styles papillate at subcapitate end. Fruits globosely compressed, leathery, finally separating from axis, pointed or more usually 2-awned at summit, seldom beakless.

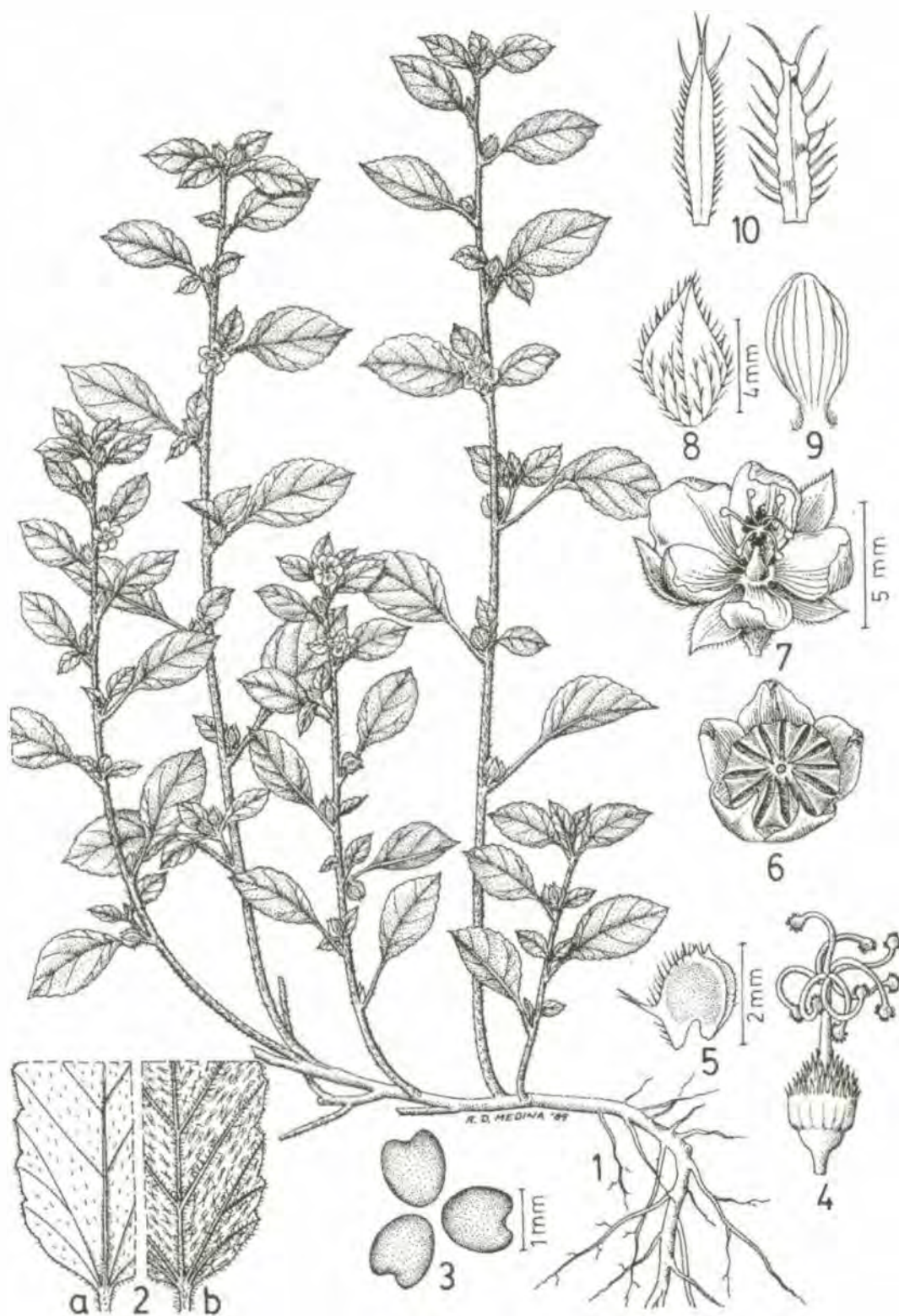


Figure 120. *Malvastrum coromandelianum*: 1. flowering and fruiting branch; 2. capsule; 3. mericarp; 4. pistil; 5. flower; 6. calyx; 7. petal; 8. two kinds of involucre (epicalyx); 9. seed; 10. portion of young stem, enlarged; 11. leaf, (a) dorsal and (b) ventral views.

Species 200, mostly in the New World; many weed species are pantropic; 10 in the Philippines.

1. Herbs prostrate, slender, spreading, suffrutescent 1. *S. javensis*
1. Undershrubs or herbs suffrutescent erect, branched,
 2. Leaves cordate, velvety-pubescent with intermixed, long, spreading hairs 2. *S. cordifolia*
 2. Leaves not cordate; stellate-pubescent or nearly glabrous
 3. Leaves lanceolate, acute 3. *S. acuta*
 3. Leaves oblong to rhomboid, obovate or cuneate
 4. Leaves oblong to rhomboid; pedicels 2-4 cm long; mericarps terminated by awn 1.5 mm long or exaristate.....4. *S. rhombifolia*
 4. Leaves variable, usually obovate or cuneate; pedicels 0.5-4 cm long; mericarps terminated by awn, 1-2 mm long 5. *S. rhombifolia* ssp. *retusa*

1. *Sida javensis* Cav., Diss. 1: 10, t. 1, f. 5, 1785; S.Y. Hu, Malvac. in Fl. China Fam. 153, 25, 1955; Borss., Blumea 14 (1): 184. 1966.

ssp. *javensis*

Figure 121

Herbs trailing. Stems up to 60 cm in length, with scattered stellate hairs or nearly glabrous. Leaves orbicular-ovate, 1-3 cm long, acute or slightly acuminate, base prominently cordate, margins coarsely toothed, sometimes obscurely lobed or trilobed; peduncles axillary, solitary, elongated, jointed in middle; calyx green, 5 mm long, segments triangular, acute or acuminate; corolla 7 mm in diameter. Carpels 5, each 2-awned at apex, awns slender, as long as carpels.

Southeastern Asia and Malesia. Widely distributed in the Philippines; weed in shaded places in the lowlands.

Com. name – *Igat-igat* (Ilk.).

Exsicc. – *Sibayan CA 1814, 1816; Valencia CA 1815** (CAHP).

2. *Sida cordifolia* L., Sp. Pl. 2: 684, 1753; Li, Woody Fl. Taiwan 549, t. 213, 1963.

Figure 122

Herbs erect, suffrutescent, 0.4-1 m high, densely pubescent with intermixed, long, spreading hairs. Leaves ovate, 1.5-4.5 cm long, obtuse, cordate, prominently dentate-serrate, densely pubescent on both surfaces. Flowers axillary, often crowded on younger branches forming leafy racemes; calyx densely pubescent. Carpels prominently rugose, awns as long as carpels.

Pantropic. Common and widely distributed in open wastelands in the Philippines.

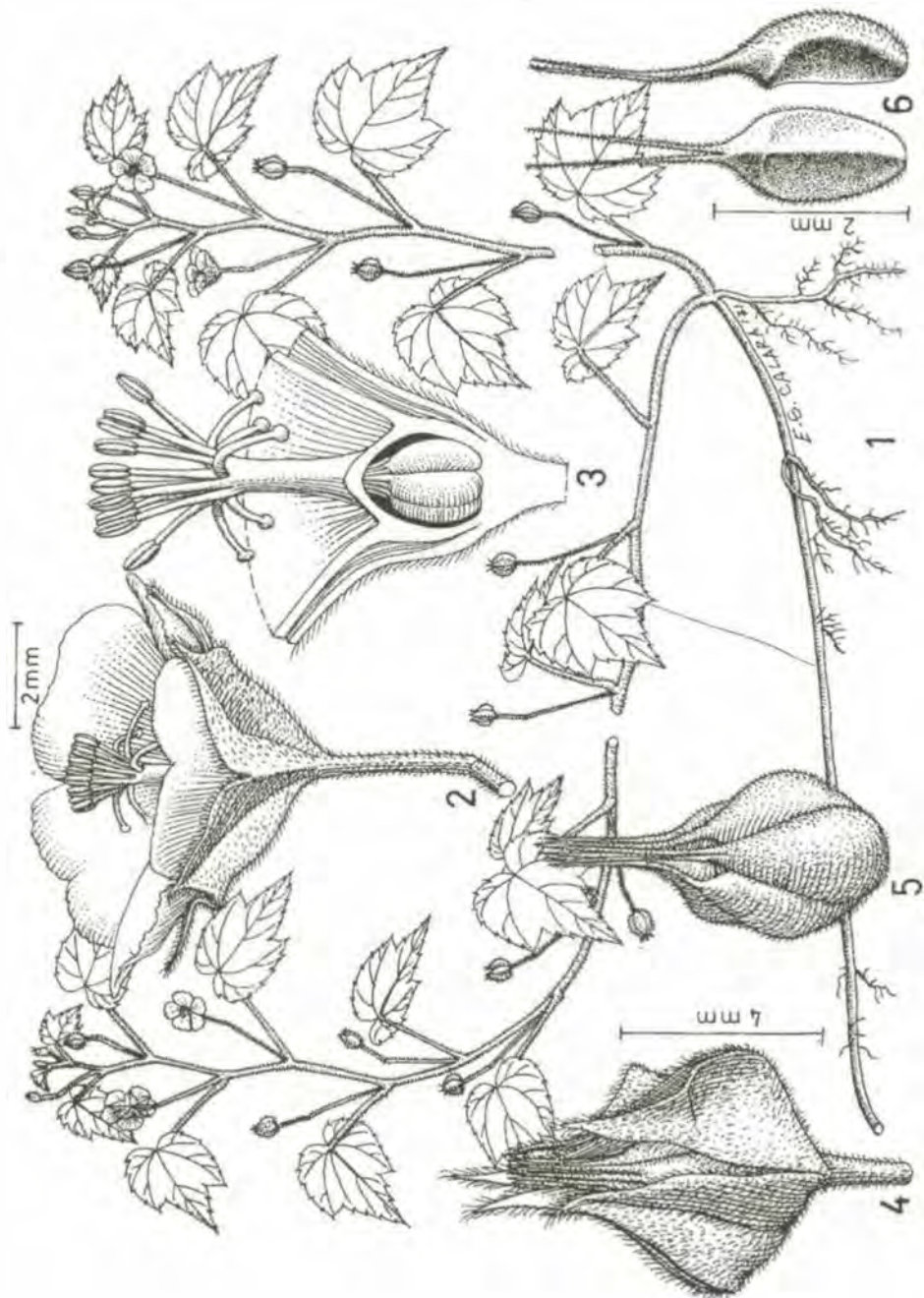


Figure 121. *Sida javensis* ssp. *javensis*: 1. habit; 2. flower; 3. flower, vertical section; 4. capsule; 5. capsule, perianth removed; 6. seed, 2 views.

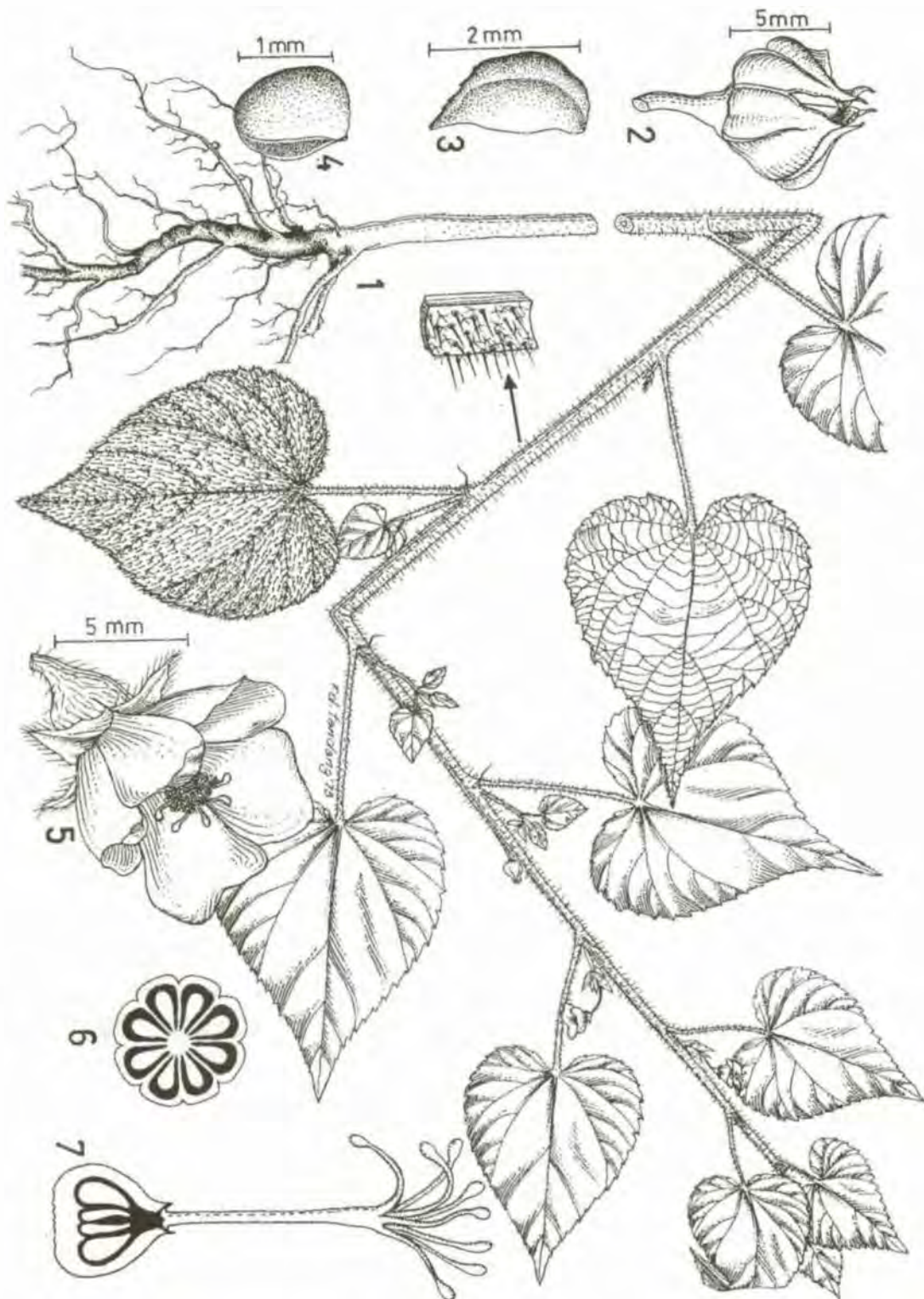


Figure 122. *Sida cordifolia*: 1. habit; 2. capsule; 3. mericarp; 4. seed; 5. flower; 6. ovary, cross section; 7. ovary, vertical section.

Com. name – *Gulipas* (Sub.).

Exsicc. – *Ordoño CA 1810; Fernandez CA 1811** (CAHP).

3. *Sida acuta* Burm. f., Fl. Ind. 147, 1768; Borss., Blumea 14 (1): 186, 1966.

ssp. *acuta*

Figure 123

Undershrubs erect numerously branched, 1 m high or less. Leaves lanceolate, 3-5 x 1-2 cm, midrib straw-brown with obscure nerves, serrate, acute or acuminate, base rounded or obtuse; petioles short, somewhat pubescent; stipules linear. Flowers axillary, solitary or in pairs; pedicels short, slender, jointed near middle; calyx green, lacinate tips usually ciliate; corolla 1.35 cm in diameter. Ripe carpels 4-9, enclosed and exceeded by calyx, 3.5 mm long, rugose, 2-awned.

Pantropic. In the Philippines, a common and abundant weed about towns and in abandoned fields.

Com. name – *Walis-walisan* (Tag.).

Exsicc. – *Baker CA 1809; Esteban CA 1807, 1808; Orlido CA 12972*, 12973* (CAHP); *Elmer 1237774* (US).

4. *Sida rhombifolia* L., Sp. Pl. 2: 648, 1753; Borss., Blumea 14 (1): 195, 1966.

ssp. *rhombifolia*

Figure 124A

Herbs erect, suffrutescent, 0.5-1.5 m high, young branchlets minutely stellate. Leaves diverse in size, usually oblong to rhomboid, 1-4 cm long, midrib prominent beneath with obscure nerves, obscurely dentate, acute to rounded, obtuse to subcuneate at base; petioles short, cinereous; stipules setaceous, as long as petiole. Flowers axillary, solitary; pedicels slender, to 3 cm in length, usually jointed above middle; calyx green, persistent, ridged at base, lobes abruptly terminating into an elongated point; corolla 1.75 cm long. Ripe carpels 8-10, nearly smooth or somewhat rugose. 2.5 mm long, not awned, enclosed by calyx; seeds flattened, reniform, 1.25-2 mm long, glabrous, dark brown or black.

It is easily recognized by the pedicel which is usually jointed above middle and much longer than petiole and by the persistent calyx which is ridged at base.

Throughout the tropical and subtropical regions of both the Old and New World. In the Philippines, it is a common weed in wastelands, roadsides, pastures, between rows in upland crops, plantations and fallow fields.

Com. name – *Takling-baka* (Pang.).

Exsicc. – *Lugod CA 4776; Blancaver CA 4779** (CAHP); *Canicosa 2125832* (US).



Figure 123. *Sida acuta* ssp. *acuta*: 1. habit; 2. leaf; 3. flower; 4. capsule; 5. seed with two awns.

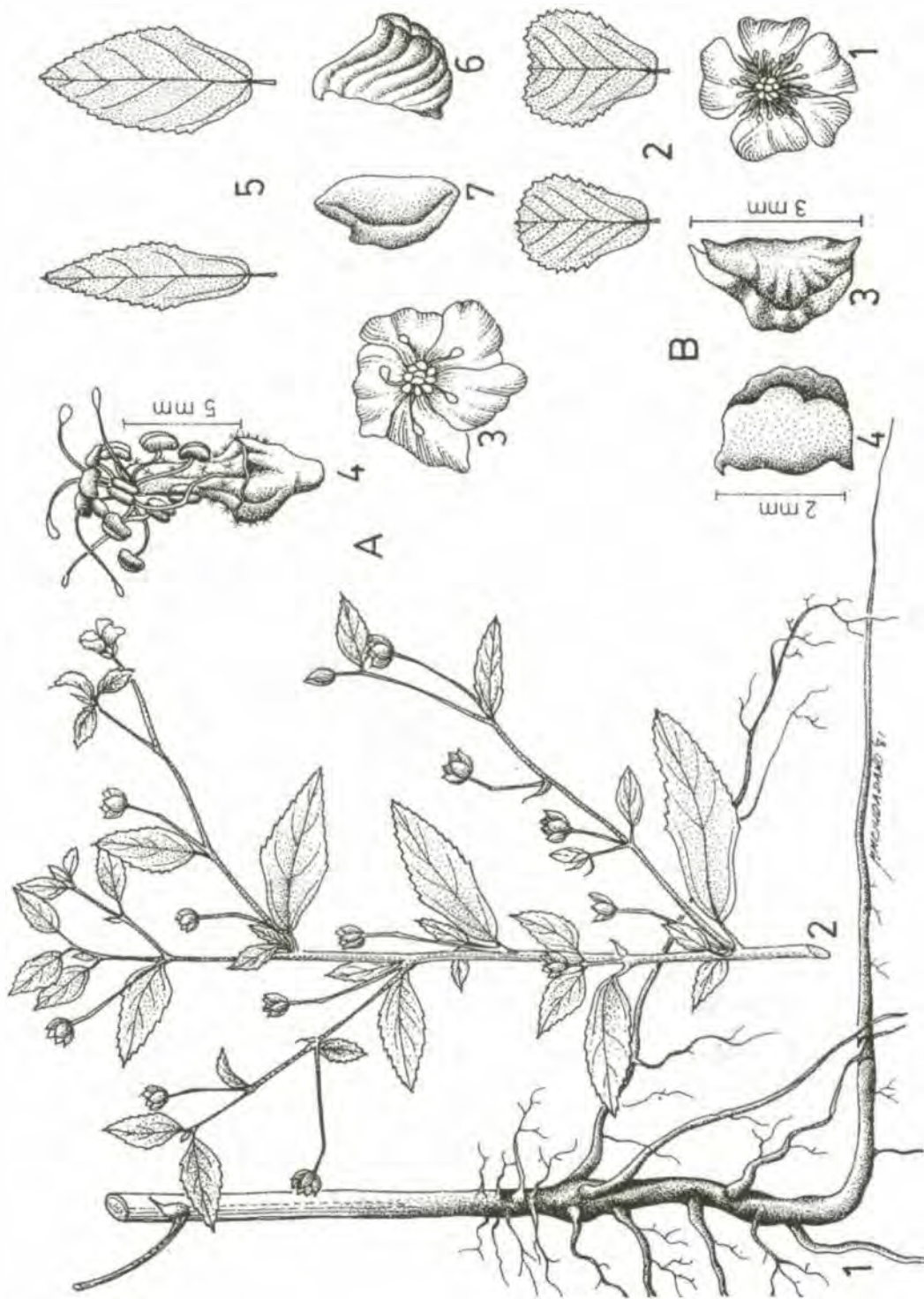


Figure 124A. *Sida rhombifolia* ssp. *rhombifolia*: 1. root system; 2. flowering branch; 3. flower, top view; 4. flower, petals excised; 5. leaves; 6. mericarp; 7. seed. B. *Sida rhombifolia* ssp. *retusa*: 1. flower, top view; 2. leaves; 3. mericarp; 4. seed.

5. *Sida rhombifolia* L. Borss., Blumea 14(1): 198, t.21e-h, 1966. – *S. retusa* L., Sp. Pl. 2: 961, 1763.

ssp. *retusa*

Figure 124B

Shrubs erect or spreading, low, stiff. Leaves variable in size and shape, usually obovate or cuneate, 1-2 cm long, midrib prominent beneath with ascending lateral nerves, grayish tomentose beneath, toothed toward retuse apex, subsessile or shortly petioled. Flowers usually solitary in upper leaf axils; pedicels 1 cm long or more, pubescent; calyx minutely puberulent, lobes acute, ridged at base; corolla little exceeding, obovately oblong, thin. Fruits compressed, enclosed by persistent calyx, faintly pubescent; carpels beaked, smooth or only slightly rugose.

Pantropic. In the Philippines, a common and widely scattered weed in open grasslands.

Com. name – *Eskoba* (C. Bis., Tag.).

Exsicc. – *Seriosa* CA 10861; *Orlido* CA 10860*, 12974, 12975; *Guantes* CA 106533 (CAHP); *Elmer* 123770 (US).

96. BOMBACACEAE

Trees or erect shrubs. Leaves alternate, simple or digitately compound, usually with peltate scales or stellate hairs; stipules often fugacious. Inflorescences axillary or terminal, sometimes cauliflorous; flowers regular, bisexual, small or large, solitary or forming few cymose clusters or even paniculate; involucre of buds closed, becoming irregularly slit; calyx cup-shaped, truncate or irregularly 3- to 5-lobed; petals 5 (7), imbricate, base occasionally connate to staminal tube; stamens 3 to many, all fertile or rarely partly staminodial; filaments free or in a tube; anthers 1- to several-locellate, longitudinally dehiscent or poricidal; pollen smooth; ovaries 2- to 5 (-10)-celled, superior, free; stigmas capitate or divided; ovules 2 to many in each cell, erect. Fruits loculicidally 5-valved capsules, dry or fleshy, indehiscent or not; seeds smooth, enveloped in woolly or silky hairs or imbedded in spongy meat, frequently arillate.

Genera 26, species 100, chiefly tropical; 7 genera and 7 species in the Philippines.

1. Leaves digitately compound
 2. Flowers red; stamens monadelphous; anthers reniform 1. *Bombax*
 2. Flowers yellow white; staminal bundles 5; anthers linear or sinuous
..... 2. *Ceiba*
1. Leaves simple
 3. Capsules indehiscent, samaroid with 5 membranous wings, much enlarged laterally or loculicidally 5-valved, if latter with broadly pyramidal spines; seeds arillate or surrounded by weak pulp

4. Capsules samaroid; leaves palmatilobate, rarely entire 3. *Cavanillesia*
 4. *Durio*
 3. Capsules dehiscent, loculicidally 5-valvate; seeds not arillate 5. *Ochroma*

1. BOMBAX Linnaeus

Shrubs erect or trees deciduous or not. Leaves palmately compound; leaflets 3-9, entire or nearly so. Flowers solitary or few together in leaf axils, large, appearing before foliage; calyx cup-shaped, truncate or irregularly lobed; petals basally connate and adnate to staminal tube; stamens numerous, monadelphous, bundles opposite petals, divided above into numerous filaments; anthers reniform, 1-celled; styles clavate; stigmas 5; ovules horizontal, many in each cell. Capsules woody, woolly within; seeds subglobose, smooth, imbedded in woolly matrix.

Species 50, mainly in tropical America; 2 in the Philippines.

1. *Bombax ceiba* L., Sp. 511, 1753; Robyns, Bull. Jard. Bot. Brux. 33: 88, 1963; Gruèzo, *Kalikasan*, Philipp. J. Biol. 5(3): 364, f.4, 1976. – *B. malabaricum* DC., Prodr. 1: 479, 1824. – *Salmalia malabarica* (DC.) Schott & Endl., Melet. Bot. 35, 1932. – *Bombax heptaphyllum* L., Syst. ed. 12, 457, 1767, non L., Sp. Pl. ed. 2, 960, 1763. – *Gossampinus heptaphylla* (L.) Bakh., Bull. Jard. Bot. Btzg. III, 6: 189, 1924, p.p. excl. syn.

Trees, up to 30 m high or more, 150 cm dbh, with steep, unequal buttresses. Trunk gray, with large umbonate spines. Leaves deciduous, 10-20 cm long; petioles crowded at ends of relatively thick, glabrous twigs; leaflets 5-7, subsessile, oblong to lanceolate-oblong, 14 x 6 cm, pale green beneath, midrib ridged beneath with numerous pinnate pairs of lateral nerves, glabrous, acute, obtuse at base. Flowers dull red, 8-10 cm long, solitary or few-fascicled, upon short, thick stalks; calyx thick, 3.5 cm across, broadly lobed, velvety on inner side; petals sub-erect, stellate-pubescent, oblong; stamens half as long as petals, basal portions united; anthers much-twisted. Capsules 15 x 4 cm, terete, inner side of thick valves with smooth seeds imbedded in copious, silky hairs or wool.

Native of India and distributed in Burma, Thailand, southern China, Philippines, Malaysia, Sumatra, Java, New Guinea and Australia; also found in the Himalayan ranges and in Sri Lanka. Throughout the Philippines, in primary and secondary forests at low and medium altitudes.

Com. name – *Malabulak* (Tag.).

Exsicc. – *Copeland CA 1820; Pancho CA 3176* (CAHP).

2. CEIBA Miller

Trees. Leaves digitately compound; leaflets 3-9, shortly stalked, glabrous, glaucous-beneath, mostly entire. Flowers appearing with or before foliage, fascicled, seldom solitary, axillary, outer parts often with felty or woolly covering, yellow or whitish; calyx campanulate-urceolate, 3- to 12-lobed, persistent; petals connate at base and adnate to staminal tube, falling off together with stamens and styles; staminal bundles 5 with 2 or 3 sinuses or linear anthers; ovaries ovoid, partly inferior, 5-celled; ovules in few longitudinal rows in each carpel; styles cylindrical, dilated; stigmas obscurely 5-lobed. Capsules oblong, dehiscent, coriaceous, 5-celled, 5-valved, valves silky within; seeds globose, smooth, densely embedded in soft, whitish hairs.

Species 10, all pantropic and mostly natives of tropical and subtropical America; 1 in the Philippines.

1. *Ceiba pentandra* (L.) Gaertn., *Fruct. Sem.* 2: 244, *t.* 133, 1791; Robyns, *Ann. Mo. Bot. Gard.* 51: 48, 1964; Gruèzo, *Kalikasan*, *Philipp. J. Biol.* 5(3): 371, *f.* 7, 1976. – *Bombax pentandrum* L., *Sp. Pl.* 511, 1753.

Trees, up to 20 m high or more. Stems cylindrical, occasionally with scattered, large, blunt spines; branches divaricate, often in subwhorls. Leaflets 5-8, subsessile, narrowly oblong to lanceolate, 6-15 x 3-4 cm, pale green or grayish beneath, acuminate, base obtuse or acute; petioles slender, as long or longer than leaflets. Flowers few or numerous, whitish, 3 cm long; pedicels 2 cm long; calyx thick, turbinate, glabrous on exterior, subtruncate; petals twice as long as calyx, densely silky on outside, oblongish; stamens barely exerted; anthers linear; styles slender; stigmas subclavate or obscurely lobed. Capsules 10-15 x 4 cm, pendulous, coriaceous, pointed at both ends, carpels tardily separating; seeds densely surrounded by soft, cottony, whitish hairs.

Native of tropical America. Introduced and well-scattered in settled regions throughout the Philippines.

Com. name – *Kapok* (Bis., Sul.).

Exsicc. – *Pancho CA 20176, 20255* (CAHP).

A single tree of *Ceiba trichistandra* (A. Gray) Bakh. [Exsicc.- *Bulalacao CA 1821; Gates CA 1822, 1823* (CAHP)] on the University campus differs in having the buttress largely extending upwardly with the main branch erecto-patent. It was introduced from South America.

3. **CAVANILLESIA** Ruiz & Pavon

Trees large, deciduous. Leaves simple, blade entire or palmatilobate sometimes cordate at base, petiolate; stipules ovate. Flowers in axillary, umbelliform cymes, bisexual, actinomorphic, pedicellate, 3-bracteolate, bracteoles fugacious; calyx campanulate, 5-lobed, tufted-pubescent outside, accrescent; petals 5, adnate to base of staminal column, tufted, pubescent; stamens numerous, divided into many pentadelphous filaments; anthers longitudinally dehiscent; ovaries sessile, 3- to 5-celled; styles simple; stigmas capitate to 5-lobulate. Capsules samaroid, coriaceous with 5 membranous wings, much enlarged laterally; seeds large, oblong-fusiform, surrounded by weak pulp.

Species 3, Panama to Peru; 1 in the Philippines.

1. ***Cavanillesia platanifolia*** (H. & B.) H.B.K., Nov. Gen. Sp. Pl. 5: 306, 1823; Robyns, Ann. Mo. Bot. Gard. 51: f.6, 1964. – *Pourretia platanifolia* H. & B., Pl. Aequin. 2: 162, t.133, 1817.

Trees, up to 40 m high or more, trunk straight, generally somewhat swollen near base. Leaf blades ovate-cordate, 3- to 7-palmatilobate, seldom entire, 25 cm long or more, lobes ovate, shortly acuminate, glabrous or puberulous on lower surface, nerves prominent below. Flowers precocious; calyx lobes triangular, acute, shortly ferruginous-tomentulose outside, silky-villous inside; petals linear-spatulate, asymmetric at apex, 2-2.5 x 0.6 cm, reddish; stamens reddish, staminal column half as long as petals, glabrous; anthers 1.5 mm long; ovaries subrotund-ovoid, 5-costate, 5-celled; styles straight; stigmas 5-lobulate. Capsules 10-12 cm long, wings semi-circular, 10-15 x 5-6 cm, membranous, reticulate-veined, 5-celled; seeds oblong-linear, acute at both ends.

Panama to Peru. Introduced in the Philippines; in cultivation on the University campus in Mt. Makiling, Luzon area.

Com. name – Chinese parasol tree (Engl.).

Exsicc. – *Curio* CA 10076; *Pancho & Paysan* CA 3356, 3357 (CAHP).

4. **DURIO** Adanson

Trees. Branchlets lepidote. Leaves simple, entire, lower surface covered with layer of stellate hairs; petioles thickened at apex. Inflorescences on young branchlets, older branches, or on bole, consisting of few-flowered cymes on reduced and hardly branched or unbranched peduncles; flowers subtended by lepidote bracts; calyx 5-lobed; petals 4-6, contorted in bud; ovaries sessile, ovoid or ribbed, covered with stellate hairs, scales or both, 3-6-celled. Fruits capsular, usually 5-locular; seeds ellipsoid, in 2 rows in each compartment, arillate.

Species 27; Sri Lanka, India, Burma, Malay Peninsula, Sumatra and Borneo; 1 in the Philippines.

1. *Durio zibethinus* Murr., Syst. Nat. Veg. ed. 13. 581, 1774; Kosterm., Reinwardtia 4: 72, 1958; Gruèzo, *Kalikasan*, Philipp. J. Biol. 5(3): 359, f.1, 1976.

Trees large, low-buttressed, 30-40 m tall, 120 cm dbh; bole cylindrical, straight, rarely angular and curved. Bark rough, pale orange-brown then reddish to dark brown, with shallow, vertical fissures 2-5 cm long; with age, bark sloughs off as thin scales or loosely adherent chips. Leaves chartaceous, elliptic or lanceolate-elliptic 10-15 x 3-4.5 cm or larger, slenderly acuminate, base acute or obtuse, pairs of lateral nerves up to 15, slender, arcuate, anastomosing near margin; stipules subfalcate, acuminate. Flowers 5-6 cm long, 2 cm in diameter, white or greenish white; calyx tubular or urceolate; stamens in 5 free phalanges; ovaries ovoid, 5-ribbed; styles pubescent; stigmas capitate. Fruits yellowish brown, ovoid or ellipsoid, 25 cm in diameter, with broadly pyramidal spines; seeds completely covered by a white or yellowish, soft, sweet aril.

Occurs in the wild in Borneo and Sumatra; mostly cultivated in Burma, Thailand, Indochina, Malaysia and Indonesia (Celebes, Java, Moluccas); apparently absent in New Guinea. In the Philippines, not known to occur in the wild but widely cultivated in Mindanao (Agusan, Lanao, Cotabato, Davao and Sulu); Mindoro, Palawan and in the vicinity of Mt. Makiling, Luzon.

Com. name – *Durian* (Lan.).

Exsicc.: – *Pancho CA 20207, 20342* (CAHP).

5. OCHROMA Swartz

Trees with very light wood, trunk sometimes buttressed. Leaves simple, blade generally cordate, palminerved with tufted hairs, petiolate; stipules broadly ovate. Flowers axillary toward tip of branchlets, solitary, bisexual, actinomorphic, pedicellate, 3-bracteolate, bracteoles fugacious; calyx tubiform, 5-lobate, lobes unequal, hairy outside, deciduous; petals 5, adnate to base of staminal column, hairy outside; stamens numerous; anthers longitudinally dehiscent; ovaries sessile, 5-celled, cells ovulate; stigmas exceeding staminal column, spirally 5-sulcate. Capsules loculicidally 5-valvate, hairy inside; seeds numerous, small, pyriform, embedded in hairs of capsule.

A neotropical, monotypic genus from southern Mexico to Bolivia.

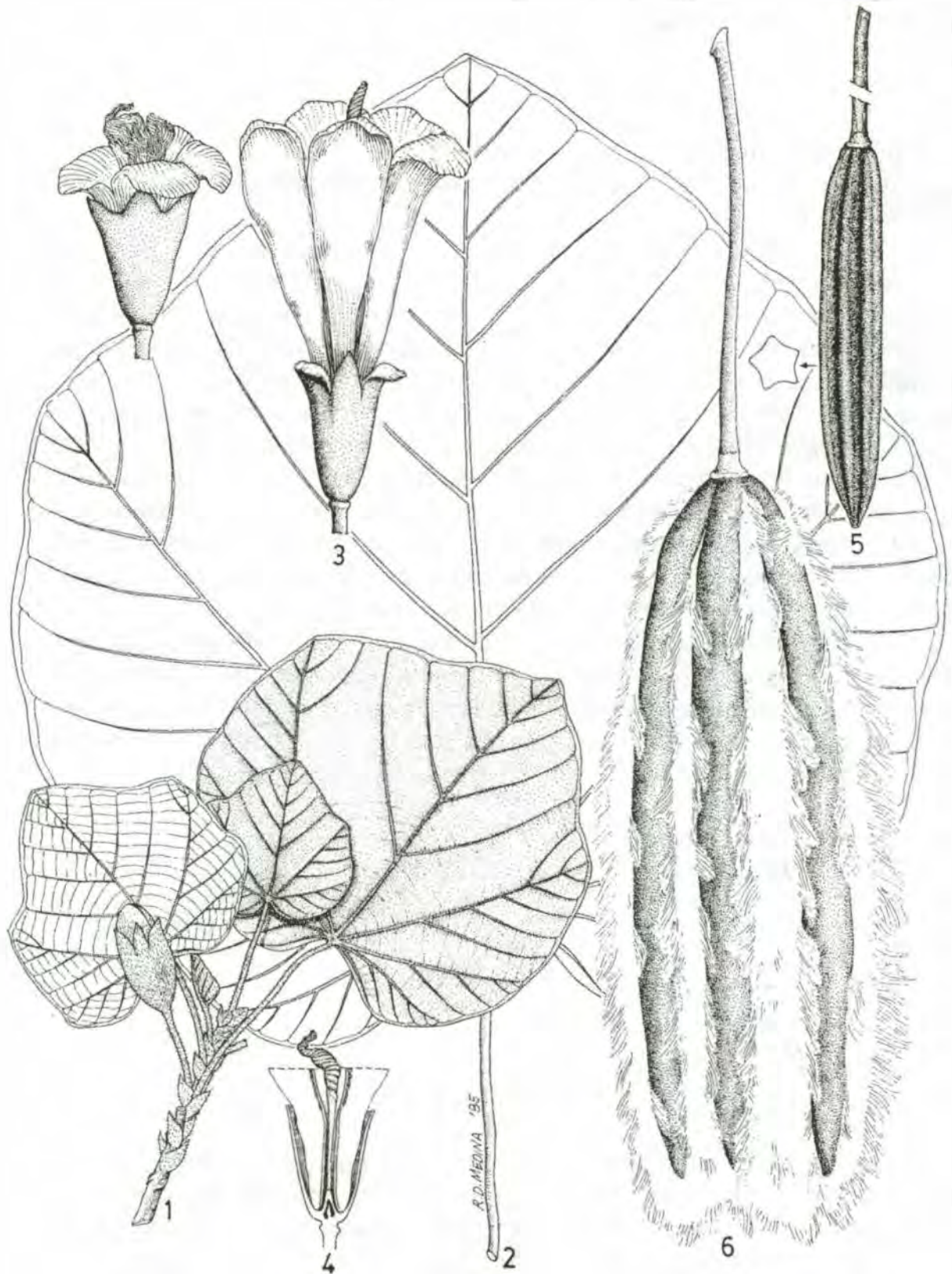


Figure 125. *Ochroma pyramidale*: 1. flowering twig; 2. outline of leaf; 3. flowers; 4. flower, vertical section; 5. young fruit; 6. matured fruit.

1. *Ochroma pyramidale* (Cav. ex Lem.) Urban, Repert. Sp. Nov. 5: 123, 1920; Robyns, Ann. Mo. Bot. Gard. 51: 64, f.9, 1964. – *Bombax pyramidale* Cav. ex Lem., Encycl. Meth. Bot. 2: 552, Apr. 1788. – *Ochroma lagopus* Sw., Nov. Sp. Prodr. Veg. Ind. Occ. 98, Jun.-Jul. 1788; Pierce, Trop. Wood. no. 69, 1-2, 1942; *Ibid.* no.70, 20-23, 1942; Gruèzo, *Kalikasan*, Philipp. J. Biol. 5(3): 367, f.6, 1976. – *O. grandiflorus* Rowlee, J. Wash. Acad. Sc. 9: 157-167, 1919. **Figure 125**

Trees, up to 30 m high. Leaf blades generally undulate, tomentulose, ovate-angulate to ovate, 10-40 x 11-35 cm, 3- to 5-sublobate, base generally deeply cordate, often truncate, apex acute or acuminate, 7- to 9-palminerved, nerves prominent beneath; petioles 3-40 cm long. Pedicels tomentulose; calyx 8-12 cm long, tomentulose outside, often purple-spotted, sericeous-villous inside, lobes 2-5 cm long; petals obovate-spatulate, 10-15 cm, whitish, puberulous on upper part outside, glabrous inside; staminal column cylindrical, 10-12 cm long; ovaries 5-angulate. Capsules oblong-fusiform, 5-angulate, 15-25 x 2.5-3 cm, valves brownish black; seeds 5 mm long; kapok pale brown.

A native of Ecuador but now widely cultivated in all tropical countries for its economically important lightweight wood. A fast-growing species in open fields, in lowlands to foothills and rolling grounds of medium altitude. In Mt. Makiling, Luzon, recently introduced on the University campus.

Com. name – Balsa wood (Engl.).

Exsicc. – *Lugod CA 5001, 5020**; *Uichanco CA 2940* (CAHP).

97. STERCULIACEAE

Herbs, shrubs or trees, rarely climbing shrubs. Leaves alternate, simple or digitately compound, often lobed; stipules caducous. Inflorescences axillary or terminal, sometimes cauliflorous, paniced; sepals 3-5, basally connate, valvate; petals as many as sepals or absent; stamens 5 to numerous, united in a tube, rarely few and free; anthers variously disposed on staminal tube, cells always 2, parallel or divergent; ovaries free, 2- to 5-celled, seldom unicarpellate, sessile or stalked; styles consolidated or as many as cells of ovary; ovules few or many, attached to inner angle of carpel. Fruits dry or fleshy, dehiscent or indehiscent; seeds arillate, albuminous or exalbuminous, attached to inner angles of carpel.

Genera 65, species 1200, in the tropics of both hemispheres; 16 genera and 48 species in the Philippines.

1. Flowers apetalous
 2. Follicles dehiscent when fully mature; seeds not winged 1. *Sterculia*
 2. Follicles indehiscent; seeds winged
 3. Inflorescences appressed-lepidote; anthers 4-20; styles free 2. *Heritiera*
 3. Inflorescences glabrous; anthers 10; styles coherent 3. *Pterocymbium*
1. Flowers petalous
 4. Flowers fascicled on stems and branches..... 4. *Theobroma*
 4. Flowers axillary or terminal
 5. Stamens 5
 6. Undershrubs; leaves elliptic, short-petioled 5. *Waltheria*
 6. Trees or suffrutescent herbs; leaves cordately ovate, long-petioled 6. *Melochia*
 5. Stamens about 15, never 5
 7. Ovaries sessile
 8. Calyx 3-partite; petals deeply 2-partite 7. *Guazuma*
 8. Calyx 5-partite; petals otherwise
 9. Flowers bracteolate, bracts caducous or persistent; fruits not winged
 10. Bracteoles persistent; ovary cell with 2-4 ovules 8. *Dombeya*
 10. Bracteoles caducous; ovary cell with numerous ovules... 9. *Pentapetes*
 9. Flowers ebracteoles; fruits winged..... 10. *Abroma*
 7. Ovaries upon a gynophore
 11. Flowers pink; capsules inflated, membranous..... 11. *Kleinhovia*
 11. Flowers yellowish white; capsules somewhat woody 12. *Pterocymbium*

1. STERCULIA Linnaeus

Trees or shrubs. Leaves simple or digitately compound. Inflorescences axillary or terminal, paniculate; flowers bisexual or polygamous; calyx tubular or funnel-shaped, 4- to 5-parted, lobes spreading or their tips cohering, often colored; petals wanting; staminal column terminated in a head or ring of sessile, 2-celled anthers; ovaries sessile or stipitate, 4 or 5 carpels, opposite petals, each 2- to many-ovuled; styles connate below; stigmas as many as carpels, free, radiating. Fruits small or large follicles, inflated, few- to many-seeded, coriaceous or woody; seeds 1 or many, naked, sometimes arillate, often winged.

Species 200, throughout the tropics; 20 in the Philippines.

- 1. Leaves digitately compound 1. *S. foetida*
- 1. Leaves simple
 - 2. Blades oblong
 - 3. Leaves pale green, glabrous beneath; panicles terminal from leaf arils, nearly equaling foliage 2. *S. oblongata*
 - 3. Leaves whitish brown, velvety-pubescent beneath; panicles axillary, shorter than foliage 3. *S. montana*
 - 2. Blades ovate
 - 4. Leaves soft, gray-pubescent beneath 4. *S. philippinensis*
 - 4. Leaves densely brown- or stellate-pubescent beneath ... 5. *S. stipularis*

1. ***Sterculia foetida*** L., Sp. Pl. 2: 1008, 1753; Merr., En. Philip. 3: 54, 1923.

Trees stout, erect with spreading crown, often deciduous or nearly so. Branches thick, marked by leaf scars. Leaves crowded at ends of branchlets, digitately compound; petioles strong, 10-20 cm long; leaflets 7-9, glabrous, coriaceous, entire, elliptic-oblong, sharply acuminate or caudate, 12-18 x 4-6 cm, sessile, midrib prominent with faint nerves. Racemose panicles few to several, terminal, usually appearing just before foliage, 1-1.5 cm long, glabrate except flowers, erect; flowers fetid, purplish, usually few-clustered at ends of short branches, 2.25 cm across; pedicels 1 cm long or shorter, articulated; calyx lobes narrowly oblong, longer than broad basal tube, villous within. Follicles large, woody, dull red, nearly glabrous, obovoid, compressed especially toward curved base, 10 cm long, upon thick stalks; seeds 10-15 in each cell.

Eastern Africa to India, through Malesia to northern Australia. In the Philippines, at low elevations but never abundant.

Com. name – *Kalumpang* (Bik., Bis., Pamp., Tag.).

Exsicc. – *Sulit 2212344* (US).

2. ***Sterculia oblongata*** R.Br. in Benn., Pl. Jav. Rar. 232, 1844; Merr., En. Philip. 3: 55, 1923.

Trees, up to 10 m high or more. Leaves simple, oblong or subelliptic, 3-18 cm, pronounced midrib with 5-8 pairs of ascending nerves, abruptly acute, base truncately rounded, often slightly cordate; petioles 3-5 cm long, glabrous. Panicles terminal from leaf axils, nearly equaling foliage, profusely rebranched, brown-stellate-pubescent; flowers yellowish white, 5.5 mm long, brown-strigose; pedicels short; calyx lobes linear, cohering at their ends; staminal column very short with numerous sessile anthers; ovaries 5, pubescent; stigmas recurved. Infrutescences upon ligneous stalks, bearing at distal end few umbellately clustered follicles; carpel compressed, elliptical, 7 cm long by half as wide, more pointed at base, short-felty, yellowish red.

Celebes. Throughout the Philippines, in primary and secondary forests at low and medium altitudes.

Com. name – *Malabubo* (Tag.).

Exsicc. – *Gates CA 1850; Velasco CA 3394 (CAHP); Villamil 902844 (US)*.

3. *Sterculia montana* Merr., Publ. Gov. Lab. Philip. 15: 40, 1906; En. Philip. 3: 55, 1923.

Trees; up to 10 m high or more. Branches brown-pubescent especially tips. Leaves oblong, 10-15 x 6-8 cm, midrib pronounced with 5-8 conspicuous pairs of nerves, velvety-pubescent beneath, abruptly acute, base broadly round; petioles 5 cm long, stout, brown-pubescent. Panicles axillary, shorter than foliage, narrowly elongated, ferruginous-stellate, branches short and rebranched; Flowers light red, 1 cm long, similarly pubescent, urceolate tube nearly as long as 5 free lobes, hirsute within; staminal column very short, bearing numerous sessile anthers in subcapitate mass. Follicles upon glabrous, woody stalks, 3-clustered, oblongish, 5 cm long, short-stipitate, flattened along upper edge, short-brown, felty-red.

Endemic. Philippines: Babuyan Islands southward to middle Luzon, in low forests.

Com. name – Mountain tapinag (Engl.).

Exsicc. – *Lugod CA 8381, 8382 (CAHP); Sulit 2188187; Foxworthy's collector 1091647; Villamil 900708 (US)*.

4. *Sterculia philippinensis* Merr., Publ. Gov. Lab. Philip. 17: 29, 1904; En. Philip. 3: 55, 1923.

Trees large, wide-spreading. Branchlets conspicuously scarred, tips with setose-brown pubescence. Leaves terminally clustered, cordately ovate, 20 cm either way, stoutly 5- to 7-veined from base, midvein with several lateral pairs from above middle, sublucid above, much paler and soft-gray-pubescent beneath, short and abruptly acute; petioles 15 cm long. Inflorescences subterminal, appearing just below young leaves, about equaling foliage, short-grayish to brown-tomentose, repeatedly rebranched; flowers reddish; calyx campanulate; pedicels articulate, 5-toothed, 5-8 mm long. Infrutescences upon elongate, glabrate stalks, usually 3-clustered; follicles tawny-tomentose when young, obovoid, slightly compressed, short and stoutly stipitate at base, reddish yellow or pink.

Endemic. Philippines: Luzon to the Visayan region, in low forests.

Com. name – *Banilad* (P. Bis., Tag.).

Exsicc. – *Pancho CA 20204, 20318 (CAHP)*.

5. *Sterculia stipularis* R.Br. in Benn., Pl. Jav. Rar. 232, 1844; Merr., En. Philip. 3: 56, 1923.

Trees large. Leaves entire, ovate or ovately elongated, 16 x 12 cm, stoutly 5-veined from base, midvein with several lateral pairs of nerves, densely stellately brown-pilose on lighter colored nether side, bluntly acute, base cordate; petioles 2-7 cm long, pubescent. Panicles rusty-pubescent throughout, shorter or equaling foliage, diffuse from upper leaf axils; flowers reddish, 4 cm long; calyx purplish, pubescent within, 5-lobed, ovately acute lobes 25 mm long; staminal column about as long as calyx lobes, bearing at its cernuous apex 8 sessile anthers. Infrutescences up to 20 cm in length, main stalk usually umbellately 3- to 5-clustered, ellipsoid, 5 cm long, short-stipitate, creased along ventral suture, tawny-tomentose, yellowish red; follicles woody, cinereous, obovoid, compressed, especially toward curved base, 5-6 mm long, upon thick stalks; seeds 4-6 in each cell.

Endemic. Philippines: Luzon to Mindoro; in forests at low and medium altitudes.

Com. name – *Tapinag* (Tag.).

Exsicc. – *Hernaez CA 10517, 40616, 29381, 29382; Lumain CA 10143; Pancho CA 10496* (CAHP).

2. HERITIERA Aiton

Trees tall. Leaves simple or digitately compound, densely silvery, stellately pubescent beneath; stipules subulate. Panicles many-flowered, terminal or axillary, appressed-lepidote; flowers small, bisexual; calyx connate, 4- to 5-dentate; corolla absent; anthers in a ring on top of column; 4-20, cells 2, parallel; ovaries 5-6, nearly free; styles free, recurved, short. Follicles 2-5, wingless to distinctly winged on one side, indehiscent, 1-seeded.

Species 31, Indo-Malaysian and the Pacific regions to tropical Australia and Africa; 3 in the Philippines.

1. Leaves digitately 3-5 (-7)-foliolate, glabrous beneath 1. *H. javanica*
 1. Leaves simple, gray-brown-scaly or lepidote beneath
 2. Leaves gray-brown-scaly beneath, rounded at base; follicles lepidote
 2. *H. sylvatica*
 2. Leaves lepidote beneath, obtuse to subcordate or suboblique at base;
 follicles glabrous 3. *H. littoralis*

1. *Heritiera javanica* (Bl.) Kosterm., *Reinwardtia* 4: 521, 1959. – *Tarrietia javanica* Bl., *Bijdr.* 227, 1825.

Trees buttressed. Leaves digitately 3-5 (-7)-foliolate; petioles 3-12 cm; leaflets ovate-oblong, 5-15 x 2-7 cm, young ones stellate-pubescent, older ones glabrous or nearly so, acute, obtuse or obtusely acuminate, base cuneate-rounded; petiolules 0.5-3 cm long. Panicles many-flowered, much-branched, 10-20 cm long, finely densely stellate-pubescent or glabrescent. Follicles 5, stellate-patent, glabrous, seed-containing part ovate, 2-2.5 cm long, wing 5-8.5 x 2-3.5 cm, flabellately veined from basal portion upwards.

Malay Peninsula, Sumatra, Borneo, Java, Philippines, north Celebes and Indochina; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. names – *Duñigon* (Sul.); *Lumbayan* (Sub., Sul.).

Exsicc. – *Gates CA 1851* (CAHP).

2. *Heritiera sylvatica* Vid., *Rev. Pl. Vasc. Filip.* 66, 1886; Kosterm., *Reinwardtia* 4: 509, 1959. – *Tarrietia sylvatica* (Vid) Merr., *Bull. Bur. For. Philip.* 1: 38, 1903.

Trees. Young branches lepidote. Leaves oblong to ovate, 15 x 4-6 cm, prominent midrib with 7 pairs of lateral nerves, shiny green above, grayish brown-scaly beneath, subacute, rounded at base; petioles 12 cm long, stout. Inflorescences shorter than foliage, cymosely paniculate, minutely brown-stellate; flowers 5-8 mm long, slenderly pedicelled, tubular, toothed, ferruginous-scaly or ciliate. Fruiting branches rigid, copper-brown, ascending. Samara lepidote, 1-1.5 cm long, wing up to 2 cm wide, base of nut often with a neck.

Celebes. Philippines: Luzon to the Visayas; in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Duñigon* (Bik., Bis., Ilk., Pamp., Sbl., Tag.).

Exsicc. – *Blancaver CA 4924*; *Guevara CA 3425*; *Lugod CA 4213*; *Orlido CA 5014* (CAHP); *Aldos 2212508* (US).

3. *Heritiera littoralis* Dryand. *in Ait.*, *Hort. Kew* 3: 546, 1789; Merr., *En. Philip.* 3: 58, 1923.

Trees. Branchlets densely lepidote toward ends. Leaves ovate-lanceolate, slightly acuminate, base obtuse to subcordate, sometimes suboblique, lower surface densely lepidote; petioles 0.5-3 cm long. Panicles many-flowered, lepidote and brown-velutinous, 8-18 cm long; pedicels 1-7 mm long; calyx yellowish, densely pubescent on both surfaces; disc densely papillose; staminal ring with 4-5 anthers. Follicles 2-5, with short, rubber-like apical crest, ellipsoid, 5-7 x 3-5 cm, woody, smooth, shiny brown.

India to tropical Africa through Malesia to Polynesia. Throughout the Philippines, along shorelines.

Com. name – *Duñgon late* (Bis., Sul., Tag.).

Exsicc. – *Pancho CA 20150, 20293* (CAHP).

3. PTEROCYMBIUM R. Brown

Trees large to medium-sized. Stems terete, strict. Leaves simple or when young angularly lobed or toothed. Inflorescences panicled, axillary or terminal; flowers apetalous, bisexual; calyx persistent, coriaceous, campanulate with short, spreading tips; staminal tubes very short, elongate in fruiting state; anthers 10, vertically arranged in transverse ring; styles coherent; carpels 5, scarcely attached to each other, stigmatic portion recurved, 1-celled, 2-ovuled. Follicles 1-6 or fewer, membranous, baggy, seed portion small, ellipsoid, leathery, long-stipitate, before ripening main or middle wings spreading out with 2 laterally lobed wings; seed solitary, albuminous.

Species 4, Indo-Malesia; 2 in the Philippines.

1. *Pterocymbium tinctorium* (Blco.) Merr. var. *javanicum* (R. Br.) Kosterm., *Reinwardtia* 1: 45, 1950. – *P. javanicum* R.Br. in Benn., *Pl. Jav. Rar.* 219, t. 45, 1844. – *Heritiera tinctoria* Blco., *Fl. Filip.* 653, 1837.

Trees strict, tall. Leaves mainly terminal, ovate, 15 x 10 cm, vigorous ones angularly lobed, gradually acuminate, 5- to 7-veined from base, midvein with few extra pairs of lateral nerves above middle, broadly rounded or cordate at base; petioles slender, glabrate, up to 8 cm long. Inflorescences branched above middle; flowers 1.5 cm long, campanulate, jointed at base to slender pedicels, green, calyx teeth gray-felty along edges; staminal column very short, with yellow anthers; carpels 5. Fruits leathery, subtended by calyx; gynophores slender, ellipsoid, winged from base, wing 5-8 cm long, lobulate at middle.

Malay Peninsula, Sumatra, Java, Borneo and Celebes. Throughout the Philippines, in secondary and thin forests, at low and medium altitudes.

Com. name – *Taluto* (Bik., Tag.).

Exsicc. – *Villamil CA 1844; Pancho CA 4212* (CAHP).

4. THEOBROMA Linnaeus

Trees or shrubs. Leaves simple, palmately nerved, entire; stipules lanceolate. Flowers bisexual, solitary or fascicled, in small cymes on stems and branches, rarely single and axillary; sepals 5, almost free and spreading or more or less united; petals 5, concave, hooded below, inflexed and narrowed

above, produced into a flat or spatulate limb; staminal column short with 5 linear, acuminate, erect lobes or staminodes; sessile stamens 1-3 in each sinus of staminal tube; ovaries 5-celled, sessile, each cell with many ovules; styles simple, with deeply 5-parted stigma. Fruits berry-like, fleshy, large, pendulous, ovoid or elliptically oblong; seeds numerous, large, crowded, almost exalbuminous.

Species 22, in tropical America; 1 in the Philippines.

1. *Theobroma cacao* L., Sp. Pl. 2: 782, 1753; Cuatrecasas, Contr. U.S. Nat. Herb. 35: 495, f. 1-6, 20-26, pl. 6, map 6, 1964

Trees small. Branches forming a dense crown, young portions pubescent. Leaves oblong, 15-40 x 4-9 cm, often variable, pronounced midrib with 7-12 pairs of conspicuous nerves whose tips almost interarch, acuminate, obtusely rounded base with a pair of submarginal nerves; petioles 1-3 cm long. Flowers 1 cm long, yellowish white, glabrate; pedicels slightly pubescent, twice length of flowers; sepals sharply pointed, united at base; petals spatulate, equaling sepals, free; stamens united at base, fertile ones shorter, arising from between purplish, lacinate, erect, sterile ones; styles shorter than staminodes with a 5-cleft stigma. Fruits pendent on stout stalks, rugose and longitudinally ridged, oblong, 10-15 cm long, turning purplish; seeds numerous, ellipsoid, embedded in white, pulpy meat. Native of Central and South American rainforests, now cultivated throughout humid tropics of the world. Introduced in the Philippines from Mexico in 1663.

Com. name – *Cacao* (Sp.).

Exsicc. – *Pancho CA 20204* (CAHP).

5. WALTHERIA Linnaeus

Herbs or undershrubs stellately pubescent. Leaves simple, toothed; stipules narrow. Flowers small, in dense axillary or terminal clusters, yellow, soft-pubescent; sepals 5, connate below into a bell-shaped tube; petals 5, oblong to spatulate, adnate to staminal column; stamens 5, basal portions of filaments united into a tube; anthers bilobed, lobes parallel; ovaries sessile, 1-celled, 2-ovulate, ovules ascending; styles excentric; stigmas clavate or brush-like. Fruits 2-valved, 1-seeded capsules; seeds usually solitary, ascending, albuminous.

Species 45, chiefly in tropical America; 1 in the Philippines.

1. *Waltheria indica* L., Sp. Pl. 2: 673, 1753; Robyns, Ann. Mo. Bot. Gard. 51: 74, f.2E, 1964. Figure 126

Undershrubs erect, branched, 0.5-1.5 m high. Branches terete, densely soft-tomentose. Leaves ovately oblong or subelliptical, 6 x 3 cm, terminal ones much-reduced, stout midrib with 5-8 pairs of ascending nerves, grayish tomentose beneath, sparsely pubescent above, finely dentate, broadly obtuse or rounded, base rounded or subcordate; petioles 2 cm long. Flowers glomerated in leaf axils, sessile or shortly stalked, 5 mm long; bracts and sepals pale green, villous; corolla somewhat exerted. Capsules small, membranous, enclosed by persistent calyx, obcuneate, hairy toward top; seeds trigonous, smooth, reddish brown, 2 mm long.

Probably a native of tropical America. A polymorphous, pantropical weed, extending to some subtropical regions. Throughout the Philippines, common in open, dry places in settled areas.

Com. name – *Barulad* (Ilk.).

Exsicc. – Gates CA 1853; Uichanco CA 1854, 1856, 1857; Velasco CA 1855* (CAHP).

6. MELOCHIA Linnaeus

Herbs, shrubs or trees. Branches stellately pubescent. Leaves simple, small, in axillary clusters, often loosely paniculate; sepals 5, connate below; petals 5, adnate to staminal tube, spatulately elongated, marcescent; stamens 5, opposite petals, connate toward base into a tube; anthers extrorse, bilobed, lobes parallel; ovaries sessile, 5-celled, cells oppositipetalous, 2-ovulate; styles 5, free or connate at base. Capsules loculicidally 5-valved or separating into valves; seeds ascending, 3-angled, albuminous, solitary in each cell.

Species 65, in the warmer parts of both hemispheres; 2 in the Philippines.

1. Small tree; inflorescence from uppermost leaf axils, corymbose or umbellately branched toward top; capsule angled, 1 cm long 1. *M. umbellata*
 1. Suffrutescent herb; inflorescence a head, terminal or axillary, intermixed with linear bracteoles; capsule depressed-globose, 4-5 mm across.....
 2. *M. concatenata*

1. *Melochia umbellata* (Houtt.) Stapf, Kew Bull. 317, 1913. – *Visenia umbellata* Houtt., Handl. 8: 309, 1777. – *Melochia compacta* Goldberg, Contr. U.S. Nat. Herb. 34: 220-224, 236-233, 1967; Fosb., Phytologia 15(7): 502, 1968.

Trees small. Young branches tomentose. Leaves cordately ovate, 10-15 cm long, often much smaller, stout nerves with 5 pairs of spreading



Figure 126. *Waltheria indica*: 1. habit; 2. flower; 3. inflorescence; 4. stamens; 5. pistil; 6. petal; 7. outer bract; 8. inner bract; 9. portion of stem, enlarged; 10. portion of leaf; 11. seed, 2 views.

nerves, soft-pubescent on underside, becoming glabrous on upper surface, dentate, acute; petioles 5-8 cm long, pubescent. Inflorescences from uppermost leaf axils, long-stalked, corymbosely or umbellately branched toward top, equaling foliage; calyx short-pedicelled, villous, 5 mm long; petals a trifle longer, pale red, yellowish toward base; ovaries linearly ovoid; stigmas 5-cleft. Capsules hairy, 1 cm long, dehiscent from apex, angled; seeds compressed, with ascending wing.

India to Mauritius, Cochin-China and Malaysia. In the Philippines, in old clearings and secondary forests at low and medium altitudes; in Mt. Makiling, Luzon, common in abandoned *kaingin* areas (swidden fields) at low altitudes.

Com. name – *Labayo* (Tag.).

Exsicc. – Baker CA 1839; Bandong CA 1840; Quibin CA 1841; Sales CA 1807; Pancho CA 10196; Orildo CA 10607, 10608 (CAHP); Mendoza 2125811 (US).

2. *Melochia concatenata* L., Sp. Pl. 2: 675. 1753; Merr., Sp. Blanc. 258, 1918. – *M. corchorifolia* L., Sp. Pl. *loc. cit.*; Li, Woody Fl. Taiwan 562, f 220, 1963; Robyns, Ann. Mo. Bot. Gard. 51: 83, 1964. **Figure 127**

Herbs erect or spreading, branched, suffrutescent, usually 1 m high or less, thinly stellate-hairy. Leaves oblong-ovate, 2-6 cm long, 5-nerved, acute or acuminate, base broad, rounded or cordate. Flowers somewhat crowded in terminal or axillary heads, intermixed with linear bracteoles; petals ovate, 7 mm long, white, pink or pale-purple. Capsules depressed-globose, 4-5 mm across, slightly hirsute.

Pantropic. Throughout the Philippines, in open wastelands at low altitudes; common weed.

Com. name – *Kalingin* (P. Bis.).

Exsicc. – Gates CA 1838; Floresca CA 10053*, 10054, 10055; Hernaez CA 12432; Guantes CA 106525; Bardenas CA 10571, 10685 (CAHP).

7. GUAZUMA Miller

Trees or shrubs, hairs chiefly stellate. Leaves asymmetrical, dentate to serrate, 3- to 7-nerved at base. Inflorescences axillary, cymose, pedunculate; flowers bracteolate; calyx divided into 2-5 lobes at anthesis, lobes reflexed, pubescent outside, deciduous; petals 5, valvate, apex involute with long, deeply bifid, liguliform appendage; stamens 15, staminal tube divided into 5 alternipetalous and 5 oppositipetalous groups of 3 filaments; filaments geniculate at apex, 1 free and 2 connate; anthers 2-thecae, thecae divergent, extrorse, longitudinally dehiscent; ovaries sessile or stipitate with 5 minute geniculate lobes at apex, 5-celled, cells many-ovulate, ovules biseriate.

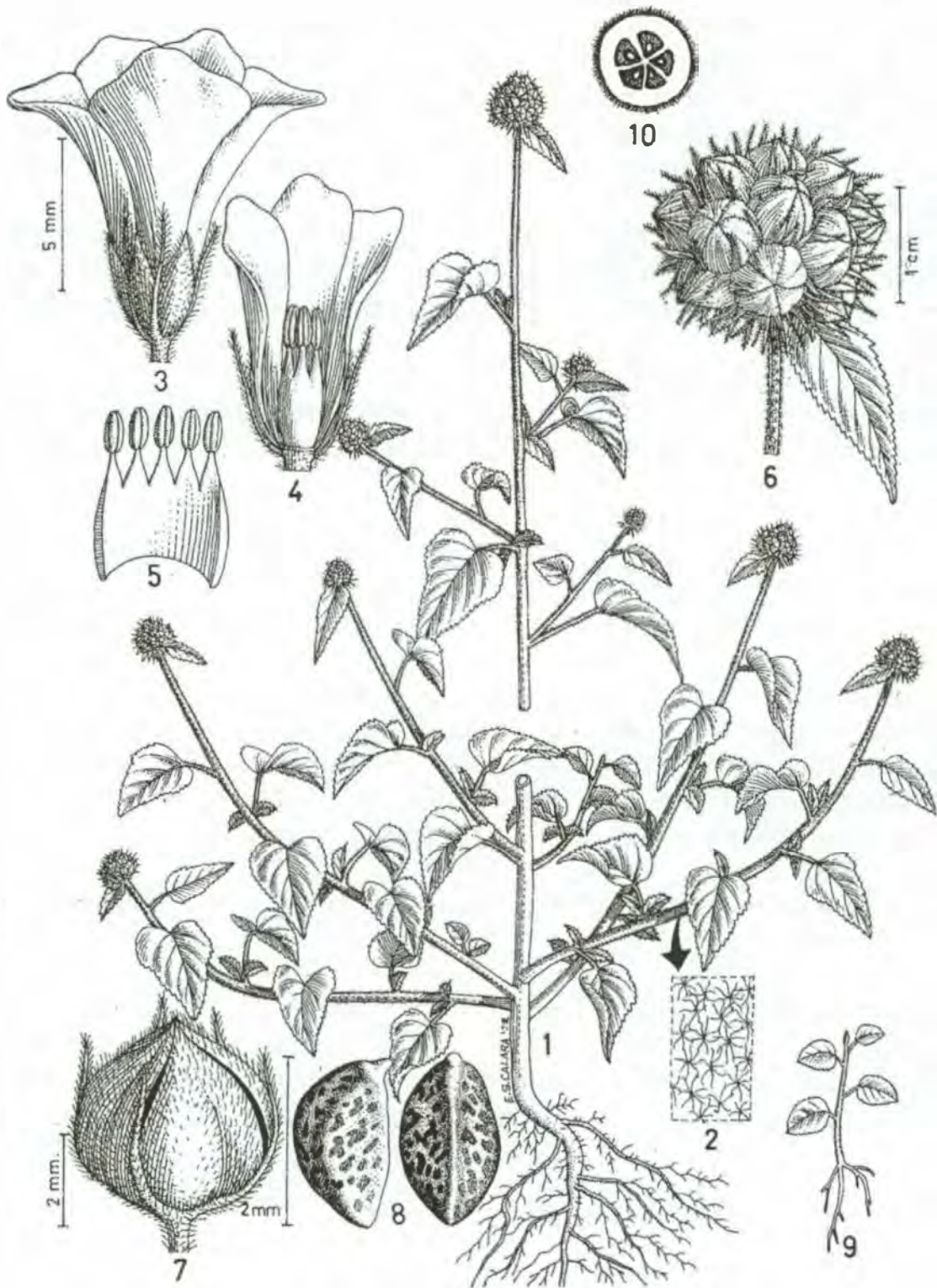


Figure 127. *Melochia concatenata*: 1. habit; 2. stellate hairs; 3. flower; 4. flower, partly excised to show stamens; 5. staminal tube, opened; 6. fruit cluster; 7. capsule; 8. seed, 2 views; 9. seedling; 10. ovary, cross section.

Capsules muriccate or with filiform appendages, indehiscent or imperfectly 5-valvate; seeds small, albuminous

A neotropical genus with 3 species; 1 in the Philippines.

1. *Guazuma ulmifolia* Lam., Encycl. 3: 52, 1789; Robyns, Ann. Mo. Bot. Gard. 51: 103, f. 7, 1964.

Trees, up to 20 m high. Leaves ovate, ovate-oblong, 6-15 x 2-6 cm, slightly to very much inequilateral, irregular, dentate to serrate, shortly puberulous above, lower ones puberulous to tomentulose, long-acuminate, base rounded to cordate; petioles 0.5-2 cm long. Inflorescences thyrsoform, ultimate axis scorpioid; calyx divided irregularly into 3 lobes; petals obovate, slightly bifid at apex, 4 x 2 mm (without appendage), appendage 5 mm long, bifid, puberulous outside, glabrous inside; ovaries ovoid, 0.8-1 x 0.8 mm, shortly puberulous especially on upper half. Capsules oblong to globose, rounded at both ends, 1.5-4 x 1.2-2.5 cm, black at maturity, tuberculate, indehiscent; seeds numerous, obovoid, 2.5-3.5 x 1.8-2 mm, testa maculate.

Introduced recently in the Philippines; occasionally cultivated.

Com. name – Guazoma (Engl.).

Exsicc. – Santos CA 1833; Sanchez CA 2935 (CAHP).

8. DOMBEYA Cavanilles, *nom. cons.*

Shrubs or small trees. Leaves simple, palmately veined. Inflorescences cymes or umbels, often many-flowered; flowers bisexual; epicalyx of 3 persistent segments; calyx segments ovate-lanceolate or linear; petals 5, sessile, unequally-sided; convolute, persistent; fertile stamens 10-15, connate at base; staminodes 5, usually longer than fertile stamens; ovaries sessile, 2- to 5-celled, ovules 2-4 in each cell, tomentose; styles simple, usually with 2-5 branches. free. Capsules loculicidally dehiscent by 5 valves.

Species 250, Africa and Madagascar; 1 in the Philippines.

1. *Dombeya wallichii* (Lindl.) B. & H. ex Hook. f. & Jacks., Gen. 1: 221, 1862; Backer & Bakh. f., Fl. Jav. 1: 405, 1963. – *Astrapaea wallichii* Lindl., Coll. Bot. 14, 1822.

Trees, up to 7 m. Leaves broad-ovate, 15-25 cm or more across, 7- to 9-nerved from base, densely tomentose beneath with stellate hairs, dentate, acuminate, base cordate; stipules large and leafy. Flowers scarlet or pink, in dense heads borne in hairy, pendulous peduncles, 15-35 cm long, subtended by large, ovate, caliculate bracts; petals 2.5 cm long; staminal tube about as long as petals; ovaries 5-celled, with 2 ovules in each cell.

Madagascar. In Mt. Makiling, Luzon, Philippines, introduced recently on the University campus as an ornamental tree.

Com. name – Dombeya (Engl.).

Exsicc. – *Pancho CA 11014; Lantican CA 8834; Hilario, Jr. CA 8809; Carbo CA 8771* (CAHP).

9. PENTAPETES Linnaeus

Herbs erect, suffrutescent, often woody at base. Branches long and spreading, minutely apiculate when young. Leaves linear, membranous, dentate, slenderly petioled, 1.5 x 10 cm, truncately rounded at base and occasionally hastately lobed. Flowers axillary; epicalyx 3, caducous, subulate; sepals 5, lanceolate, sparsely ciliate; petals 5, red; staminal tube short with 15 stamens, fertile ones in small groups alternating with 5 linearly elongate staminodes, rarely as long as petals; anthers extrorse; ovaries sessile, 5-celled, cells containing numerous ovules; styles entire, twisted and thickened upwards; stigmas 5, minute. Capsules loculicidally 5-valved, ovoidly globose, 1 cm thick, doubly hairy; seeds 8-12, in 2 series of each cell, not winged.

A monotypic genus. India, Indochina, Java, Moluccas, and the Philippines.

1. *Pentapetes phoenicea* L., Sp. Pl. 2: 698, 1753; Merr., En. Philip. 3: 46, 1923.

Characteristics (Refer to genus description).

Introduced, now naturalized; throughout the Philippines, in open, rather damp grasslands.

Com. name – *Yamyampaka* (Sub.).

Exsicc. – *Pancho CA 20288, 20358* (CAHP).

10. ABROMA N.J. Jacquin

Shrubs or trees. Leaves cordately oblong or ovate, serrulate, sometimes angled or lobulately toothed. Peduncles leaf-opposed, cymosely few-flowered; sepals 5, connate at base; petals 5, purplish, concave below, prolonged above into a large spoon-shaped lamina; staminal cup composed of 5 fertile and as many sterile divisions, fertile filaments opposite petals with 3 divergently bilobed anthers; staminodes obtuse, longer than fertile filaments; ovaries sessile, pyramidal, 5-lobed; cells numerous ovuled; styles 5. Capsules membranous, 5-angled, 5-winged, truncate at apex, septicidally 5-valved, valves villous along edges; seeds many, trigonous, albuminous.

Species 2 or 3, Indo-Malesia and tropical Australia; 1 in the Philippines.

1. *Abroma angusta* (L.) L.f., Suppl. 341, 1781; Fosb., *Micronesica* 2: 150, 1966. – *Theobroma angusta* L., Syst. ed. 12, 233, 1767.

Shrubs or small trees. Branchlets violaceous, soft-pubescent, spiculate. Leaves ovate, 15 x 10 cm, 5-veined from base, midvein with several lateral pairs of nerves above middle, obscurely dentate, acute to acuminate, deeply sinuate at base; petioles 1-8 cm long. Peduncles few-flowered; flowers bisexual, 5 cm across, yellowish with purple base; sepals 2.5 cm long, persistent; petals contorted in bud, claws concave; tube short, 5 petaloid staminodes alternating with 5 sessile anthers. Capsules turbinate, with irritating hairs, 4 x 7 cm, winged across truncate apex, sections extended into apical points; seeds subellipsoid, finely punctate, numerous.

India to southern China and Malesia. Throughout the Philippines, in moist or well-shaded places along edges of forests; in Mt. Makiling, Luzon, locally numerous in forest borders.

Com. name – *Anabo* (Bis., Iln., Ilk., Ting.).

Exsicc. – *Adolfo* CA 9188; *Quisumbing* CA 1826; *Velasco* CA 1827; *Ela* CA 1828; *Orlido* CA 5015; *Estioko, Jr.* CA 1830; *Gorrez* CA 2936 (CAHP).

11. KLEINHOVIA Linnaeus

Trees low, spreading. Young twigs velutinous. Leaves simple, ovate, membranous, paler beneath, glabrate, young ones often finely tomentose, blades as long as petioles, abruptly acuminate, broadly rounded or shallowly cordate at base, 5- to 7-veined from base, larger ones with lateral nerves with evident cross bars; petioles terete, 5-12 cm long. Inflorescences erect, terminal, paniculate, much-exceeding foliage, usually pubescent; flowers not large; sepals 5, deciduous, tomentulose on exterior; petals unequal, nearly as long as calyx, less than 1 cm long; staminal column dilated into a 5-fid cup, each lobe with 3 anthers; ovaries inserted in staminal cup or gynophore, 5-lobed, 5-celled. Capsules membranous, pendent, inflated, obovoid, 2 cm long, loculicidally 5-valved; seeds globose, brown, roughened with excrescences, 1 or 2 in each cell.

Monotypic; eastern Africa, tropical Asia, Taiwan, Philippines, southward to Malesia.

1. *Kleinhovia hospita* L., Sp. Pl. ed. 2, 1365, 1763; Li, *Woody Fl. Taiwan* 559, f. 219, 1963.

Characteristics (Refer to genus description).

Throughout the Philippines, in woods, shrubberies, secondary forests, deserted clearings and along streams, creeks and rivers; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Tan-ag* (Bik., S.-L. Bis., Tag.).

Exsicc. – *Pancho CA 9970; Ramos CA 10651; Lugod CA 4649, 4650; Gates CA 1835; Velasco CA 1836; Jovellanos CA 1837; Claude CA 1890 (CAHP); BF 20035, 1237870 (US).*

12. PTEROSPERMUM Schreber, *nom. cons.*

Trees or shrubs. Branches scaly or stellately tomentose. Leaves usually bifarious, mostly oblique, simple or lobed, similar in vesture. Flowers 1-3 in axillary and terminal cymes; bracteoles entire or laciniate, persistent or caducous, sepals 5, shortly connate or mostly free; petals 5, deciduous with calyx; staminal tube short, with 5 ligulate staminodes opposite petals; anthers 3 between each pair of staminodes, linear, 2-celled, cells parallel; styles entire; stigmas 5-furrowed; ovaries inserted within top of column or gynophore, 3- to 5-celled; ovules many in each cell. Capsules often large, woody and leathery, terete or angled, loculicidally 5-valved; seeds winged above, attached in 2 rows in inner angle of cells, numerous.

Species 20, tropical Asia; 9 in the Philippines.

- 1. Leaf base cordate; fruits angular 1. *P. diversifolium*
- 1. Leaf base oblique; fruits terete
 - 2. Leaves many, gradually tapering from near base; fruits usually scurfy 2. *P. obliquum*
 - 2. Leaves few, oblong and abruptly terminated; fruits usually glabrous ...
..... 3. *P. niveum*

1. *Pterospermum diversifolium* Bl., Bijdr. 88, 1825; Merr., En. Philip. 3: 49, 1923.

Trees medium-sized. Leaves ovately oblong, 15 x 7 cm, ridged midrib with 5-7 pairs of ascending nerves, sublucid on upper surface, yellowish felty on lower side, abruptly short-acute, shallowly cordate or truncate at base; petioles 3-5 cm long, stout, felty. Flowers 2- or 3-clustered, buds linearly oblong; peduncles short, axillary, ferruginous; bracts ligulate, thick, entire; sepals strap-shaped, 10 cm long, rusty-tomentose outside, silky within; staminal column slender, laciniately divided; petals glabrous, equaling sepals, tapering at base, yellowish, ovaries downy. Fruits heavy, upon woody, elongate stalks, pendent, 8-12 cm long, constricted at base, prominently angled, brown with ciliate scales; seeds compressed with wings twice as long.

Indochina, Malay Peninsula, Sumatra, Borneo, Java and the Moluccas in woods and forests of low elevations; Throughout the Philippines; in Mt. Makiling, Luzon, in open wooded areas at low altitudes.

Com. name – *Bayok* (Bik., P. Bis., Tag.).

Exsicc. – *Gates CA 1842; Rodriguez CA 1843; Diaz CA 3434; Rosco CA 3370* (CAHP); *BF 20132, 568363; Elmer 1237614; Mabesa 1294606* (US).

2. *Pterospermum obliquum* Blco., Fl. Filip. 529, 1837; Merr., Sp. Blanc. 260, 1918, En. Philip. 3: 50, 1923.

Trees low, wide-spreading. Leaves bifarious, ovately elongate or oblongish, gradually tapering to acuminate point, 10 x 4 cm, gradually reduced toward ends of branches, midrib with 5-7 pairs of nerves, base obliquely rounded; petioles 5 mm long, tomentose. Flowers few, upon short, ascending stalks from uppermost leaf axils, ferruginous; bracts numerous, subpersistent, lacinate; calyx densely covered on both sides with stellate hairs, narrowly linear, 3 cm long, spreading; petals as long as calyx, spatulate; staminal column with lacinate segments; anthers linear; styles glabrate; stigmas clavately furrowed. Capsules terete, 3-5 cm long, short-stipitate, rufous-brown but frequently glabrate with age; seeds numerous, flat, with wings 1.5-cm long.

Endemic. Throughout the Philippines at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests at low altitudes.

Com. name – *Kulatingan* (Bik.).

Exsicc. – *Domingo CA 1845; Barroga CA 4955; Cabrera CA 5080; Estioko, Jr. CA 2845; Gates CA 1846; Magnaye CA 1847; Blancaver CA 4787; Quirao CA 3374* (CAHP).

3. *Pterospermum niveum* Vid., Rev. Pl. Vasc. Filip. 67, 1886; Li, Woody Fl. Taiwan 562, f. 221, 1963.

Trees small to medium-sized. Leaves ovately oblong, 15 x 7 cm, stout midrib with 7-9 pairs of prominent ascending nerves, basal ones with secondary nerves, lower side covered with grayish white-appressed wool, abruptly acute, inequilateral to obliquely subcordate at base; petioles 1 cm long. Peduncles ascending, longer than petioles, few-flowered; bracts velutinous; calyx thick, linear, 5 cm long, tomentose on both sides, curvingly spreading; petals about as long as calyx, glabrous, dingy white; staminal column 1 cm long, laciniately dissected; anthers linear; ovaries densely villous; styles and clavate stigmas glabrate. Capsules up to 10 cm long, terete, subligneous, pointed at both ends but sharply so at apex; seeds compressed, with wing 2-cm long.

Taiwan. Throughout the Philippines, in low forests and valley woods; in Mt. Makiling, Luzon, in open or abandoned *kaingin* areas at low altitudes.

Com. name – *Bayok-bayokan* (Bik.).

Exsicc. – *Pancho CA 20130, 20290* (CAHP).

98. DICHAPETALACEAE

Trees, shrubs or lianas scandent; monoecious or dioecious. Leaves alternate, entire; stipules deciduous. Flowers small, mostly polygamous or occasionally terminal, dichotomously branched or glomerules, sometimes reduced to 2 or 1; sepals 5, more or less united; petals 5, notched or bifid; stamens 5, alternating with and sometimes adnate to base of petals; disc glands 5, alternating with stamens; ovaries pubescent, 2- to 3-celled; ovules in pairs, pendulous from top of each cell. Drupes pubescent or hispid, frequently didymous; embryo small, cotyledons thick, exalbuminous.

Genera 4, species 200, in the tropics, but chiefly African; a single genus and 8 species in the Philippines.

1. DICHAPETALUM Thouars

Shrubs erect, trees or lianas; monoecious or dioecious. Flowers axillary, sometimes pseudo-terminal in dichotomously branched cymes, rarely solitary, actinomorphic, bisexual or unisexual; petals free, induplicate-valvate to imbricate, white; stamens equal; anthers oblong; ovaries globose. Fruits drupes, mostly hairy, pericarp coriaceous or thin-fleshy; endocarp crustaceous; pyrenes 1-3, 1-seeded.

Species 120, in the tropics.

1. *Dichapetalum timoriense* (DC.) Boerl., Handl. 1: 199, 1890; Leenh., Fl. Mal. I. 5: 307, f. 1, 1957. – *Chailletia timoriensis* DC., Prodr. 6: 57, 1825. – *Dichapetalum luzoniense* Merr. & Rolfe, Philip. J. Sc. 3(Bot.): 106, 1908.

Figure 128

Shrubs scandent. Branches wiry, densely pubescent toward ends. Leaves oblong, 9-13 x 4-7 cm, prominent midrib with about 8 pairs of nerves, upper surface glabrous, soft-pubescent beneath, narrowed toward blunt apex, subcuneate at base; petioles 5 mm long. Cymes axillary, pubescent, 3 cm across; calyx villous, lobed; petals glabrous, free, cleft at apex; stamens glabrous; filaments bearing short anthers; ovaries obovoid, 1-5 cm long.

Malaysia through Melanesia. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-350 m.

Com. name – *Ariskis* (Tagb.).

Exsicc. – Bernardo CA 28029* (CAHP); Robinson & Brown BS 17334, 900686; Sulit 2244140 (US).

99. THYMELAEACEAE

Shrubs, trees, rarely herbs, with tough, fibrous inner bark or bast. Leaves alternate or opposite, simple, entire, estipulate. Flowers bisexual, axillary or terminal, in heads, umbels, spikes or racemes; perianth regular, tubular or campanulate with 4 or 5 lobes, imbricate in bud, often with alternating scales at base; disc annular, cupular or of scales; corolla absent or represented by free or united, petaloid appendages; stamens 2, or as many or twice as many as lobes; anthers 2-celled; ovaries superior, 1- to 2-celled, seldom 4- or 5-celled; styles short or long, terminal or concentric; stigmas capitate; ovules solitary in each cell, pendulous from near top of cell. Fruits usually indehiscent; seeds with fleshy albumen or exalbuminous.

Genera 55, species 500, in temperate as well as tropical regions; 6 genera and 22 species in the Philippines.

1. Ovary 1-celled; fruits 1-seeded..... 1. *Wikstroemia*
 1. Ovary 2-celled; (1-celled by abortion in *P. perrottetiana*); fruits 2 (-1)-seeded....
 2. *Phaleria*

1. WIKSTROEMIA Endlicher, *nom. cons.*

Shrubs or small trees. Leaves opposite or decussate, rarely ternate. Flowers terminal or axillary, racemose, fascicled or solitary, spicate, often ebracteolate; perianth tube or receptacle elongate with 4 spreading lobes, lobes finally becoming detached; stamens 8 in 2 series, inserted upon mouth of perianth; filaments short; disc scales 1-4, thin, often incised; ovaries ellipsoid, 1-celled; styles short; stigmas large, globose. Fruits drupaceous, often surrounded by dried remains of floral tube.

Species 70, in southeastern Asia, Australia and the Pacific Islands; 10 in the Philippines.

1. Leaves ovate to oblong-ovate; flowers sessile 1. *W. ovata*
 1. Leaves broadly lanceolate; flowers pedicelled..... 2. *W. meyeniana*

1. *Wikstroemia ovata* C.A. Mey., Bull. Ac. Imp. Sc. St. Petersb. Cl. Ph. -M. 1: 357, 1843; Meisn. in DC., Prodr. 14: 544, 1857; Merr., En. Philip. 3: 133, 1923.

Shrubs or small trees. Leaves ovate to oblong-ovate, 10 x 4 cm, midrib prominent with obscure nerves, obtuse to acute or acuminate, base rounded, obtuse or cuneate, subsessile. Flowers sessile in an umbel, erect, yellowish tinged, tubular, 1.5 cm long, with 4 short lobes, glabrate. Stamens alternating with corolla lobes. Fruits subglobose, 5-8 mm across, shiny, yellowish red.

North Borneo. Throughout the Philippines, in secondary forests at low altitudes; in Mt. Makiling, Luzon, in open wooded areas at low altitudes.

Com. name – *Salagong bilog* (Tag.).

Exsicc. – Gates CA 1933, 1936; Lugod CA 7030; Diloy CA 1934; Ela CA 1935; Velasco CA 1937; Catalan CA 1938, 2861; Palis CA 2979; Pordesimo CA 3182 (CAHP).

2. *Wikstroemia meyeniana* Warb. in Perk., Fragm. Fl. Philip. 171, 1905; Ding Hou, Fl. Mal. I, 6: 33, 1960. **Figure 129**

Shrubs or small trees. Leaves broadly lanceolate, 10 x 3 cm, midrib raised beneath with obscure nerves gradually tapering toward acuminate point, base rounded, subsessile. Flowers yellowish green, terminal or rarely from uppermost leaf axils, sparsely pubescent, umbellately clustered; peduncles usually solitary, 1-2 cm long; perianth tube usually ciliate toward base, broadly 4-lobulate at apex. Fruits shiny, bright red, ovoid, 8 x 6 mm; seeds terete, pointed toward apex.

Indochina. Philippines: northern to southern Luzon; in forests at low and medium altitudes; in Mt. Makiling, Luzon, in open wooded areas at low altitudes.

Com. name – *Salagong laparan* (Tag.).

Exsicc. – Hernaez CA 28390* (CAHP); Elmer 1050319; Foxworthy's collector 1091612 (US).

2. PHALERIA Jack

Shrubs or small trees. Leaves opposite, decussate. Flowers white, terminal or lateral, in capitate clusters or cymes; involucre-like bracts leafy and deciduous; receptacles elongated, cylindric, somewhat widened toward top; perianth erect with 4-6 small, spreading lobes; disc cupular or sometimes appendaged; stamens in 2 series, exserted; filaments filiform, with small, basifixed anthers; ovaries almost sessile, 2-celled, often adnate to a basal membrane; styles slender. Fruits drupaceous, 1- or 2-seeded, endocarp hard or coriaceous, exocarp fibrous and fleshy.

1. Flowers pedunculate, pubescent; fruits 1-seeded 1. *P. perrottetiana*
 1. Flowers sessile or nearly so, glabrous; fruits 2-seeded 2. *P. coccinea*

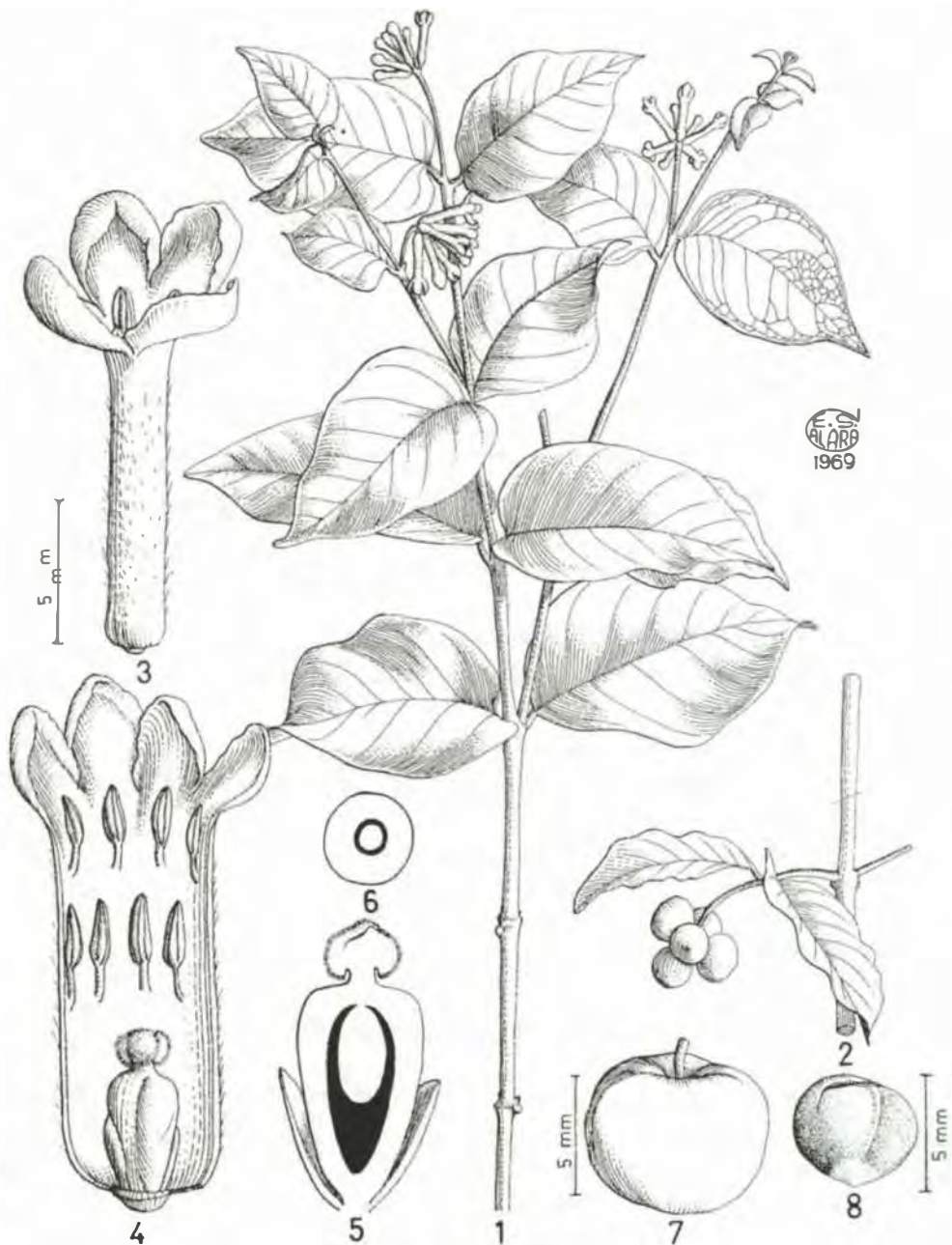


Figure 129. *Wikstroemia meyeniana*: 1. flowering branch; 2. portion of fruiting branch; 3. flower; 4. flower, opened; 5. ovary, vertical section; 6. ovary, cross section; 7. fruit; 8. seed.

1. *Phaleria perrottetiana* (Decne.) F.-Vill., Nov. App. 183, 1830; Ding Hou, Fl. Mal. I, 6: 18, 1960. – *Drimyspermum perrottetianum* Decne., Ann. Sc. Nat. Bot. II, 19: 40, 1843.

Shrubs or small trees. Leaves oblong, 18 x 8 cm, midrib ridged beneath with 7-10 pairs of ascendingly curved nerves, acute, base obtusely rounded; petioles short, thick. Flowers whitish, solitary or few-clustered at apices or upper leaf axils, pubescent; peduncle short, stout, subtended by greenish, early-falling bracts; perianth 2 cm long, 4-lobulate. Fruits reddish tinged when ripe, ovately pointed, 1-seeded.

Louisiade Archipelago and Malesia. Throughout the Philippines, in primary forests at low altitudes.

Com. name – *Tuka* (Ibn.).

Exsicc. – *Pancho CA 20133, 20280* (CAHP).

2. *Phaleria coccinea* (Gaudich.) F.v. Muell., Descr. Not. 2: 9, 1885; Ding Hou, Fl. Mal. I, 6: 21, 1960. – *Dais coccinea* Gaudich., Voy. Uranie 443. t. 44, 1826. – *Phaleria cumingii* (Meisn.) F.-Vill., Nov. App. 183, 1880. – *Drimyspermum cumingii* Meisn. in DC., Prodr. 14: 605, 1857.

Shrubs or small trees. Branchlets reddish brown, usually hollow. Leaves oblong, 10 x 5 cm, midrib prominent beneath with obscure, ascendingly curved nerves, abruptly acute, base obtuse, short-petioled. Flowers sessile or nearly so, terminal or lateral, often from gnarly, woody, lumps on stem, glabrous, subtended by caducous foliaceous bracts; stamens exserted, with short, oblong anthers; styles equaling stamens; stigmas thick. Fruits fleshy, 1.5 cm across, subglobose, 2-seeded.

New Britain, Moluccas and New Guinea. Philippines: Luzon to Visayan Islands; in forests at low altitudes; in Mt. Makiling, Luzon, in wooded areas at low altitudes.

Com. name – *Salagong gubat* (Tag.).

Exsicc. – *Pancho CA 20261* (CAHP).

100. ELAEAGNACEAE

Shrubs or rarely trees, often spinescent and scandent. Leaves with copious silvery, brown-stellate scales, sometimes entire, alternate or opposite, estipulate. Flowers small, regular, unisexual or bisexual in axillary fascicles or cymes; perianth of pistillate flowers tubular, 2- to 6-cleft, those of staminate with 2 membranous sepals; stamens adnate to perianth tube, twice as many as lobes in staminate flowers or as many as lobes and opposite them in pistillate; filaments abortive; anthers dorsally attached, longitudinally dehiscent; ovaries superior, 1-celled, free, with single ovule; styles filiform; stigmas capitate or cylindrical, often lateral. Fruits indehiscent, enclosed in thin, fleshy perianth tube; seeds with hard, stone-like or coriaceous shell.

Genera 3, species 50; mostly in the north temperate regions of both hemispheres; 1 genus and 1 species in the Philippines.

1. ELAEAGNUS Linnaeus

Shrubs scandent (in ours). Leaves alternate, silvery or yellowish to brown-lepidote beneath. Flowers bisexual; similarly scaly, solitary or in axillary to terminal fascicles, pedicelled; calyx segments white or yellowish; perianth tube closely surrounding ovary and constricted above it, its limbs 4, sometimes 6, deciduous, oblong; stamens 4, alternating lobes and inserted upon a cylindrical or funnel-shaped rim attached at base of perianth lobes; styles linear; stigmas lateral. Fruits fleshy drupes, outer coat fleshy; seeds coriaceous or crustaceous.

Species 40, in warm parts of the northern hemisphere; a few in the tropics.

1. *Elaeagnus triflora* Roxb. (Hort. Beng. 11, 1814 *nomen*), Fl. Ind. ed. 1, 459, 1820. – *E. philippinensis* Perr., Mem. Soc. Linn. Paris 3: 114, 1824; Merr., En. Philip. 3: 134, 1923. **Figure 130**

Shrubs. Leaves subelliptic to ovately oblong, 4-9 x 4 cm, often variable, shiny dark green above, copper-brown-lepidote or grayish white beneath, obtuse, base rounded; petioles 1 cm long, densely scurfy. Flowers solitary or few-fascicled, ascending from uppermost leaf axils, short-pedicelled; perianth thick, subangular, silvery white, flecked with brown scales, with 4 ovate lobes. Fruits juicy, sweet, yellowish to red.

Throughout the Philippines, in coconut plantations and forests at low altitudes, up to 1500 m; in Mt. Makiling, Luzon, in coconut plantations and in the *parang*.

Com. name – *Alingaro* (Tag.).

Exsicc. – *Orlido* CA 10312*; *Desampero* CA 10865; *Sulit* CA 10741, 10742; *Gates* CA 1939, 1940; *Cabrera* CA 5067 (CAHP); *McGregor* BS 456, 90093 (US).

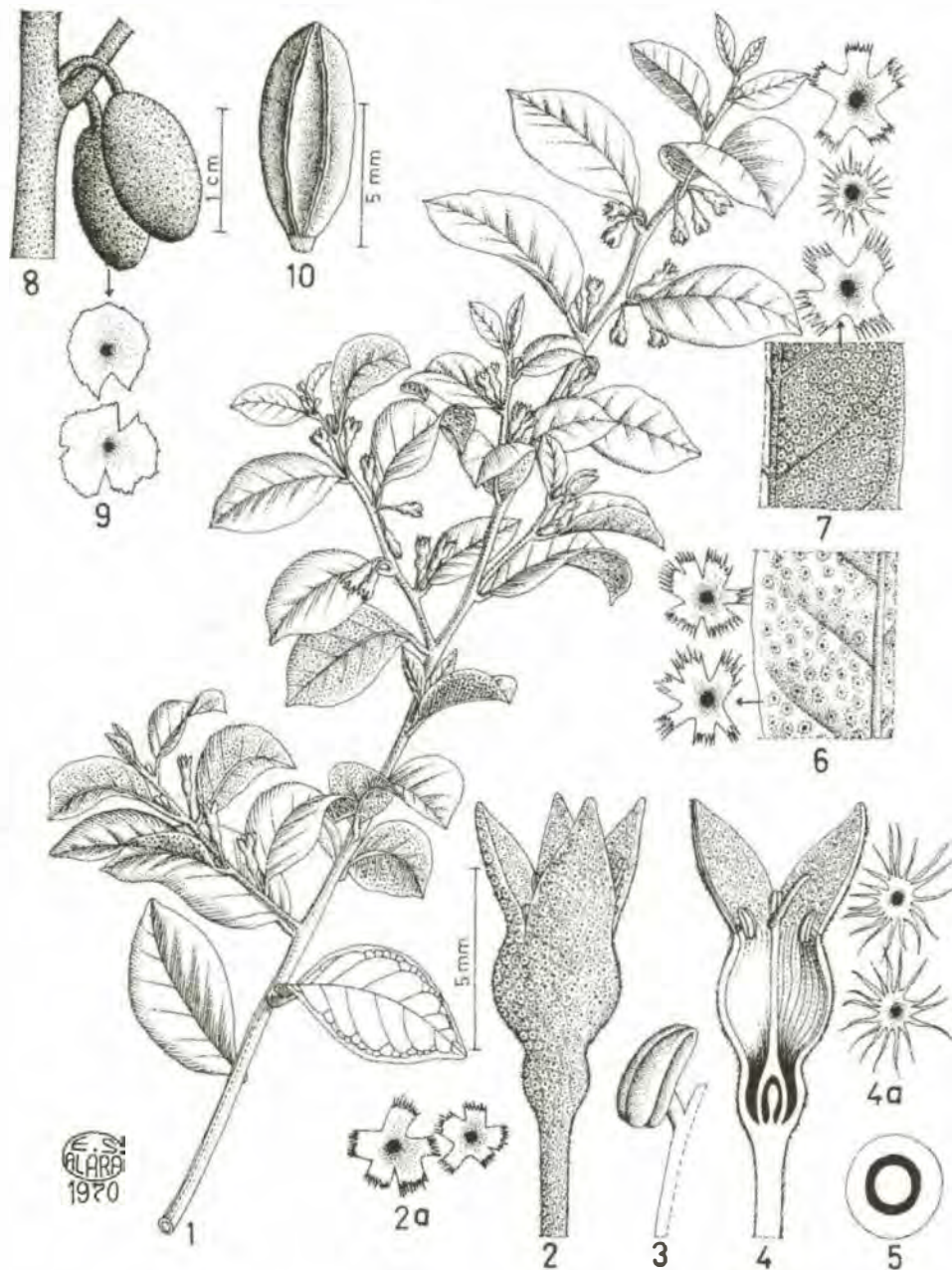


Figure 130. *Elaeagnus triflora*: 1. flowering branch; 2. flower; 2a. outer scales of flower; 3. stamen; 4. ovary, vertical section; 4a. inner scales of flower; 5. ovary, cross section; 6, 7. dorsal (6) and ventral (7) surfaces of leaf with scales; 8. fruits; 9. fruit scales; 10. seed

101. FLACOURTIACEAE

Trees or shrubs, nearly scandent. Leaves spirally arranged, alternate or distichous, seldom opposite or in subwhorls, simple, pinnate or rarely palmately veined, entire or finely toothed; stipules small, deciduous or wanting. Flowers relatively small, regular, bisexual or unisexual, rarely polygamous, chiefly axillary, fascicled or racemose, usually with bracteoles; calyx 3-6, free or slightly united, hypogynous or grown into a short basal tube, partly surrounding ovary, imbricate or valvate in bud; petals 3-8 or absent, free, imbricate or valvate, small, usually as many as sepals; stamens 5 or indefinite, often with alternating staminodes, seriate or in bundles; filaments free or somewhat united; anthers various, connective short-glandular or prolonged, nearly always laterally dehiscent; ovaries superior or nearly so, 1-celled but with placentae, usually surrounded at base with various glands or projections or a continuous disc; styles with terminal stigma, free or connate. Fruits usually fleshy, rarely dry, often capsular, loculicidally 2- to 5-valved or indehiscent, drupaceous or berry-like; seeds solitary or more, along each placenta, arillate or exarillate.

Genera 84, species 1300 in the tropics generally; 12 genera and 4 species in the Philippines.

1. Flowers unisexual
 2. Fruits 6 cm or more in diameter
 3. Stipulate; petals 4-5, without basal scale; leaves entire or serrate, never lobulate, penninerved 1. *Hydnocarpus*
 3. Estipulate; petals 4-9, each with large basal scale; leaves entire or lobulate, palminerved 2. *Pangium*
 2. Fruits 5 cm or less in diameter
 4. Stamens 5 3. *Trichadenia*
 4. Stamens numerous
 5. Styles solitary; fruits smooth when dry 4. *Xylosma*
 5. Styles 2 or more, usually 5-7; fruits rugosely angled when dry 5. *Flacourtia*
1. Flowers bisexual
 6. Flowers apetalous
 7. Flowers in terminal, spicate racemes; mature fruits tomentose 6. *Osmelia*
 7. Flowers in axillary fascicles; mature fruits glabrous 7. *Casearia*
 6. Flowers petalous
 8. Ovaries and fruits adnate to calyx; petals similar to calyx segments, persistent 8. *Homalium*
 8. Ovaries and fruits entirely free; petals not similar to calyx segments, deciduous
 9. Stamens inserted upon base of sepals and petals; flowers and fruits tomentose 9. *Scolopia*

9. Stamens inserted upon base of sepals and petals; flowers and fruits tomentose 10. *Ahernia*

1. HYDNOCARPUS Gaertner

Trees or shrubs. Leaves alternate, penninerved; stipules caducous. Staminate flowers in axillary, peduncled, branched cymes or sessile fascicles, rarely solitary from trunk or younger branches. Pistillate flowers similarly arranged, mostly solitary or in fascicles of 2-3 from axils of younger branches; sepals 3-5, rarely 7-11, free or slightly connate at base, concave, imbricate, reflexed at anthesis, caducous; petals 4-5, rarely more, free or slightly connate at base, caducous. Staminate flower stamens 5 to numerous; filaments free with oblong to ovate-cordate anthers; rudimentary ovaries sometimes present. Pistillate flower staminodes 5 to numerous; anthers reduced or entirely absent; ovaries sessile, unilocular with 3-6 placentae; stigmas sessile with 3-5 short or elongate, radial branches. Fruits indehiscent, globose or ovoid, few- to many-seeded; seeds densely packed in a pulp, angular-ovoid with membranous aril and hard testa.

Species 40, southeastern Asia through Malesia; 5 in the Philippines.

1. Fruits axillary on younger branches, rufous-tomentose, 7-10 x 6 cm..... 1. *H. sumatrana*
 1. Fruits from trunk or big, old branches, dark brown with purple and greenish spots, 15-25 x 10-18 cm..... 2. *H. alcalae*

1. *Hydnocarpus sumatrana* (Miq.) Koord., Exk. Fl. Java 2: 631, 1912; Sleum., Fl. Mal. I, 5: 27, 1954. – *Bergsmia sumatrana* Miq., Fl. Ind. Bat. Suppl. 159, 389, 1860. – *Hydnocarpus hutchinsonii* Merr., Philip. J. Sc. 17: 291, 1920.

Trees. Leaves oblong or subobovate-oblong, 10-25 x 5-10 cm, midrib prominent on both sides, lateral nerves slightly impressed above, densely reticulate veins rather prominent on both sides, abruptly acuminate, base distinctly inequilateral; petioles 1-2 cm long. Staminate flowers in 2- to 4-flowered cymes, rusty-pubescent; pedicels 1-2 cm long, rusty-velvety; sepals ovate-oblong, 8-11 x 4-6 mm, ferruginous-tomentose on both sides; petals oblong, 10-12 x 4-5 mm, glabrous, ciliate; pistillate flowers 1-2, peduncled; sepals larger than staminate but petals similar to those in staminate; filaments appressed to ovary, 2 mm long; ovaries densely fulvous-pilose, sulcate. Fruits subglobose, slightly attenuate at apex or apiculate, densely fulvous-tomentose; seeds many, 2 x 1.5 cm, irregularly compressed.

Sumatra, Java, Borneo and Celebes. Philippines: Luzon, Mindanao; in forests at low altitudes. In Mt. Makiling, Luzon, cultivated on the University campus.

Com. name – *Bagarbas* (Lan.).

Exsicc. – *Pancho, Lande & Floresca CA 9781, 9782, 9783, 9784; Santos CA 1916; Champhaka CA 8072* (CAHP).

2. *Hydnocarpus alcalae* C. DC., Philip. J. Sc. 11(Bot.): 37, 1916; Sleum., Fl. Mal. I, 5: 25. 1954.

Trees medium-sized. Leaves ovate-oblong, 15-25 x 7-10 cm, midrib raised beneath with prominent lateral nerves, entire or shallowly crenate, acuminate, base inequilateral; petioles 1 cm long, stout. Flowers in pseudo-racemose panicles, staminate in fascicles of 3 or 4, pistillate solitary from trunk or big branches, each panicle 15-30 cm long; cymes sessile, 1-2 cm long with 2-4 fascicled flowers on top; staminate flower sepals ovate, 1.25 x 0.75 cm; petals elliptic, villous at margin; filaments 1 cm long, glabrous; anthers cordately oblong; pistillate flowers similar to staminate but slightly larger. Fruits pendent, obovoid; 15-25 x 8-10 cm, dark brown; seeds numerous, 3-5 x 2-3 cm, embedded in astringent pulp.

Endemic. Philippines: Luzon (Albay, Laguna); introduced and naturalized in Mt. Makiling, Luzon.

Com. name – *Dudoa* (Bik.).

Exsicc. – *Pancho CA 9943; Peña de la CA 8157; Lugod CA 4197, 4198, 4199, 4200; Espiritu CA 8199* (CAHP); *Walker 2159173* (US).

2. PANGIUM Reinwardt

Trees. Leaves spirally arranged, long-petioled, entire or vigorous ones trilobulate, palmately veined, ovately cordate, estipulate. Flowers unisexual, pistillate usually solitary, staminate in few-flowered, racemose panicles, large; calyx globose, irregularly splitting into 2-4 concave lobes; petals 4-9, each with a large basal scale; stamens many, with pointed, otherwise expanded filaments; anthers ovate, 2-celled, lateral slit toward apex bearing connective; pistillate petals alternating staminodes; ovaries ovoid, free with 2-4 parietal placentae, each with numerous curved ovules; stigmas sessile, obscurely 2- to 4-lobed. Fruits large, ovoid, brown, indehiscent; seeds embedded in soft pulp, large, somewhat flattened or obscurely triangular, crustaceous.

Monotypic; throughout Malesia to Melanesia and Micronesia.

1. *Pangium edule* Reinw. (ex Bl. Cat. Gew. Buitz. 112, 1823, *nom. nud.*), Syll. Ratisb. 2:13, 1825; Sleum., Fl. Mal. I. 5: 36, f. 12-15, 1954.

Trees large, wide-spreading, buttressed. Leaves cordately ovate, 20 cm long, middle of 5 basal veins with few lateral pairs of nerves above middle, cross bars prominent, short and abruptly pointed; petioles nearly as

long as foliage. Panicles glabrous, equaling petioles, few-branched above middle; flowers yellowish green or whitish, globose in bud, stellately spreading in anthesis, pendent upon thick, brown stalks, ovoidly globose, 10-12 cm in diameter, thin shell appressed-scaly-brown; seeds promiscuously scattered in whitish pulp, 3-5 cm across, compressed, somewhat angular, veiny with conspicuous hilum.

Philippines: Southern Luzon to Mindanao; in forests at low and medium altitudes; in Mt. Makiling, Luzon, cultivated in the vicinity of the College of Forestry and Natural Resources campus.

Com. name – *Pangi* (Bik., P. Bis., S.-L. Bis.).

Exsicc. – *Pancho* CA 20174, 20286 (CAHP).

3. TRICHADENIA Thwaites

Trees dioecious. Leaves spirally arranged, large, pinnately veined; bud bracts pubescent; stipules foliaceous, caducous. Flowers in racemose spikes or cymose panicles, axillary; calyx coriaceous, rounded, irregularly split; petals 5, imbricate, longer than calyx; stamens 5, alternate with petals; filaments rather thick, often with rudimentary ovaries; anthers 2-celled, sub-basifixed, linear; pistillate flowers without staminodes; ovaries free, sessile with 3 parietal placentae, each with 1 or 2 ovules; styles 3, short, divergent; stigmas capitately enlarged. Fruits berry-like, subglobose capsules 1- to 3-seeded, indehiscent; seeds large, bony.

Species 2, Sri Lanka, eastern Malesia and Melanesia; 1 in the Philippines.

1. *Trichadenia philippinensis* Merr., Philip. J. Sc. 4 (Bot.): 296, 1909; Sleum., Fl. Mal. I, 5: 39, 1954.

Trees. Leaves subelliptic or ovately oblong, 15-30 x 6-15 cm, stout midrib with 9-12 pairs of nerves, subentire, abruptly pointed, base broadly rounded; petioles 3-8 cm long; stipules linear-lanceolate, pubescent, 6 mm long. Inflorescences equaling petioles or longer, subcapitate, tawny-puberulent; staminate flowers yellowish white, larger than yellowish green pistillate ones, short-stipitate, subtended by small, pubescent bracts. Fruits few, terminally clustered upon thickened stalks, irregularly globose, 3 cm across, ultimately smooth, yellowish brown when ripe.

South Celebes, Moluccas, New Guinea to Melanesia. Throughout the Philippines; in primary forests at low altitudes, up to 500 m.

Com. name – *Malapingan* (Bik., Tag.).

Exsicc. – *McGregor* 1172067; *Elmer* 1050150 (US).

4. XYLOSMA G. Forster, *nom. cons.*

Trees dioecious or shrubs, often with axillary, simple spines on trunk and branches. Leaves spirally arranged, toothed or crenate, glabrate, estipulate. Flowers small, in axillary subfascicles or racemose spikes; sepals 4-6, imbricate in bud; petals none; stamens numerous, filaments coriaceous; anthers short, subversatile; ovaries with 2 parietal placentae, seldom 3-6, each placenta with few ovules; styles solitary, short, thick; stigmas terminal, capitate. Fruits globose, usually terminated by persistent style, 2- to 8-seeded, indehiscent, berry-like, often with thin exocarp, smooth in dry state; seeds small, crustaceous

Species 100, tropical and subtropical regions of both hemispheres; 3 in the Philippines.

1. *Xylosma luzonense* (Presl) Clos, Ann. Sc. Nat. IV, 8: 229, 1957, *in clavi*, 273; Merr., Philip. J. Sc. 9(Bot.): 323, 1914; Sleumer, Fl. Mal. I, 5: 68, 1954. – *Prockia luzonensis* Presl, Rel. Haenk. 2: 94, 1835.

Shrubs or small trees. Leaves subelliptic or broadly lanceolate, 5-10 x 3-4 cm, midrib pronounced beneath with obscure lateral nerves, obscurely crenate toward bluntly acute apex, basal obtuse end entire; petioles 5-8 cm long, somewhat flat. Spicate racemes 1-2 cm long, axillary, ascending, glabrous, subtended at base by small bracts; staminate flowers yellowish white, alternate; pedicels short, divaricate, subtended by blunt, ciliate-margined bracteoles; calyx segments similar to bracteoles; stamens many, ascending, inserted upon rugose, fleshy integument; filaments glabrous; anthers minute, terminal. Fruits shiny, yellowish or when old, wine-red, globose, 7.5 mm in diameter, apiculate, few-seeded.

South Celebes, Lesser Sunda Islands and the Moluccas. Philippines: northern to southern Luzon; in forests at low altitudes.

Com. name – *Kuliaga* (Tag.).

Exsicc. – *Pancho CA 20247* (CAHP).

5. FLACOURTIA L'Heritier

Shrubs or trees, trunk spiny or not. Leaves spirally arranged, shortly petioled, mostly crenate, estipulate. Inflorescences subfascicled or short-cymose; flowers small, unisexual, rarely bisexual; sepals 4-6 (-7), small, imbricate in bud, petals wanting; stamens numerous; anthers versatile; ovaries inserted on glandular disc; styles 2 or more, usually 5-7, with entire, notched or 2-lobed stigmas; ovules usually in pairs on each placenta. Fruits indehiscent, endocarp hard, skin frequently fleshy, with as many seeds as there are cells; seeds obovoid, testa coriaceous

Species 15, in tropics of the Old World; 3 in the Philippines.

1. Styles 4-6, connate into a distinct column; leaves ovate-oblong to ovate-lanceolate..... 1. *F. jangomas*
 1. Styles 6-7 (-8), free or nearly so, leaves elliptic-oblong 2. *F. rukam*

1. *Flacourtia jangomas* (Lour.) Raeusch., Nomencl. Bot. ed. 3, 290, 1797; Sleum., Fl. Mal. I, 5: 72, f. 30a-d, 1954. – *Stigmarota jangomas* Lour., Fl. Cochinch. 2: 634, 1790.

Trees small, deciduous; trunk and branches commonly thornless when old, otherwise with simple or branched, woody thorns. Leaves narrow-ovate to ovate-oblong, long-obtuse-acuminate, broadly cuneate to rounded at base, cinnamon-brown when young in fresh state, glabrous, subserrate-crenate; petioles 6-8 mm, puberulous or glabrescent. Racemes axillary, subcorymbose, glabrous, few-flowered, staminate 1.5-3 cm, pistillate 1-1.5 cm long. Fruits subglobose, 1.5-2.5 cm across, dull-brownish red or purple, then blackish with greenish yellow pulp, enclosing 4-10 flat seeds, tipped with short style column with 4-6 minute stigma points.

East Africa, India, southeastern Asia to Malesia. In the Philippines, cultivated in villages; sometimes an escape.

Com. name – Governor's plum (Engl.).

Exsicc. – *Dalimot* CA 10504, 10505; *Pancho & Bardenas* CA 10030, 10040; *Blancaver* CA 4775; *Espiritu* CA 6081; *Velasco* CA 1913; *Estioko*, Jr. CA 1914 (CAHP).

2. *Flacourtia rukam* Zoll. & Mor. in Mor., Syst. Verz. 33, 1846; Sleum., Fl. Mal. I, 5: 73, f. 31-33, 1954. – *F. euphlebica* Merr., Philip. J. Sc. 9 (Bot.): 324, 1914.

Trees small, usually with crooked branches. Leaves ovately oblong or subelliptic, 10-18 x 5-7 cm, midrib with 6-10 pairs of ascendingly curved nerves, obscurely crenate toward acute to acuminate apex, obtuse to rounded base entire; petioles 1 cm long. Flowers greenish, axillary, usually fascicled, cinereous or subglabrous, bracteate, short stalks equaling petioles; calyx ovate; stamens with circle of glands; anthers minute; ovaries glabrous with 6-7 (-8) elongate-filiform, free styles; stigmas capitate. Fruits subglobose, 1.5 cm, indehiscent; pericarps wine-red, succulent, longitudinally 4- to 8-ridged when dry.

Indochina, Thailand to Hainan; throughout Malesia. Throughout the Philippines, in forests at low and medium altitudes; often cultivated for its edible fruits.

Com. name – *Bitongol* (Tag.).

Exsicc. – *Gates* CA 1912 (CAHP).

6. OSMELIA Thwaites

Trees dioecious. Leaves spirally arranged, pinnately nerved; stipules small, deciduous or not. Flowers bisexual on elongate, racemose spikes, sessile or subsessile, bracts and bracteoles forming an involucre, apetalous, mostly appearing terminal, dingy or yellowish white; calyx tube short, 4 or 5 lobes imbricate when young; stamens 8-10, alternating with equal number of hairy scales; filaments long, filiform; anthers rotund, dorsally attached, 2-celled, longitudinally dehiscent; ovaries free, pubescent, with 3 parietal placentae with few ovules; styles 1, short; stigmas capitate. Fruits 3-valved capsules, more or less leathery, obscurely 3-angled, hairy; seeds rounded with reddish aril.

Species 4; 1 in Sri Lanka, 3 of which occur throughout Malesia; 1 in the Philippines.

1. *Osmelia philippina* (Turcz.) Benth., (*sphalm. philippinensis*) J. Linn. Soc. Bot. 5: Suppl. 2, 89, 1861; Sleum., Fl. Mal I, 5: 79, f. 35, 1954. – *Stachycrater philippinus* Turcz., Bull. Soc. (Imp.) Nat. Mosc. 31: 465, 1858. – *Osmelia subrotundifolia* Elm., Leafl. Philip. Bot. 7: 2655, 1915.

Shrubs or small, erect trees. Leaves oblong to oblong-elliptic, 16 x 6 cm, conspicuous midrib with 8 pairs of ascendingly curved nerves, entire, abruptly acute to acuminate, base obtusely rounded; petioles 1 cm long. Spikes or spicately branched panicles terminal, somewhat lateral, puberulent, central part much-exceeding basal branches, nearly as long as leaves in anthesis; flowers short-pedicelled, finely pubescent, whitish, calyx segments broad, thin. Infrutescences usually much-elongated, pendent; capsules yellowish felty when dry, gray-purple when fresh, ovately ellipsoid and obscurely trigonous toward apex; seeds smooth, subglobose, few, relatively large.

Sumatra, Simalur Island and Lingga Archipelago. Throughout the Philippines, in forests at low and medium altitudes.

Com. name – *Oonog* (Tag.).

Exsicc. – *Gates CA 1918, 1920; Villamil CA 1917; Cadiz CA 1919; Pancho CA 4418, 4419; Lugod CA 8723; Espiritu CA 8724 (CAHP); Elmer 1237306; Foxworthy's collector 1091557, 1091562; Tamesis 711181; Rosenbluth & Tamesis 711481 (US).*

7. CASEARIA Jacquin

Shrubs erect, unarmed or small trees. Leaves alternate, petioled, often punctate; stipules small, deciduous. Flowers bisexual, small, axillary, cymosely fascicled or capitately clustered, seldom solitary; pedicels short-bract-subtended; calyx tube short or elongate, 4-6 lobes slightly imbricate, persistent; corolla none; stamens 5-12, hypogynous with equal number of staminodes arising from a disc, free or often united toward base, forming with disc a corona; filaments thread-like; anthers small, oval obovoid, introrse toward top with or

without scales, dehiscing laterally; ovaries free, with 2 or 3 lateral placentae; ovules many, curved, usually in more than 1 row. Fruits glabrous, mainly 2- to 3-valved, ultimately dehiscent, coriaceous or somewhat fleshy; seeds arillate or hairy.

Species 160, in the tropics of both hemispheres; 14 in the Philippines.

- 1. Leaves soft-pubescent beneath..... 1. *C. grewiaefolia* var. *cinerea*
- 1. Leaves glabrous
 - 2. Blades crenate..... 2. *C. grewiaefolia* var. *deglabrata*
 - 2. Blades entire
 - 3. Leaves oblong, truncately rounded at base; fruits not splitting 3. *C. fuliginosa*
 - 3. Leaves elliptic, obtuse at base; fruits splitting from apex into 3 valves 4. *C. trivalvis*

1. ***Casearia grewiaefolia*** Vent. var. ***cinerea*** (Turcz.) Sleum., Fl. Mal. I, 5: 95, 1954. – *C. cinerea* Turcz., Bull. Soc. (Imp.) Nat. Mosc. 31: 462, 1958.

Shrubs or small trees. Leaves oblong, 16 x 6 cm, entire or obscurely crenate, velutinous on both sides, 9-12 pairs of ascendingly curved lateral nerves less conspicuous than midrib, acuminate, truncately rounded and somewhat oblique at base; petioles 1 cm long. Flowers whitish, glomerated in leaf axils, cinereous; pedicels surrounded at base by thin, brown whorls of bracts; calyx coriaceous, acute lobes recurved, overlapping inner erect ones; stamens ascending, alternating with ciliate appendages; anthers ovate, versatile. Fruits pubescent when young, up to 3 cm long, subtended by persistent calyx segments, obscurely longitudinally ridged in dry state.

Philippines: northern to southern Luzon; in forests up to an altitude of 600 m; in Mt. Makiling, Luzon, in open wooded areas in the lowlands.

Com. name – *Kaluag-abuhin* (Tag.).

Exsicc. – *Pancho* CA 20243, 20352 (CAHP).

2. ***Casearia grewiaefolia*** var. ***deglabrata*** Koord. & Val., Bijdr. Booms. Java 1: 174, 1894; Sleum., Fl. Mal. I, 5: 95, 1954. – *C. crenata* Merr., Philip. J. Sc. 1: Suppl. 99, 1906. **Figure 131**

Differs from var. *cinerea* by the pronounced glabrescence in all parts and its crenate blade.

Indochina, Thailand, throughout Malesia and Melanesia. Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, in open wooded areas in the lowlands.

Com. names – *Kaluag-babae*, *Kaluag-linis* (Tag.).

Exsicc. – *Orlido* CA 2995; *Roa* CA 3300* (CAHP); *Robinson & Foxworthy* 902288 (US).

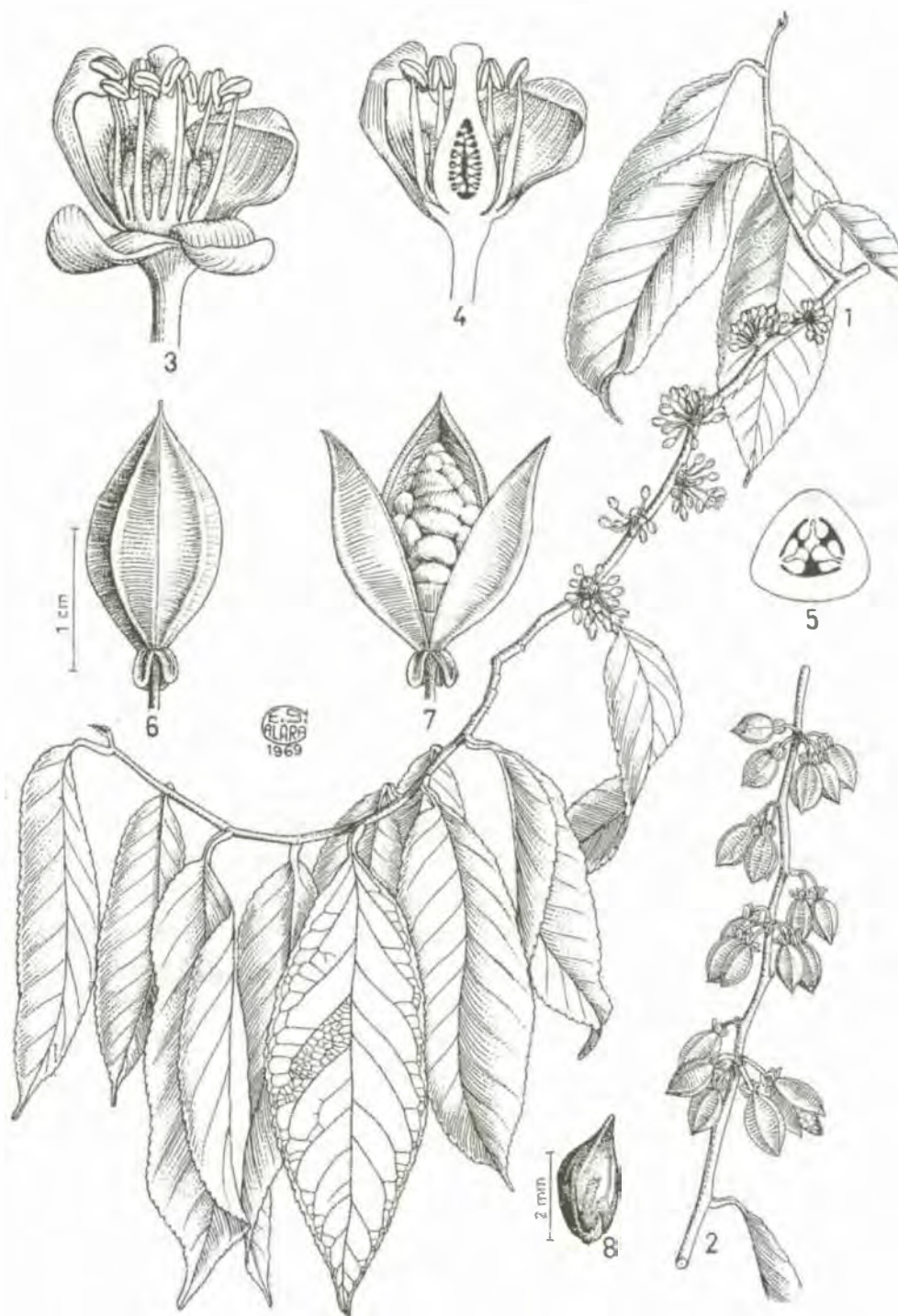


Figure 131. *Casearia grewiaefolia* var. *deglabrata*. 1. flowering branch; 2. fruiting branch; 3. flower; 4. flower, vertical section; 5. ovary, cross section; 6. capsule; 7. capsule, opened; 8. seed.

3. *Casearia fuliginosa* (Blco.) Blco., Fl. Filip. ed. 2, 262, 1845; Sleum., Fl. Mal. I, 5: 92, 1954. – *Anavinga fuliginosa* Blco., Fl. Filip. 372, 1837.

Shrubs or small trees. Leaves ovately oblong, 7-18 x 3-5 cm, midrib with 7-10 pairs of ascendingly curved nerves, entire or nearly so, sharply acute to slenderly acuminate, truncately rounded at base; petioles 1 cm long. Flowers densely glomerated in axils of leaves, short-fuliginous-pubescent, greenish yellow or whitish; pedicels subtended by numerous brown, cinereously margined bracts, calyx united toward base, overlapping, pubescent. Fruits subglobose or ovoid, 1.5 cm long, glabrous in mature yellowish red state, mucronate, costate when dry.

Endemic. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, scattered in the lowlands, sometimes numerous.

Com. name – *Talitan* (Sbl.).

Exsicc. – *Gates CA 1911* (CAHP); *Amarillas 1293709*; *Salvosa 1262337*; *Elmer 105059, 1050058, 1237691, 1237664*; *McGregor 1239227* (US).

4. *Casearia trivalvis* (Blco.) Merr., Sp. Blanc. 275, 1918; Sleum., Fl. Mal. I, 5: 91, 1954. – *Samyda trivalvis* Blco., Fl. Filip. 374, 1837.

Shrubs or small trees. Leaves elliptic, 5-15 cm long, stout midrib with 4-7 pairs of ascending curved nerves, reticulations evident, acute to acuminate, base obtuse; petioles 5-8 mm long, canaliculate. Flowers dingy white, densely clustered in leaf axils; pedicels subtended by thick, imbricating bracts, hairy; calyx lobe united, segments obovately oblong, overlapping, less pubescent than larger bracts. Fruits ovately ellipsoid or obscurely trigonous toward short pointed apex, 1.5 cm long, subtended by persistent, enlarged calyx, glabrous, red, splitting from apex into 3 valves.

Endemic. Philippines: northern to southern Luzon and Mindoro; in forests at low altitudes, up to 800 m; in Mt. Makiling, Luzon, in open wooded areas at low altitudes.

Com. name – *Kapikapihan* (Tag.).

Exsicc. – *Elmer 354526*; *Canicosa 2245838*; *Mabesa 1293710* (US).

18. HOMALIUM Jacquin

Trees or shrubs. Leaves alternate, petioled or sessile, stipulate, stipules minute, caducous. Flowers bisexual, small, hairy, in slender axillary or subterminal, simple or paniced racemes or spikes, bracts at base of pedicels often prominent, caducous; calyx tube adnate to ovary base, 4-12 lobes narrow, persistent; petals as many, inserted in throat of calyx, linear to oblong,

persistent, disc tomentose; stamens solitary or in fascicles of 2-12, opposite petals with alternating hairy glands, ovaries half superior; styles 2-5, filiform, stigmas capitate; ovules 1-7 near apex. Capsules half embedded, 2- to 8-valved at apex or indehiscent with persistent calyx wings; seeds usually few, angular or oblong.

Species 180, in the tropics of both hemispheres, 13 in the Philippines.

1. *Homalium bracteatum* Benth. J. Linn. Soc. Bot. 4: 37, 1860; Sleum., Fl. Mal. I. 5: 61, 1954. – *H. curranii* Merr., Philip. J. Sc. 4 (Bot.): 297, 1909.

Trees medium-sized. Leaves oblong, 20 x 9 cm, midrib ridged beneath with 5-8 pairs of ascendingly curved nerves, reticulations evident on both sides, acute, subentire toward rounded base, otherwise coarsely and serrately crenate; petioles 1 cm long. Inflorescences terminal, spicately paniculate, olivaceous-puberulent, about equaling foliage; flowers grayish white, solitary or few-clustered, stipitate, subtended by broad, persistent bracts, usually numerous, cinereous-pubescent; petals twice as long as calyx lobes, persistent, curved over dry fruit.

Endemic, Philippines: northern to southern Luzon and Samar; in forests at low altitudes.

Com. name – *Arangan-babae* (Bik.)

Exsicc. – *Pancho* CA 20368, 20481 (CAHP)

9. SCOLOPIA Schreber, *nom. cons.*

Shrubs or small trees, often with spines on trunks or branches. Leaves alternate, often with 2 distinct glands at base of blade or apex of petiole; stipules minute. Flowers small, racemose, bisexual, axillary; sepals 3-6, slightly imbricate in bud; petals as many as sepals, similar in shape, alternating with calyx segments, numerous, inserted on inner side of a row of disc glands, subperigynous, filaments thread-like, free; anthers dorsally attached, 2-celled, opening by slits, extrorse, connective either glabrous or hairy; ovaries free, sessile with 3 lateral placentae, each with 2 to many ovules, styles solitary, exceeding stamens; stigmas peltate or obscurely 3-lobulate. Fruits indehiscent, fleshy, with few seeds.

Species 37, tropical Africa and Asia to Queensland and New South Wales; 2 in the Philippines.

1. *Scolopia luzonensis* (Presl) Warb. in E. & P., Pfl. Fam. 3, 6a, 30, 1893; Sleum., Fl. Mal. I. 5: 11, 1954, Blumea 20: 38, 1972. – *Dasianthera luzonensis* Presl, Rel. Haenk. 2: 90, t. 66, 1835.

Shrubs. Leaves ovate-oblong to broadly lanceolate, sometimes nearly rotund, 10-15 x 5-8 cm, midrib with subbasal ascending nerves and few pairs of obscure ones up, reticulations prominent, entire or obscurely crenate, acute, broadly obtuse at base; petioles 5-8 mm long. Inflorescences pale or yellowish white, terminal or from upper most leaf axils, spicate racemes 3-5 cm long or longer, glabrate or puberulent; pedicels 1 cm long, jointed, subtended by minute bracts; calyx united at turbinate base; petals dissimilar; stamens indefinite, upon a disc; ovaries free, styles thick, twice as long as stamens. Fruits glabrous, yellowish to red, free from persistent calyx, short-ellipsoid, less than 1 cm long, terminated by slender point.

British North Borneo, Lesser Sunda Island (Flores) and Celebes. Philippines: Luzon to Mindanao; in forests at low altitudes.

Com. name – *Ariinguai* (Sbl.).

Exsicc. – *Pancho* CA 20387, 20507 (CAHP); *Bartlett* 13492, 13714 (PNH).

10. **AHERNIA** Merrill

Trees. Leaves alternate, 5-plinerved with 2 basal glands, oblong or obovately so, 16 x 6 cm, midveins prominent, puberulent when young, usually with few additional pairs of much-ascending nerves above middle, cross bars evident, entire or slightly crenate, acute to sharply acuminate, base rounded; petioles 2-3 cm long, estipulate. Inflorescences mainly terminal, paniculately branched, usually shorter than foliage, tomentulose; pedicels 5-8 cm long, bract-subtended; flowers 2-3 cm across, grayish white; sepals and petals similar in vesture; stamens numerous, upon corolla and calyx base; filaments sparsely ciliate; ovaries free, pubescent, ovately ellipsoid with 5 placentae; styles simple, pubescent toward base. Fruits crustaceous, indehiscent, ovoidly ellipsoid, 1.75 cm long, gray-felty; seeds many, black.

Monotypic. Hainan (Southern China) and the Philippines.

1. ***Ahernia glandulosa*** Merr., *Philipp. J. Sc.* 4 (Bot): 295, 1909; *En. Philip.* 3: 107, 1923.

Characteristics. (Refer to genus description)

Philippines: Luzon (Benguet, Nueva Ecija, Bataan, Rizal, Laguna); in forests at low and medium altitudes; in Mt. Makiling, Luzon, scattered but sometimes locally numerous in the lowlands.

Com. name – *Sanglai* (Tag.).

Exsicc. – *Pancho* CA 8893, 8979, 11050; *Santos* CA 10458; *Hermosa* CA 1910; *Gates* CA 1908, 1909 (CAHP).

102. VIOLACEAE

Herbs, shrubs or small trees, sometimes scandent. Leaves in rosette or cauline, spirally arranged or subopposite, simple, pinnately or palmately nerved, sometimes with spiny margins; stipules free, various. Flowers regular or irregular, 2-bracteolate; sepals 5, equal or unequal, persistent, imbricate in bud; petals 5, hypogynous, regular or when irregular frequently spurred, equal or unequal, imbricate or contorted in bud; stamens 5; filaments short and broad; anthers free or connate, introrse, connective broad and produced above anther cells; ovaries sessile, 1-celled, superior; styles simple, stigmas capitate, truncate or cupular, entire or lobed; ovules numerous on 3 parietal placentae. Fruits 3-valved capsules, rarely berries; seeds small, smooth.

Genera 16, species 850; mainly in temperate regions, few in the tropics; 3 genera and 18 species in the Philippines.

1. RINOREA Aublet

Trees or erect shrubs. Leaves spirally arranged or subopposite, entire or minutely toothed, simple, stipules small. Flowers small, usually yellowish white, regular, solitary or fasciated, occasionally in short racemes, axillary or terminal; calyx segments, nearly equal, free; petals as many as calyx segments, free, subequal, sessile or short-stipitate; stamens free or more or less united, equal, usually with short filaments, scaly on their backs; connective of anthers circularly united or nearly so, mainly exceeding cells with its appendages; ovaries with 3 placentae, each bearing 1 to many ovules, styles straight, terminated by capitate or obscurely 3-lobed stigma; seeds few, smooth or rarely woolly, subglobose, small.

Species 12, in tropics of both hemispheres; 4 in the Philippines.

1. *Rinorea bengalensis* (Wall.) O. Kuntze, Rev. Gen. Pl. 1: 42, 1891; Jacobs, Blumea 15: 128, 1967. – *R. fasciculata* (Turcz.) Merr., Philip. J. Sc. 12(Bot.): 286, 1917; En. Philip. 3:104, 1923. – *Pentaloba fasciculata* Turcz., Bull. Soc. (Imp.) Nat. Mosc. 27: 341, 1854.

Trees erect. Leaves oblong, 10-20 x 3-7 cm, stout midrib with 7-10 pairs of ascendingly curved nerves, entire or obscurely crenate, obtuse or obtusely rounded at both ends; petioles 1 cm long. Flowers 5 mm long, from leaf axils, glabrous, yellowish white; pedicels 1 cm long, subtended by short, obtusely pointed bracts; sepals glabrous or tedges ciliate; petals as many as sepals, alternating sepals, twice as long. Fruits trigonously ellipsoid, 1 cm long, apiculate, glabrate, subtended by slightly enlarged calyx, reddish.

Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, infrequent in forests at low altitudes.

Com. name – *Tuak* (Tag.).

Exsicc. – *Pancho CA 20521* (CAHP).

103. ELATINACEAE

Annual herbs or low undershrubs, erect or spreading, branched, glabrous or pubescent. Leaves opposite, serrate or entire. Flowers small, axillary, solitary or fascicled, pedicelled; sepals 5, free, imbricate; petals 5, free, imbricate; stamens 5-10, hypogynous, free; ovaries superior, free, ovoid, 3- to 5-celled; styles 5, short or stigmas sessile; ovules numerous on inner angles of cells. Fruits septicidal capsules, small, 5-celled, 5-valved.

Genera 2, species 30; in temperate and tropical zones of both hemispheres; 1 genus and 1 species in the Philippines.

1. BERGIA Linnaeus

Herbs (in ours) or small shrubs in wet or dry places. Leaves finely serrate, pinnately nerved. Flowers solitary, fascicled or clustered, 3- to 5-merous, mostly bracteate, sepals mostly free, acute with distinct midrib, margins pellucid; stamens as many or twice as many as 5 petals; ovaries 3- to 5-celled; styles short with subglobose stigma. Capsules septicidal, globose; seeds smooth or ribbed.

Species 20, tropical and subtropical

1. *Bergia ammannioides* Roxb., Hort. Beng. 34, 1814, *nom. nud.*; Roxb., Nov. Pl. Sp. 219, 1821; Backer, Fl. Mal. I, 4: 205, 1951. – *B. serrata* Blco., Fl. Filip. 387, 1837. **Figure 132**

Herbs erect or ascending, 10-30 cm high, often decumbent below. Stems and branches reddish, glandular-pubescent. Leaves oblong-elliptic to oblong-lanceolate, 1-2 cm long, acute, base narrowed, shortly petioled; pedicels and sepals glandular-pubescent. Sepals green, lanceolate, acuminate, 3 mm long; petals pink, as long as sepals; stamens slender, 10 or sometimes less. Capsules ovoid, 2-2.5 mm long.

Tropical Africa, Asia to southern China, Malesia and tropical Australia. Philippines: northern to southern Luzon; a characteristic rice paddy weed.

Com. name – *Bergia* (Engl.).

Exsicc. – *Bardenas CA 10575**; *Lugod CA 5031*; *Teodoro CA 1903* (CAHP).

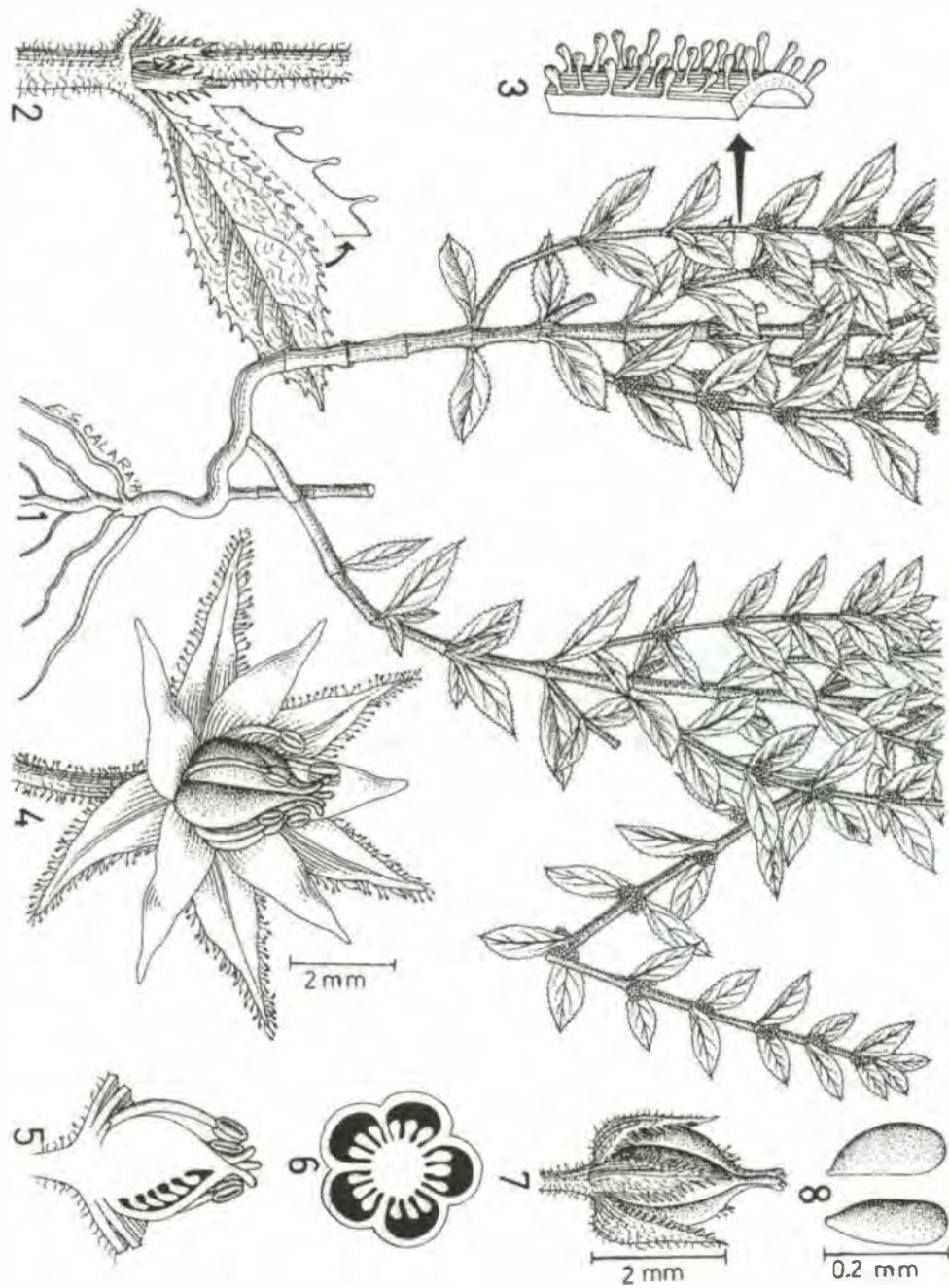


Figure 132. *Bergia ammannioides*: 1. habit; 2, portion of stem with stipules and leaf; 3. portion of epidermis; 4. flower; 5. ovary, vertical section; 6. ovary, cross section; 7. fruit; 8. seed, 2 views.

104. PASSIFLORACEAE

Herbaceous or woody vines, climbing by means of tendrils. Leaves alternate, simple, entire or lobed; stipules usually present. Flowers axillary, solitary or in cymes, small to large, usually with 3 minute to large bracteoles, regular, bisexual or unisexual. Calyx tubular at base, fleshy to thin, 5-lobed; petals as many as calyx segments or none; corona of one to several rows of slender filaments, arising from calyx tube, rarely none; stamens 5; filaments united and adherent to stalk of ovary; ovaries superior, usually stalked, 1-celled, many-ovuled with parietal placenta; styles usually 3. Fruits berry-like, fleshy, indehiscent, often large or capsular, 3-valved.

Genera 10, species 500; chiefly tropical America; 2 genera and 9 species in the Philippines.

1. Flowers large, showy, bisexual; fruits fleshy berries 1. *Passiflora*
 1. Flowers small, unisexual; fruits capsules 2. *Adenia*

1. PASSIFLORA Linnaeus

Usually herbaceous or climbing. Leaves glandular beneath at base or on petiole. Flowers bisexual, showy; calyx 5-lobed; petals 5, as long as calyx lobes; corona of numerous, usually filiform segments arising from calyx tube; gynophores surrounded at base by a shallow membranaceous cup or basal corona; anthers 5, dorsifixed. Fruits fleshy, berry-like, indehiscent; seeds arillate.

Species 370, chiefly in tropical America; 4 in the Philippines.

1. Stems prominently 4-angled and narrowly 4-winged
 2. Leaves ovate to elliptic, glandless underneath; petioles with scattered glands; cultivated 1. *P. quadrangularis*
 2. Leaves semi-orbicular or inversely reniform, undersurface with a row of 3-9 glands arranged 5-15 mm apart; petioles glandless; wild
 2. *P. pulchella*
 1. Stems terete
 3. Plants nearly glabrous; leaves deeply palmately 3-lobed, involucrel bracts nearly entire 3. *P. edulis*
 3. Plants hirsute and ciliate; leaves very shallowly lobed or only sinuate, involucrel bracts 2- to 3-pinnately divided into fine segments
 4. *P. foetida*

1. *Passiflora quadrangularis* L., Syst. ed. 10, 1248, 1759; Chakravarty, Bull. Bot. Soc. Beng. 3: 64, 1949.

Vines stout, glabrous, herbaceous reaching a height of 10-25 m; stems prominently 4-angled and narrowly winged. Leaves ovate to elliptic, 10-15 cm long, entire, shortly acuminate, base broadly rounded; petioles with scattered glands; stipules foliaceous, 1.5-2 cm long. Flowers large, solitary, fragrant; petals reddish; corona filaments violet. Fruits large, ellipsoid, 15-20 cm long, fleshy, edible.

Native of tropical America, now cultivated in many other tropical countries. In the Philippines, it is occasionally planted, but nowhere spontaneous.

Com. name – *Granadilla* (Sp.)

Exsicc. – *Pancho* CA 3395, 8934. *Lugod* CA 8377. *Gates* CA1825 (CAHP).

2. *Passiflora pulchella* H B K., Nov. Gen. 2: 134, 1817

Figure 133

Vines suffrutescent up to 5 m long. Stems angular, glabrous; tendrils long. Leaves shiny above, glaucous beneath, entire, reticulately veined with 3 prominent nerves, semi-orbicular or inversely reniform with 2 lateral lobes, central lobe almost completely aborted, all lobes mucronate, under surface between central nerve and each lateral nerve bearing a row of 3-9 glands arranged 5-15 mm apart, base rounded. Petioles 1.5-3 cm long, glandless. Stipules linear-subulate, up to 8 mm long. Flowers solitary on terete, glabrous, 4-7 cm long peduncle; bracts 1.5 cm long, entire or coarsely dentate toward apex; sepals narrowly oblong; petals white with bluish tinge; corona of 2 rows, violet, 1 cm long; androgynophores 1 cm long; filaments 8 mm long; anthers 7 mm long; stigmas spherical. Fruits oblong-ovoid, 2 cm long.

Tropical America. Introduced recently and is thoroughly naturalized in the Philippines; in Mt. Makiling, Luzon, common at the Jamboree site.

Exsicc. – *Pancho* CA 20502* (CAHP)

3. *Passiflora edulis* Sims in Curtis' Bot. Mag. t. 1989, 1818, Chakravarty, Bull. Bot. Soc. Beng. 3: 61, 1949.

Vines herbaceous, nearly glabrous with terete stems; stipules linear-subulate, 1 cm long, entire or minutely glandular-serrulate. Leaves ovate, 8-13 cm long, deeply palmately 3-lobed, oblong, acuminate, serrate; petioles biglandular at apex. Flowers fragrant, 4.5 cm in diameter, solitary; pedicels 3 cm long; bracts 3, green, elliptic to obovate, irregularly toothed, glandular on margins; sepals oblong, green, 2 cm long, spurred at apex; petals lanceolate, pale-purplish, as long as sepals; corona filaments numerous, in 3 series, white at base, blue-purple above, often with white markings.

Native of Brazil. In the Philippines, occasional in and about towns, but not spontaneous.

Com. name – Passion flower (Engl.).

Exsicc. – *Pancho* CA 10625; *Advincula* CA 12516; *Hernaez* CA 12440 (CAHP).

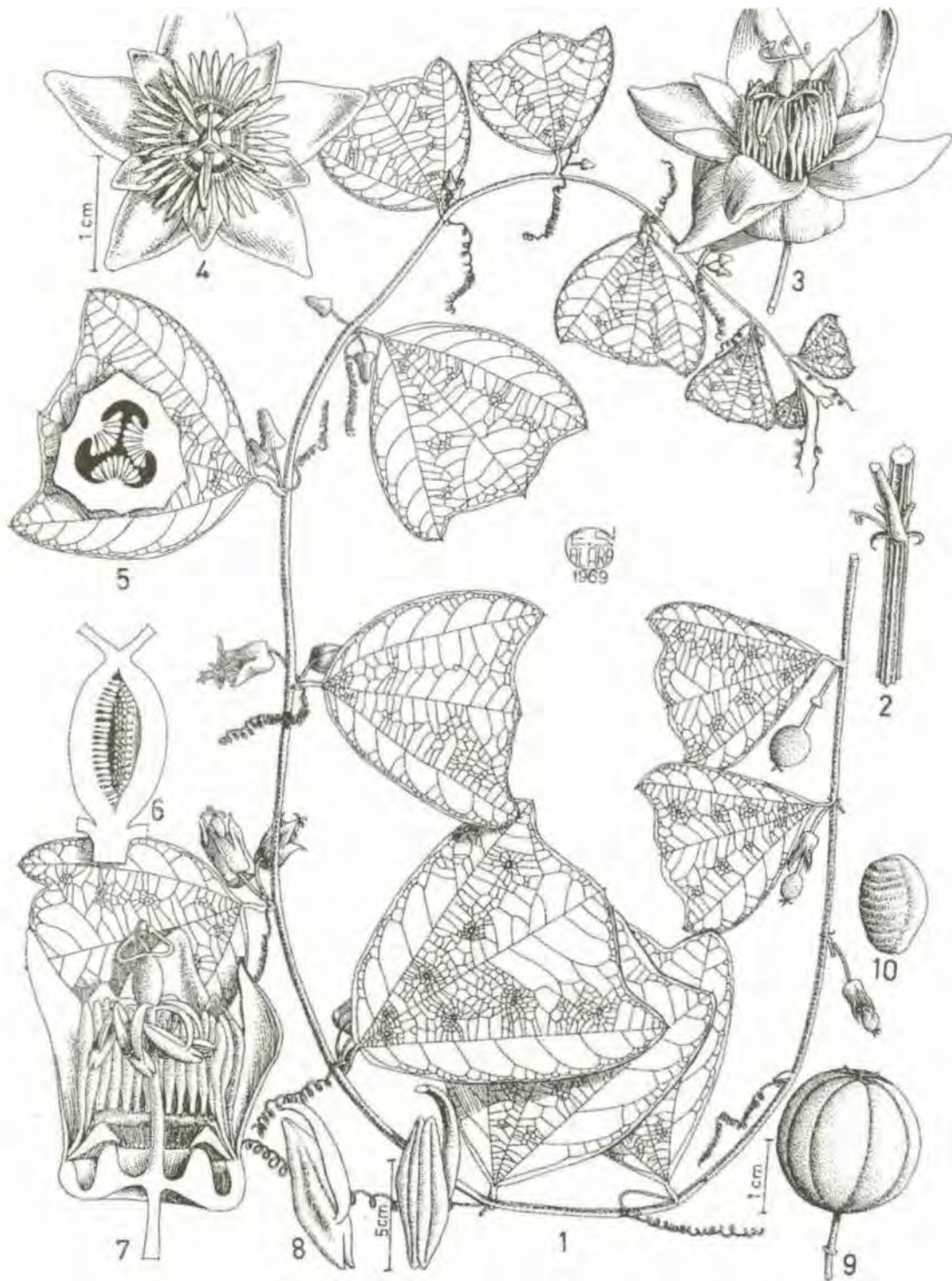


Figure 133. *Passiflora pulchella*: 1. flowering branch; 2. portion of stem; 3. flower; 4. flower, top view; 5. ovary, cross section; 6. ovary, vertical section; 7. flower, vertical section; 8. stamen, 2 views; 9. fruit; 10. seed.

4 *Passiflora foetida* L., Sp. Pl. 2: 959, 1753; Merr., En. Philip. 3: 113, 1923.

Figure 134

Vines herbaceous. Stems slender, terete, prominently villous with spreading hairs; stipules semi-auriculate, deeply cleft into filiform or pinnatisect segments with gland tips. Leaves ovate to oblong-ovate, 6-9 cm long, shallowly 3-lobed or often only sinuate, ciliate, acute or acuminate, base cordate. Flowers solitary, white or pinkish, 3 cm in diameter, subtended by prominent involucre of 3 bracts, latter are 1-3 pinnately divided into numerous segments, ultimate segments glandular; sepals 1.5 cm long, pale; petals as long as sepals, white or pinkish; corona of 3-seriate slender segments. Fruits ovoid, 3-5 cm long, dry, inflated.

Native of tropical America, now found in various other tropical countries. Throughout the Philippines, occasionally in and about towns, spontaneous or subsponaneous; a common weed.

Com. name – *Karunggut* (Bik.).

Exsicc. – *Orlido CA 10867, 10863, 12979**. *Jagunap CA 1922; Gutierrez CA 1923; Jarmin CA 1924* (CAHP).

2. ADENIA Forskal

Twiners, usually glabrous, herbaceous or suffrutescent. Leaves entire or palmately lobed, usually with 1 or more flat, circular glands on under surface and with similar ones at apex of petiole. Flowers small, unisexual, in axillary, peduncled, few-flowered cymes; calyx of staminate flowers tubular or campanulate, 5-lobed, petals 5, free, 1-nerved, corona a ring of threads from calyx tube or wanting, disc glands 5, strap-shaped or capitate; androecium cup-shaped, membranaceous beneath; filaments 5; ovaries rudimentary or none. Pistillate flowers with calyx and corolla as in staminate; corona a membranaceous fold or none; staminodes 5, forming a membranaceous cup surrounding base of ovary, dividing above into barren filaments, ovaries stalked or sessile. Fruits capsular, 3-valved.

Species 40, in tropics of the Old World; 5 in the Philippines

1. *Adenia heterophylla* (Bl.) Koord., Exk. Fl. Java 2: 637, 1912; de Wilde Fl. Mal. 1, 7: 424, f. 8, 1972. – *A. zucca* (Blco.) Merr., Sp. Blanc. 276, 1918; En. Philip. 3: 117, 1923. – *Passiflora zucca* Blco., Fl. Filip. 648, 1837.

ssp. *heterophylla* var. *heterophylla*

Leaves ovate to oblong-ovate, 7-15 cm long, entire or often palmately 3-lobed, acuminate, base cordate. Cymes long-peduncled, few-flowered, flowers small. Fruits ovoid, 6-7 cm long, scarlet, smooth, many-seeded.



Figure 134. *Passiflora foetida*: 1. flowering branch; 2. flower; 3. ovary, vertical section; 4. ovary, cross section; 5. stamen, 2 views; 6. young fruit; 7. mature fruit, sepals removed; 8. seed; 9. seed, mucilage removed; 10. portion of stem with stipules.

Throughout the Philippines, in thickets and secondary forests at low and medium altitudes; in Mt. Makiling, Luzon, in open wooded areas at low altitudes.

Com. name – *Binoyok-boyok* (Tag.).

Exsicc. – *Gates CA 1921* (CAHP).

105 BIXACEAE

Shrubs or small trees. Leaves simple, glabrous, hairy or scaly, alternate, entire or toothed, sometimes digitately lobed, palmately veined or rarely pinnate; stipules minute, caducous. Flowers usually large, in terminal panicles, perfect, regular; sepals 4 or 5, imbricate, deciduous, hypogynous, petals as many as sepals, free, entire, large, colored, imbricate and twisted in bud; stamens numerous, inserted on an annular, hypogynous disc, filaments thin, free; anthers straight or horse shoe-shaped, attached below middle or at middle, versatile, 2-celled; ovaries superior, 1-celled or cells grown together with central placenta; ovules numerous, curved; styles simple, filiform. Capsules usually softly prickly, rarely smooth, loculicidally bivalved; endocarp membranous, separating from valves; seeds numerous, obovoid, angular, testa fleshy, studded with rounded, sessile glands.

Monotypic. Tropical America; cultivated in many tropical countries.

1. BIXA Linnaeus

Characteristics (Refer to family description).

1. *Bixa orellana* L., Sp. Pl. 512, 1753; Backer, Fl. Mal. I, 4: 239, f. 1, 2, 1951.

Figure 135

Shrubs erect or small trees. Leaves ovate, sometimes angularly toothed or lobulate, 10-20 cm long, midrib with 5-8 pairs of nerves, usually with 2 pairs from base, gradually acuminate, base truncately rounded or subcordate; petioles 3-5 cm long, slightly scurfy. Inflorescences terminal, erect, several branches scurfy; pedicels thick; flowers white or pink, 4-6 cm across, showy; sepals elliptic, pulverulent, united at base; petals obovately oblong, veiny, spreading; stamens interlaced; anthers opening by short, apical slits or pores; ovaries with slender style; stigmas notched. Capsules ovoidly globose, 4 cm long, covered with soft spines; seeds numerous, covered with dark red coloring matter.

In settled areas throughout the Philippines, often cultivated.

Com. name – *Achuete* (Bik., Ilk., P. Bis., Sbl., Tag.).

Exsicc. – *Ballesteros CA 8004**; *Estioko, Jr. CA 1904, 1906*; *Gates CA 1905*; *Jesena CA 8878*; *Lugod CA 4723*; *Novero CA 8120* (CAHP).

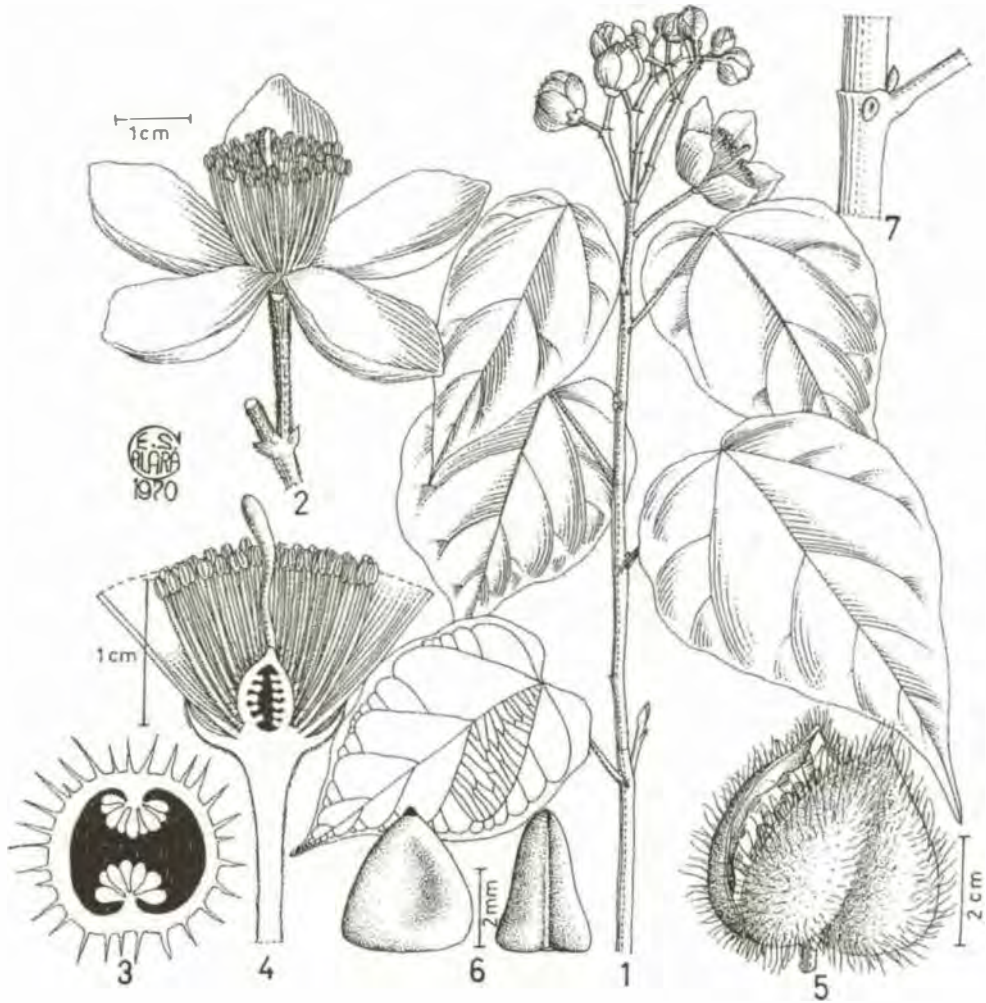


Figure 135. *Bixa orellana*: 1. flowering branch; 2. flower; 3. ovary, cross section; 4. flower, vertical section; 5. fruit; 6. seed, 2 views; 7. portion of stem showing stipules.

106. COCHLOSPERMACEAE

Trees or shrubs, often deciduous. Leaves palmatilobed; stipules caducous. Flowers actinomorphic, bisexual, showy, mostly yellow, paniculate or racemose; sepals 5, imbricate; petals 5, imbricate, emarginate; stamens numerous; ovaries 1-celled or perfectly or imperfectly 3-celled (5-celled in *C. regium*), upper portion remaining 1-celled; ovules numerous. Capsules 3- to 5-valved; seeds covered with woolly hairs.

Genera 3, species 15; in tropical and subtropical America, tropical Africa and southeastern Asia; 1 genus and 1 species in the Philippines,

1. COCHLOSPERMUM Humboldt, Bonpland & Kunth, *nom. cons.*

Trees or erect shrubs, deciduous before flowering (in ours), often with colored juice. Leaves spirally arranged, palminerved. Flowers terminal or subterminal in racemes, corymbs or panicles, bisexual, actinomorphic, yellow (in ours); sepals free, persistent or caducous; petals 5, free, imbricate or contorted; stamens equal or unequal; filaments free, anthers basifixed, linear, 2-celled, dehiscing by confluent pore-like slits; ovaries 1-celled or lower half incompletely 3- to 5-celled. Capsules loculicidal. 1-celled, 3- to 5-valved; seeds numerous, covered by woolly hairs.

Species 10, in tropics of the world.

1. *Cochlospermum regium* (Mart. & Schrank) Pilg., Notizbl. 8: 716, 1924; van Steenis, Fl. Mal. I, 4: 61, 1949. – *Maximiliana regia* Mart. & Schrank, Flora 2: 452. 1819. – *Cochlospermum vitifolium* Spreng., Syst. Veg. 2: 596, 1825 **Figure 136**

Trees small, 3-10 m high, with often reddish brown branchlets. Leaves orbicular, 15-30 cm wide, incised to 2/3-3/4, 5-lobed, glabrous, crenate-serrate, acuminate with cordate base; domatia present in basal axils of main ribs at tufts of hairs. Flowers in dense panicles at ends of leafless twigs, pedicellate, bright yellow; stamens red in lower half; sepals tomentose, persistent; petals 4-6 cm long; ovaries pubescent. Capsules 5-valvate, obovoid, finely velvety-pubescent.

Recently introduced in the Philippines; rare and only in cultivation.

Com. name – Buttercup tree (Engl.).
Exsicc. -- *Pancho CA 20343** (CAHP).



Figure 136. *Cochlospermum regium*: 1. branch tip; 2. flowering branch; 3. pistil; 4. ovary, vertical section; 5. ovary, cross section; 6. stamen; 7. fruit, unopened; 8. fruit, opened; 9. seed.

107. CARICACEAE

Trees small, soft-wooded, often dioecious or monoecious; milky latex present in all parts. Leaves large, usually clustered at branch tips, variously lobed and divided, glabrous or rarely hairy, long-petioled, estipulate. Inflorescences axillary, rarely cauliflorous; flowers pentamerous, regular; calyx gamosepalous, 5-lobed. Staminate flowers gamopetalous, lobes valvate or contorted; stamens 10, biseriate, inserted on corolla; filaments free or connate. Pistillate flowers with free petals; ovaries superior, sessile, 1- or 5-locular, with parietal placentation; styles short or absent; stigmas 5, sessile, simple; ovules numerous. Fruits fleshy berries with numerous seeds, seeds with soft succulent outer testa and hard inner testa.

Genera 4, species 40, in tropical and subtropical America; 1 genus and 1 species in the Philippines.

1. *CARICA* Linnaeus

Trees with milky sap dioecious, erect, normally unbranched. Leaves long-petioled, large, palmately 7- or 9-lobed. Staminate flowers in axillary, narrow, pendulous, elongate panicles; corolla salver-shaped, tube slender, cylindrical, lobes 5, convolute or valvate. Pistillate flowers large, axillary; ovaries 1-celled; stigmas 5-lobed; ovules in 2 or many series on parietal placenta. Fruits fleshy; seeds enclosed in gelatinous covering, testa variously roughened.

Species 25, tropical and subtropical America.

1. *Carica papaya* L., Sp. Pl. 2: 1036, 1753; Merr., En. Philip. 3: 118, 1923.

Figure 137

Trees erect, small, 3-6 m high, unbranched or when injured becoming branched, trunk marked with large petiole scars. Leaves suborbicular, 1 m broad or less, palmately 7- or 9-lobed, each lobe pinnately incised or lobed; petioles stout, hollow, 1 m or more long. Staminate flowers in crowded clusters, fragrant, corolla tube slender, 2 cm long; pistillate flowers in short axillary spikes or racemes; petals 5 cm long or less. Fruits subglobose, obovoid or oblong-cylindrical, 5-30 cm long, orange-yellow when mature, fleshy.

Tropical America, now pantropic. Cultivated throughout the Philippines; frequently spontaneous.

Com. name - *Papaya* (Sp.).

Exsicc. - *Gates CA 1926** (CAHP).

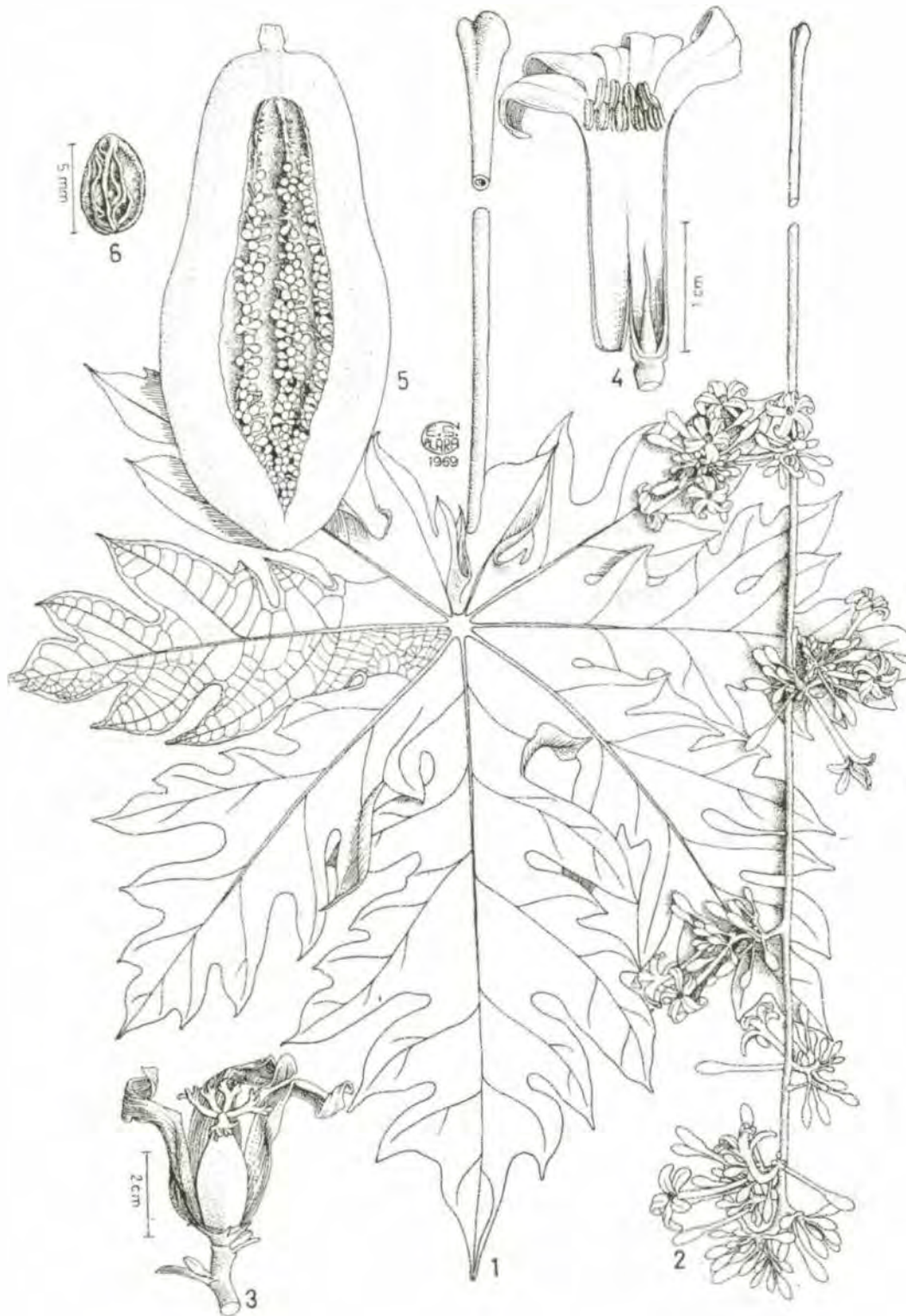


Figure 137. *Carica papaya*: 1. leaf; 2. staminate inflorescence; 3. pistillate flower, 4. staminate flower, opened; 5. fruit, vertical section, 6. seed.

108. DATISCEAE

Trees dioecious or tall herbs. Leaves large, petioled, simple or pinnate, spirally arranged, entire or unequally pinnatifid, estipulate. Flowers small, unisexual, rarely bisexual, fascicled, racemed or paniculate from leaf axils; calyx of staminate short, tubular, 3- to 9-lobed, petals wanting or 8; stamens isomerous and episealous, 4-25; calyx tube adnate to ovary with 3-9 short lobes; ovaries 1-celled, open or closed at vertex; styles lateral, simple or 2-parted, free or alternating placentae; ovules numerous, ascending or horizontal with 2 integuments. Capsules coriaceous, dehiscing at vertex between styles; seeds numerous, small.

Genera 3, species 4; all in tropical Asia except 1 in west Central America; 1 genus and 1 species in the Philippines.

1. OCTOMELES Miquel

Trees buttressed. Leaves thinly coriaceous, ovate, entire, 3- to 9-veined, somewhat scaly beneath when young, terminally clustered; petioles long, 5-angled. Flowers upon long, axillary spikes, usually minutely scurfy, sessile, subtended by subulate bracts; calyx tube of staminate hollow, rounded or campanulate, scurfy with 6-8 short, triangular lobes; petals alternating calyx appendages, twice as long; filaments elongated, compressed, subulate; anthers large, linear but strongly recurved; calyx of pistillate fusiform without petal or staminode; ovaries embedded in calyx with 5-8 lateral placentae; styles as many. Outer portion of fruit irregularly separating, inner or hairy part 6- to 8-valved; seeds numerous, minute.

Monotypic. Melanesia and Malesia (except Java and the Lesser Sunda Islands).

1. *Octomeles sumatrana* Miq., Fl. Ind. Bat. Suppl. 133, 336. 1861; van Steenis, Fl. Mal. I, 4: 383, t. 1, 3, 1953. **Figure 138**

Trees. Leaves alternately crowded at ends of minutely scurfy branchlets, 20-30 x 6-20 cm, 5-veined from base, midvein with few pairs of lateral nerves, lower side grayish, tessellate with minute brown scales, short and bluntly pointed, base cordately ovate; pedicels 10-30 cm long, angularly ridged, lepidote. Spikes yellowish green, subterminal or axillary, pendulous, exceeding foliage; calyx of staminate flowers thick, campanulate, short-toothed; petals lance-shaped; stamens much-exserted; anthers geniculately curved; calyx of pistillate flowers jug-shaped, irregularly splitting when in fruit; styles adnate, one-sided to calyx, free short portions with thick, peltate stigma. Bony endocarp of fruits persistent dehiscing from apex toward base into 6-8 parts.

Throughout the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, in the vicinity of College of Forestry and Natural Resources campus.



Figure 138. *Octomeles sumatrana*: 1. habit; 2. flowering twig; 3. ovary, vertical section; 4. ovary, cross section.

Com. name – *Binuang* (Bag., Mbo., Tag., Tagb).

Exsicc. – *Gates CA 1927** (CAHP).

109. BEGONIACEAE

Herbs erect or succulent, creeping, climbing or undershrubs. Stems often reduced to a rootstock. Leaves alternate, entire, toothed or lobed, usually very unequal-sided. Inflorescences axillary or terminal, cymose, usually dichotomous, rarely fascicled; flowers unisexual, zygomorphic or actinomorphic, perianth of staminate flowers of 2 valvate, petaloid sepals and 2 usually smaller valvate petals, that of pistillate of 2 to many similar imbricated, petaloid tepals; stamens epigynous, 4, 8 to many; filaments free or united; anthers narrowly obovate; perianth of pistillate flowers of 2-5 segments; ovaries inferior, 2- to 4-celled; styles 2-5, free or united below; stigmas branched or twisted; ovules numerous. Fruits usually winged, angular, thin-walled capsules, variously dehiscent or irregularly breaking up; seeds very small, numerous.

Genera 5, species 810, in most moist tropical countries; 1 genus and 98 species in the Philippines.

1. BEGONIA Linnaeus

Tepals in staminate and pistillate flowers free, 2-9, in pistillate not in 2 regularly alternating rows (thus, not differentiated into sepals and petals). Fruits loculicidally or irregularly (but not apically) dehiscent. For other characteristics, refer to family description.

Species 800, in most tropical countries.

1. Climbing on tree trunk; capsules almost equal, wings complete from base to apex
 2. Branches and whole plant glabrous; leaves oblong-ovate, 2-6 cm long, coarsely and sharply toothed at middle; stipules lanceolate, as long as petioles, deciduous 1. *B. aequata*
 2. Branches, petioles and veins of leaves ferruginous-hirsute; leaves oblong, 3-5 x 10-15 cm, unequally and coarsely toothed; stipules not as above 2. *B. cumingii*
1. Creeping on soil or stone, but not climbing on tree trunk; capsules, including wings subequal
 3. Leaves dark green, without mottling, light green beneath, base deeply incised 3. *B. muricata*
 3. Leaves green or mottled above, often purplish beneath, base not incised 4. *B. nigritarum*

1. *Begonia aequata* A. Gray, Bot. Wilkes U.S. Explor. Exped. 658, 1854; Merr., En. Philip. 3: 119, 1923.

Climbing on tree trunk. Stems slender, occasionally with rootlets at nodes, branches and whole plant glabrous. Leaves nearly equal-sided, ovate-oblong, 2-6 cm long, thin, coarsely and sharply toothed at middle, acuminate, 3- or 5-nerved at obtuse or rounded base; stipules lanceolate, pointed, scarious, deciduous, as long as petioles. Peduncles axillary, very short, fork; pedicels shorter than leaves, 1- to 3-flowered. Capsules orbicular, equally 3-winged, complete from base to apex.

Endemic. Philippines. Luzon (Laguna); in primary forests at 400 -1000 m; in Mt. Makiling, Luzon, often encountered in the mossy forest.

Exsicc. – *Orlido CA 12545; Pancho CA 1931 (CAHP); Elmer 854542, 123742; Merrill 1238350, 711095; Robinson 901663 (US).*

2. *Begonia cumingii* A. Gray, Bot. Wilkes U.S. Explor. Exped. 658, 1854; Merr., En. Philip. 3: 121, 1923. – *B. oxysperma* A.DC. in Ann. Sci. Nat. Ser. 4, XI, 122, 1859

Climbing on tree trunk, glabrous, young parts especially petioles and veins of leaves beneath more or less ferruginous-hirsute. Leaves long-petioled, 10-15 x 3-5 cm, pale beneath, punctate, half-cordate or half-sagitate, acuminate, base rounded, unequally and coarsely toothed, often denticulate. Capsules elliptic, 2 cm long, smooth, almost equally 3-winged, wings complete from base to apex.

Endemic. Philippines: Luzon (Laguna); in primary forests at 700-1400 m; in Mt. Makiling, Luzon, often encountered in the mossy forest.

Com. name – *Taingang-babui* (Tag.).

Exsicc. – *Estioko, Jr., CA 1928, 1930 (CAHP); Robinson 627668; Merrill 711096 (US).*

3. *Begonia muricata* Bl., Cat. 103, 1823; Backer & Bakh. f., Fl. Jav. 1: 309, 1963. – *B. repens* Bl., En. Fl. Jav. 1: 95, 1830, *non* Lam.

Leaves obliquely ovate-cordate, 4.5-17 x 4.5-13 cm, dark green above, light green beneath, with long hairs on both surfaces, sometimes glabrous above, acuminate, base deeply incised; petioles 5-25 cm long. Cymes on 3- 30-cm long peduncles, 5- to 12-flowered; pedicels in staminate 2-10 mm long; in pistillate 9-15 mm long; perianth pink or white; tepals 6-20 x 5-18 mm, sparsely red-pubescent dorsally; stamens 45 or more. Capsules 0.5-1.25 x 1.25-2 cm, wings subequal, broad.



Figure 139. *Begonia nigritarum*. 1 habit; 2. pistillate flower; 3 ovary, vertical section; 4. ovary, cross section; 5. staminate flower; 6. stamen; 7. fruit; 8. seed.

Endemic. Philippines: Luzon (Laguna); in primary forests at 600-1200 m.

Com. name – *Pingol-bato* (Tag.).

Exsicc. – *Pancho CA 20354* (CAHP).

4. *Begonia nigritarum* Steud., Nomencl. 104, 1821; Merr., En. Philip. 3: 126, 1923. – *B. capensis* Blco., Fl. Filip. 724, 1837. – *B. merrillii* Warb. in Perk., Fragm. Fl. Philip. 53, 1904. **Figure 139**

Rootstock creeping, with numerous brown stipules and scattered brown hairs. Leaves obliquely ovate, fleshy. 2.5-10 cm long, often purplish beneath, green or somewhat mottled above, slightly hairy at least on margins, acute or acuminate, base cordate, long-petioled. Scapes erect, equaling or longer than leaves, dichotomous, few-flowered. Flowers pink or nearly white, 1.2-1.4 cm in diameter, staminate and pistillate flowers with 4 perianth segments. Capsules subequally broadly rhombic-ovoid, including wings, triangular; 5-8 mm long, 3-winged, wings subacute.

Throughout the Philippines; on banks, along streams, damp cliffs, etc., in forests at low altitudes, up to 1200 m; in Mt. Makiling, Luzon, in damp cliffs and stone crevices at the mossy forest.

Com. name – *Pingol-bato* (Tag.).

Exsicc. – *Advincula CA 12514**, *Baker CA 19321*, *Pancho CA 9941*, *Paysan CA 9137*, *Raymundo CA 10449* (CAHP); *Elmer 1237113*, *Robinson 714447*, *Serviñas 903021* (US).

110. CUCURBITACEAE

Herbs climbing, monoecious or dioecious or shrubs with simple or branched tendrils. Leaves alternate, simple, lobed or divided, usually cordate, petioled, estipulate. Flowers solitary, racemose, umbellate or paniculate, regular, yellow or white; calyx tube woolly, adnate to ovary, its limb tubular or campanulate, 5-lobed, imbricate when young; petals 5, inserted upon calyx limb, united in a tube or nearly free, sometimes fimbriate along margins, valvate or involute; stamens usually 3, occasionally 5, 2 or 1, variously attached; anthers free or united, 1- or 2-celled, cells straight or conduplicate, connective sometimes produced or crested; ovaries inferior, 3-celled; style usually 1 with 3 stigmas; ovules many on parietal placentae. Fruits small to very large, fleshy or ultimately dry, indehiscent or dehiscent by valves or by a lid; seeds often compressed, frequently wrinkled, embedded in a pulp of fibrous mass.

Genera 90, species 660; in all the warmer parts of the world especially in the tropics; 15 genera and 31 species in the Philippines.

1. Anther cells straight; slender or coarse vines
 2. Monoecious, slender vines; calyx tube short, 5-partite; fruits 2 cm long (in ours); seeds wingless
 3. Tendrils simple; rudiment of pistil present; pollen smooth 1. *Melothria*
 3. Tendrils 2- to 3-fid; rudiment of pistil absent; pollen echinulate..... 2. *Bryonopsis*
 2. Dioecious, coarse vines; calyx tube deeply 3-partite; fruits 15-25 cm long (in ours); seeds compressed with laterally broadened, membranous, wing-like margins 3. *Alsomitra*
1. Anther cells conduplicate or curved in two directions like the letter S; usually coarse vines
 4. Corolla divided about one-half to base or less
 5. Flowers yellow, 12 cm long; fruits 12 cm or more in diameter, variable in shape 4. *Cucurbita*
 5. Flowers white, 2.5-3 cm long; fruits 2.5 cm long 5. *Diplocyclos*
 4. Corolla free or divided nearly to base
 6. Petals fimbriate 6. *Trichosanthes*
 6. Petals entire
 7. Flowers white; calyx tube of staminate flowers elongate; anthers included or nearly so 7. *Lagenaria*
 7. Flowers mostly yellow; calyx tube or staminate flowers short; anthers usually exerted
 8. Anthers not or scarcely cohering; stamens inserted near mouth of calyx tube
 9. Staminate flowers racemose; fruits cylindrical, sometimes angled, opening at end 8. *Luffa*
 9. Flowers solitary; fruits ellipsoid, indehiscent 9. *Benincasa*
 8. Anthers more or less cohering; stamens inserted below mouth of calyx tube
 10. Tendrils 2- or 3-fid; lobes of leaves pinnatifid 10. *Citrullus*
 10. Tendrils simple; lobes of leaves not pinnatifid
 11. Staminate flower clustered, short-pedicelled 11. *Cucumis*
 11. Staminate flowers racemose or solitary and long-pedicelled, usually bracteolate 12. *Momordica*

1. MELOTHRIA Linnaeus

Herbs slender, monoecious, tendrils simple or 2-fid. Leaves deltoid-ovate, entire or lobed, usually scabrous, base truncate or cordate. Flowers small, unisexual, axillary, pedicellate; calyx tube short, lobes 5; corolla 5-partite; staminate flowers with 3 stamens inserted on middle of calyx tube

pistillate flowers with oblong ovary; stigmas 3. Fruits globose to ellipsoid or fusiform; seeds small, numerous.

Species 88, of wide tropical distribution; 7 in the Philippines.

1. *Melothria indica* Lour., Fl. Cochinch. 35, 1790; Chakravarty, Rec. Bot. Sur. Ind. 17: 150, 1959. **Figure 140**

Vines slender, 1-2 m long, with simple tendrils. Leaves triangular-ovate, 3-8 cm long, scabrous, subentire or irregularly toothed, acute or acuminate, base hastate-cordate; petioles 1-3 cm long. Flowers straw-colored, 5 mm long; pedicels 0.5-2.5 cm long, solitary or few in each axil; staminate and pistillate flowers often in the same axil. Fruits ovoid or ellipsoid, pointed, 2 cm long.

India to China through Malaysia to the Moluccas and Samoa. Throughout the Philippines, in open grasslands and old clearings; in Mt. Makiling, Luzon, in old *kaingin* areas at low altitudes.

Com. name – *Melon-daga* (Tag.).

Exsicc. – *Orlido CA 4911**; *Barroga CA 4940*; *Velasco CA 2643, 2644* (CAHP).

2. BRYONOPSIS Arnott

Herbs climbing, monoecious. Leaves deeply palmate- or pedatipartite. Tendrils 2-fid. Flowers fascicled; staminate and pistillate flowers often in same fascicle; calyx tube of staminate widely campanulate, 5-toothed, entire; corolla deeply 5-partite, lobes patent or recurved; stamens 3 within calyx tube, free; anthers basifixed; rudiment of pistil absent; calyx and corolla of pistillate flowers as in staminate, but smaller; staminodes 3; ovaries ovoid-globose; styles thickened toward apex; stigmas 3, large, lobed. Fruits globose or ovoid berries, bright red when ripe with white spots and longitudinal lines; seeds embedded in slime, pyriform, thick-margined.

Species 3, tropical Africa and Asia; 1 in the Philippines.

1. *Bryonopsis laciniosa* (L.) Naud., Ann. Sci. Nat. Bot. V, 6: 30, 1866. – *Bryonis laciniosa* L., Sp. Pl. 1: 1013, 1753. **Figure 141**

Plants much-branched, 2-4 m tall. Leaves broadly ovate, 3- to 9-fid, 6-20 x 7-22 cm; petioles 2-10 cm long. Fascicles 2- to 8-flowered, 1-4 flowered pistillate, others staminate; pedicels of staminate flowers 8-20 mm long; calyx 5-6 mm long; corolla lobes ovate, 7-8 mm long, greenish yellow, pubescent on both sides; pedicels of pistillate flowers 2-4 mm long; ovaries separate from calyx tube by constriction; corolla lobes 4-6 mm long. Fruits 2-3 cm long; seeds brown, 6-7 mm long with corky thickenings.

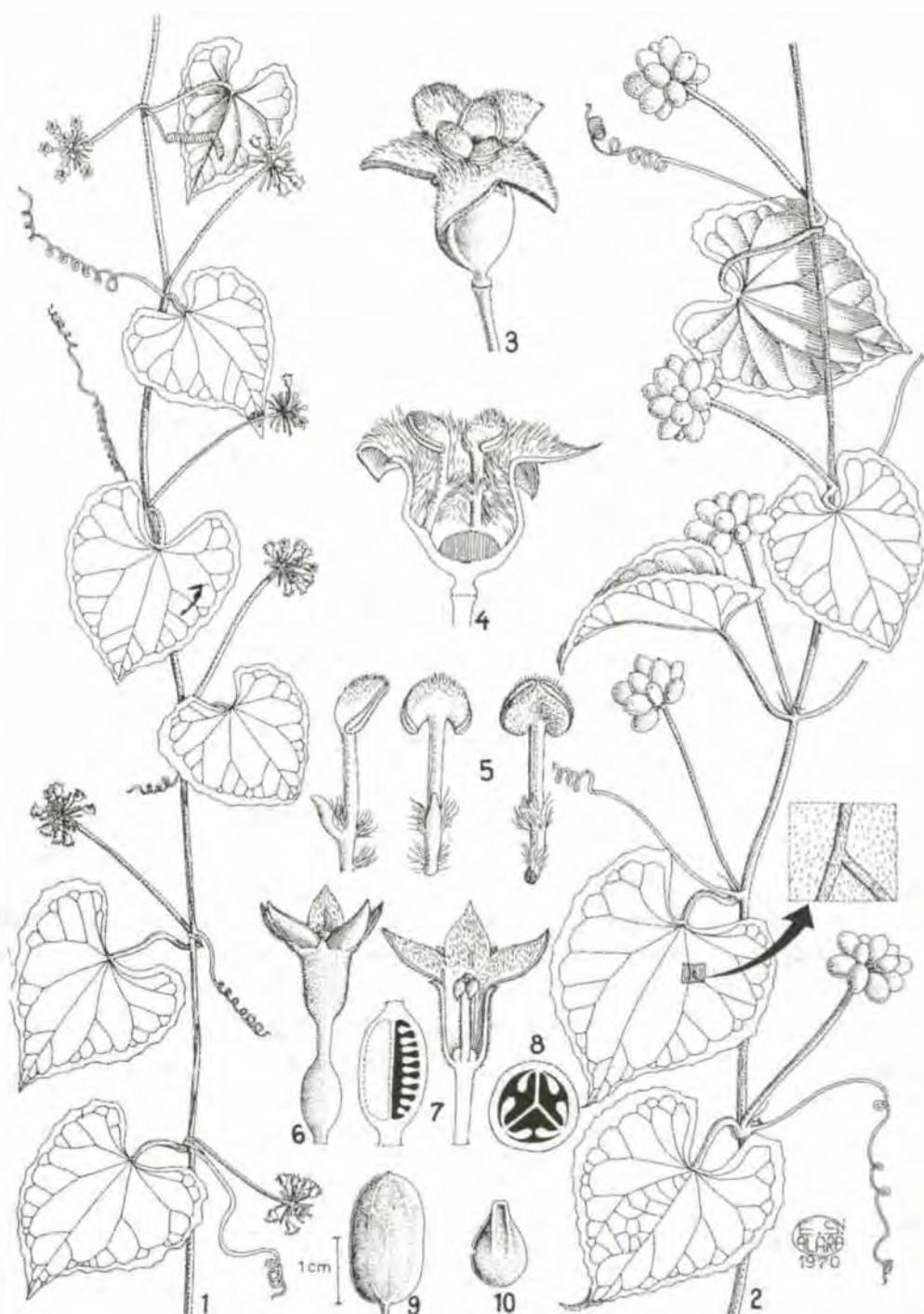


Figure 140. *Melothria indica*: 1. staminate twig; 2. pistillate twig; 3. staminate flower; 4. staminate flower, vertical section; 5. stamen, 3 views; 6. pistillate flower; 7. ovary, vertical section; 8. ovary, cross section; 9. fruit; 10. seed.

Tropical Africa and Asia through Malesia to Australia. Throughout the Philippines, in thickets, old clearings and forest edges at low and medium altitudes.

Com. name – *Melong-uak* (Tag.).

Exsicc. – *Hernaez CA 18607**, 19004, 19005 (CAHP); *Ramos 38731*; *Ramos & Edaño 18865* (US).

3. ALSOMITRA (Blume) M.J. Roemer

Climbers woody, dioecious; tendrils 2-fid at apex. Leaves entire or lobed. Staminate flowers paniced; calyx deeply 3-partite, campanulate; corolla rotate, lobes acute; stamens 3, inserted within calyx tube, free; anthers erect, oblong; rudiments of pistil 3, small; pistillate flowers racemose; calyx 2- to 3-lobed or circumscissile; corolla as in staminate but larger; ovaries at first 3-, afterwards 1-celled; ovules numerous, pendulous; styles 3-partite. Fruits large, subglobose, 3-valved at flat apex; seeds numerous, hanging, compressed, with laterally broadened, membranous, wing-like margins.

Species 4, India to Polynesia and Australia; 1 in the Philippines.

1. *Alsomitra macrocarpa* (Bl.) Roem., Syn. Monog. 2: 117, 1846; de Wit, Bull. Jard. Bot. Btzg. III, 18: 193-200, 1949. – *Macrozanonia macrocarpa* (Bl.) Cogn., Bull. Herb. Boiss. 1: 612, 1893. – *Zanonia macrocarpa* Bl., Bidjr. 937, 1326. – *Z. philippinensis* Merr., Philip. J. Sc. 1: Suppl. 241, 1906.

Climbers of tall, forest trees. Leaves subelliptic to broadly ovate, 12-15 x 7-9 cm, reticulate on both sides, glabrous, acute, sometimes apically acutely 3-lobed, obtuse to shallowly truncate at base; petioles 3-5 cm long. Inflorescences paniculately elongate with small greenish flowers. Infrutescences ligneous, hanging, short pedicels thick; fruits ovately ellipsoid, 15-25 cm long, subtriangularly indented at apex, usually opening by an operculum, 3-valved; seeds packed in rows, 2 cm long, with broad, hyaline wings.

Sumatra, Java, Borneo, Celebès, Halmahera, New Guinea and the Bismarck Archipelago. In most parts of the Philippines, in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 250-400 m.

Com. name – *Kabatete* (Tag.).

Exsicc. – *Gates CA 2652, 2653* (CAHP); *Villamil 1237863*; *Mabesa 1294494* (US).

4. CUCURBITA Linnaeus

Annual vines coarse, herbaceous, hispid or hairy, monoecious. Leaves cordate, 5-angled or lobed. Flowers large, yellow, solitary; calyx tube campanulate, lobes 5, linear or foliaceous; corolla campanulate, 5-lobed; staminate flowers with 3 stamens inserted in calyx tube; anthers connate, one

1-celled, two 2-celled; pistillate flowers with oblong ovary; styles short; stigmas 3, bifid. Fruits very large, indehiscent., fleshy; seeds compressed, margined, smooth.

Species 21, cosmopolitan; 1 in the Philippines.

1. *Cucurbita maxima* Duchesne in Lam., Encycl. 2: 151, 1786; Chakravarty, Rec. Bot. Sur. Ind. 17: 123, 1959.

Vines herbaceous, prostrate or climbing, very coarse, reaching a length of 4 m or more. Leaves orbicular-cordate, 15-30 cm in diameter, shallowly 5-lobed, rather finely toothed, hispid, upper surface often mottled. Flowers campanulate, erect, yellow, 12 cm long, corolla limb about as wide, 5-lobed, staminate flowers longer peduncled than pistillate. Fruits very large, variable in shape.

Probably a native of tropical America; cultivated in all warm and tropical countries. Cultivated throughout the Philippines.

Com. name – *Kalabasa* (Tag.); Squash (Engl.).

Exsicc. – *Lugod* CA 8398, 8399 (CAHP).

5. DIPLOCYCLOS (Endlicher) Post & O. Kuntze

Annual or perennial, monoecious, herbs scandent, glabrous. Leaves palmatifid, 5- to 7-lobed, margins obscurely denticulate. Staminate flowers with erect, 5-lobed, lanceolate calyx; corolla campanulate, 5-partite; stamens 3. Pistillate flowers with stamens and corolla as in staminate; staminodes 3, linear. Fruits ovoid-globose, baccate, indehiscent. many-seeded; seeds embedded in slime, flat, with corrugated margins.

Species 5, pantropic; 1 in the Philippines.

1. *Diplocyclos palmatus* (L.) C. Jeffrey, Kew Bull. 15: 352. 1962; Jones & Gray, Aust. Clim. Plts. 98, 1977. – *Bryonia palmata* L., Sp. Pl. 1012, 1753. – *Bryonopsis laciniosa sensu* Naud., Ann. Sc. Mat. ser. 4, 12:141, 1859; *et sensu auct. mult. non* (L.) Naud., *l.c.* – *Ilocania pedata* Merr., Philip. J. Sc. 13(Bot.): 65, 1918. **Figure 142**

Perennial monoecious climbers, glabrous, with long, slender, weak stems. Leaves palmatifid, up to 10 cm across. Flowers small, unisexual, on short, axillary racemes or clusters; pistillate flowers on short pedicels but staminate and pistillate may be together in same cluster. Fruits ovoid, 2.5 cm long, yellow or red when ripe with conspicuous longitudinal stripes. All parts give off a nauseous smell if handled.

Sri Lanka to Australia; now widely distributed in many tropical countries as climbers on fences and trees. In the Philippines, it occurs only in Luzon (Ilocos Norte, Laguna); in Mt. Makiling, Luzon, common along borders of clearings at low altitudes.

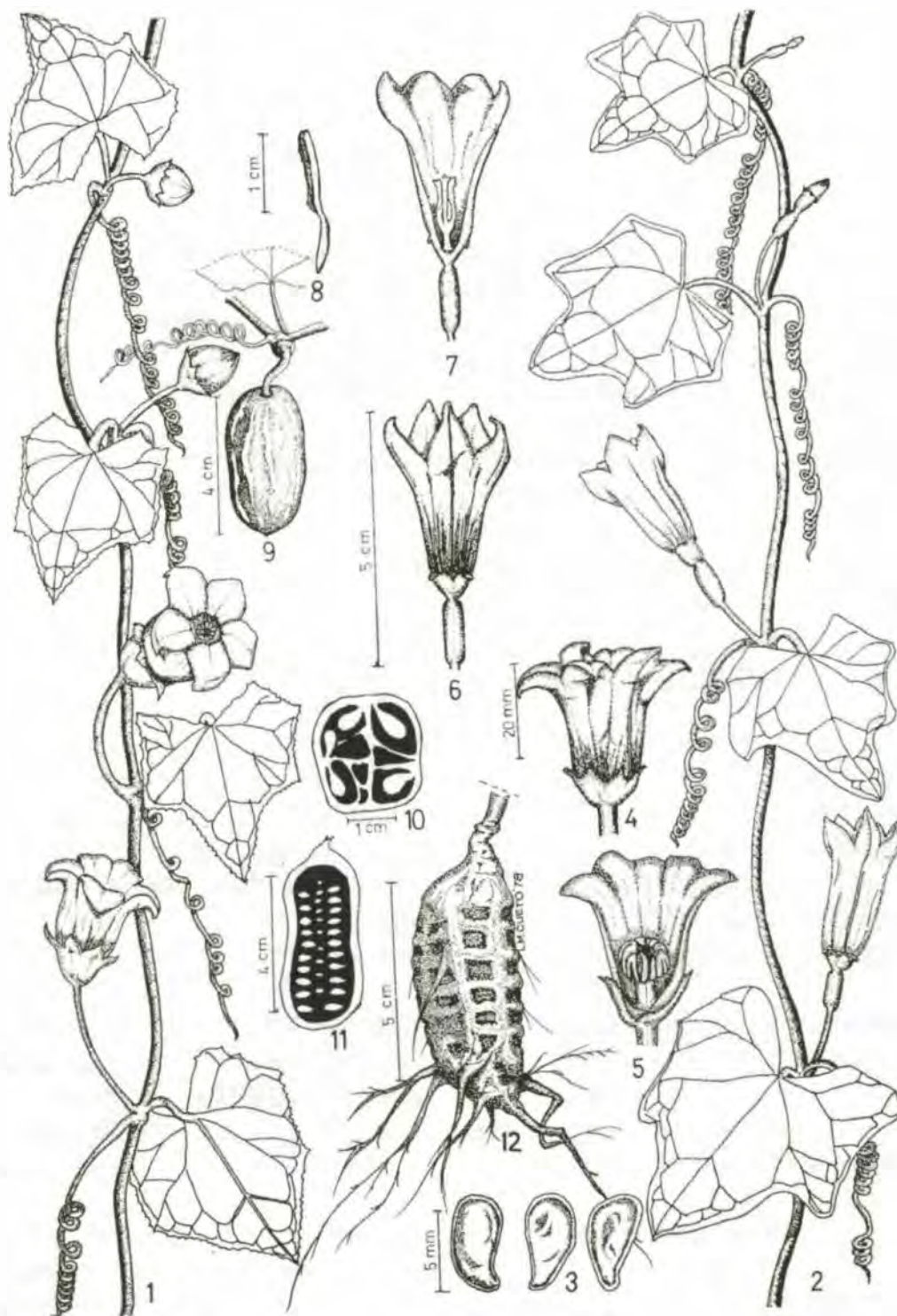


Figure 142. *Diplocyclos palmatus*: 1. staminate branch; 2. pistillate branch; 3. seeds; 4. staminate flower; 5. staminate flower, partly excised to show stamens; 6. pistillate flower; 7. pistillate flower, partly excised; 8. stamen; 9. fruit; 10. fruit, cross section; 11. fruit, vertical section; 12. root.

Com. names – *Tambling* (Tag.); *Striped cucumber* (Engl.).

Exsicc. – *Hernaez CA 28843**; *Pancho CA 28844, 28845* (CAHP).

6. TRICHOSANTHES Linnaeus

Vines herbaceous, slender or coarse. Leaves 3- to 9-lobed, denticulate. Flowers white, staminate peduncles usually in pairs, rarely solitary, others racemose, bracts large, small or none; calyx long-tubular, 5-lobed, entire, serrate or lacinate; corolla deeply 5-fid, lobes long-fimbriate; stamens 3; anthers connate, cells conduplicate; pistillate flowers solitary; calyx and corolla as in staminate; ovaries 1-celled; styles slender, 3- to 6-fid at apex. Fruits globose or ovoid, smooth; seeds few to many, compressed.

Species 44, India to Japan southward to Australia; 6 in the Philippines.

1. Staminate inflorescences ebracteolate (bracts, when present, minute); vines slender with small flowers and fruits 1. *T. cucumerina*
1. Staminate inflorescences large-bracted; vines coarse with large flowers and fruits red, globose 2. *T. quinquangulata*

1. *Trichosanthes cucumerina* L., Sp. Pl. 2: 1008, 1753; Chakravarty, Rec. Bot. Surv. Ind. 17: 31, 1959.

Vines herbaceous, scandent, 5-6 m high; stems 4-angled, hairy. Leaves orbicular-reniform or broad-ovate, 7-10 x 8-12 cm, 3- or 5-lobed, lobes broad, rounded or obtuse, pubescent on both surfaces, base broadly cordate. Staminate inflorescences long-peduncled, axillary, cymosely 6- to 15-flowered, bracts minute or none; calyx tube dilated above, 1 cm long, green, hairy; petals white, nearly free, fimbriate, oblong, 1.3 cm long; pistillate flowers solitary, axillary, peduncled. Fruits ellipsoid, pointed, up to 4 cm long, 2.5 cm thick, green, mottled with longitudinal gray stripes when young, orange-red when mature; seeds compressed, undulate, hard, rugose, 1 cm long, embedded in soft, red pulp.

India, Thailand, Malaysia, Java, tropical Australia, Bonin Islands and Polynesia. In most parts of the Philippines, in thickets at low and medium altitudes, up to 1200 m; in Mt. Makiling, Luzon, encountered mostly in old clearings.

Com. name – *Melon-melonan* (Tag.).

Exsicc. – *Raguini CA 2640* (CAHP).

2. *Trichosanthes quinquangulata* A. Gray, Bot. Wilkes U.S. Explor. Exped. 645, 1854; Merr., En. Philip. 3: 585, 1923.

Vines coarse, glabrous with angled or sulcate stems. Leaves suborbicular, 10-20 cm long, sharply 5- or 7-angled or lobed, acuminate; base deeply cordate.

Staminate racemes long-peduncled, many-flowered, one or two flowers opening at a time, bracts large, ovate, 3-4 cm long; flowers white, large; calyx lobes 2-2.5 cm long, irregularly toothed; corolla tube slender, limbs spreading, 7-9 cm in diameter; Fruits globose, 10 cm in diameter, smooth, red or crimson.

Endemic and widely distributed in the Philippines, in thickets and old clearings at low and medium altitudes; in Mt. Makiling, Luzon, in old clearings and forest borders.

Com. name – *Maramelon* (Tag.).

Exsicc. – *Gates CA 2657* (CAHP); *Forest Guard 1237867*; *McGregor 898355* (US).

7. LAGENARIA Seringe

Annual vines herbaceous, coarse. Leaves ovate or orbicular, cordate, toothed; petioles 2-glandular at apex. Flowers large, white, solitary, staminate long, pistillate short-peduncled; calyx tube funnel-shaped with 5 narrow lobes; petals 5, free, obovate; staminate flowers with 3 stamens, anthers connate, cells conduplicate; pistillate flowers with oblong ovary; styles short with 3 bifid lobes. Fruits large, fleshy, ultimately dry, indehiscent, very variable in shape.

Monotypic. Pantropic.

1. *Lagenaria siceraria* (Mol.) Standl., Field Mus. Bot. 3: 435. 1930. – *Cucurbita lagenaria* L., Sp. Pl. 2: 1010, 1753. – *C. siceraria* Mol., Sagg. Chil. 133, 1782. – *Lagenaria leucantha* (Duchesne) Rusby, Mem. Torr. Bot. Club 6: 43, 1896. – *Cucurbita leucantha* Duchesne in Lam., Encycl. 2: 150, 1786.

Vines coarse several meters long. Leaves suborbicular, 10-40 cm long, pubescent on both surfaces, 5-angled or lobed. Flowers white; petals 3-4 cm long; calyx pubescent. Fruits green, mottled with gray or white, polymorphous, often club-shaped, up to 80 x 15 cm, in other forms ovoid to depressed-globose, nearly as thick as long.

Native of tropical Asia or Africa, now cultivated in all tropical countries.

Cultivated throughout the Philippines, fruits eaten as vegetable.

Com. name – *Upo* (Tag.).

Exsicc. – *Pancho CA 20349* (CAHP).

8. LUFFA Miller

Vines monoecious, coarse, pubescent or nearly glabrous. Leaves cordate, 5-angled or lobed. Flowers yellow, staminate in long or short racemes, pistillate solitary; staminate flower calyx tube obconical, lobes 5, triangular

to lanceolate; petals 5, obovate; stamens 2, 3 or 5; filaments free or connate; pistillate flower calyx tube slightly produced above ovary, lobes and corolla as in staminate; ovaries oblong; styles cylindrical; stigmas 3-lobed. Fruits large or small, cylindrical or 10-angled, oblong, 3-celled, fleshy when immature, ultimately dry, usually dehiscent by a circumscissile operculum at top.

Species 3, in the warmer parts of the Old World; 2 in the Philippines.

1. Stamens 5; fruits cylindrical 1. *L. cylindrica*
 1. Stamens 3; fruits sharply 10-angled 2. *L. acutangula*

1. *Luffa cylindrica* (L.) Roem., Syn. Monog. 2: 63, 1846; Chakravarty, Rec. Bot. Surv. Ind. 17: 75, 1959. – *Momordica luffa* L., Sp. Pl. 2: 1009, 1753. – *M. cylindrica* L., loc. cit.

Annual vines herbaceous, scandent, hairy or nearly glabrous, up to 10 m or more long; stems 5-angled. Leaves orbicular-ovate to reniform-ovate, 10-20 cm in diameter, shallowly 5- or 7-angled or lobed, denticulate, scabrous, acuminate, base deeply cordate; petioles 10-12 cm long, scabrous. Staminate flowers in axillary, solitary, long-peduncled racemes, crowded at and near apex of peduncle; calyx green, lobes ovate-lanceolate, acuminate, 1 cm long; corolla rotate, yellow, 5-7 cm in diameter; stamens 5; pistillate flowers solitary, peduncled. Fruits oblong, cylindrical, 12-30 cm long, green, smooth or slightly 10-ribbed.

Tropics of the world, native country uncertain. Commonly cultivated throughout the Philippines, fruits used as vegetable.

Com. name – *Patola* (Tag.).

Exsicc. – *Flores CA 2641, 2642* (CAHP).

2. *Luffa acutangula* (L.) Roxb., Hort. Beng. 70, 1814; Chakravarty, Rec. Bot. Surv. Ind. 17: 79, 1959. – *Cucumis acutangulus* L., Sp. Pl. 2: 1011, 1753.

Annual vines herbaceous, coarse. Leaves suborbicular-ovate, 10-20 cm long, shallowly 5-lobed, base cordate. Pistillate flowers axillary, pedicelled, solitary; staminate flowers in axillary racemes, yellow, 2 cm long, calyx lobes lanceolate, acuminate; stamens 3, 1 unilocular, 2 bilocular; filaments bearded at base. Fruits oblong-obovate, 20-25 x 5 cm, green with 10 prominent, longitudinal sharp angles.

Throughout the Old World tropics; cultivated throughout the Philippines, fruits used as vegetable.

Com. name – *Patola* (Tag.).

Exsicc. – *Pancho CA 20381* (CAHP).

2. *Cucumis sativus* L., Sp. Pl. 2: 1012, 1753; Chakravarty, Rec. Bot. Surv. Ind. 17: 105, 1959.

Vines prostrate or climbing, coarse. Leaves ovate, 8-14 cm long, 5-angled or 5-lobed, lobes or angles acute, hispidulous on both surfaces. Flowers axillary, solitary or fascicled, sessile or short-pedicelled, staminate and pistillate similar in color and size, yellow, 2 cm long. Fruits various, usually cylindrical, 10-20 cm long, yellow when mature, slightly tuberculate.

Probably a native of tropical Asia. Cultivated for its edible fruits in all warm and tropical countries, grown throughout the Philippines.

Com. name – *Pepino* (Sp.).

Exsicc. – *Lugod CA 8358* (CAHP).

12. MOMORDICA Linnaeus

Annual or perennial vines slender, coarse, monoecious or dioecious. Leaves cordate, undivided or lobed. Flowers yellow or white, pistillate solitary, peduncled, staminate solitary or racemes, bracteolate or not; staminate flower calyx tube short, campanulate, 5-lobed; corolla 5-partite nearly to base; stamens 3; anthers free, one 1-celled, other two 2-celled; pistillate flowers similar to staminate; ovaries oblong to lanceolate-cylindric, rugose, indehiscent or dehiscent; fruits 3-valved; seeds smooth, wrinkled or sculptured.

Species 60, mostly in tropical Asia and Africa, few in America; 2 in the Philippines.

1. Vines monoecious, slender; flowers 12 mm long or less; fruits oblong 1. *M. charantia*
 1. Vines dioecious, coarse; flowers 3-4 cm long, subtended by a large bracteole; fruits globose 2. *M. cochinchinensis*

1. *Momordica charantia* L., Sp. Pl. 2: 1009, 1753; Chakravarty, Rec. Bot. Surv. Ind. 17: 88, 1959. Figure 143

Vines monoecious, herbaceous, scandent, glabrous or nearly so, tendrils simple. Leaves orbicular, 2.5-10 cm in diameter, cut to base into 5 or 7 oblong-ovate, variously toothed lobes, base cordate. Flowers solitary, long-peduncled, yellow; staminate flowers 12 mm long, peduncled, with orbicular, green, 1-cm long bract at about middle; pistillate flowers similar to staminate, long-peduncled. Fruits oblong, cylindrical, from 2-3 cm in wild forms, to at least 25 cm in length in cultivated forms, pointed at both ends, ribbed, rugose, dark to light green.

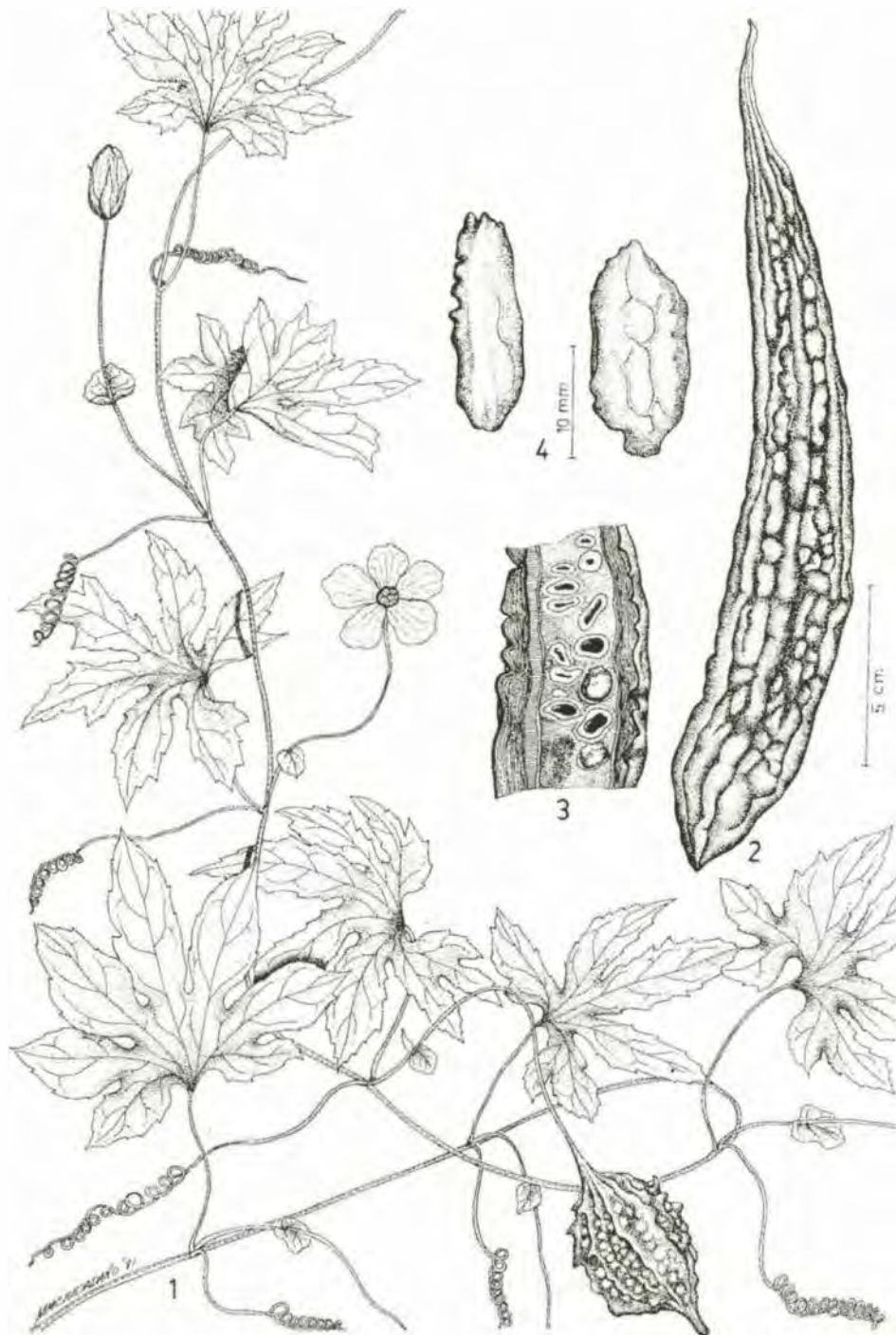


Figure 143. *Momordica charantia*: 1. flowering and fruiting twig; 2. fruit; 3. fruit, vertical section; 4. seed, 2 views.

Tropics of the world, probably of Asiatic origin. Throughout the Philippines, cultivated and wild.

Com. name – *Ampalaya* (Tag.); Bitter gourd (Engl.).

Exsicc. – *Albino* CA 2646, 2647; *Estioko, Jr.* CA 2648* (CAHP).

2. *Momordica cochinchinensis* (Lour.) Spreng., Syst. 3: 14, 1826; Chakravarty, Red. Bot. Sur. Ind. 17: 95, 1959 – *Muricia cochinchinensis* Lour., Fl. Cochinch. 2: 596, 1790.

Vines dioecious, coarse, up to 12 m or more long, slightly pubescent or nearly glabrous; petioles, bracteoles and sometimes leaf margins with few, large glands. Leaves broadly ovate, 8-18 cm long, deeply palmately 3-lobed or sometimes entire, acuminate. Staminate flowers axillary, solitary, pedicelled, buds enclosed by a large, green, inflated bracteole inhabited by ants, opening at anthesis, turning yellowish; calyx nearly black, with 5 acuminate lobes, 2 cm in diameter; petals pale-yellow, oblong or oblong-ovate, 3.5-4 cm long, three with large dark-colored blotch at base. Fruits large, ovoid or subglobose, 8-12 cm in diameter, yellow, roughened with scattered, tubercle-like spines. Seeds large, flattened, circular.

India to China, and Taiwan through Malaysia to the Moluccas. Widely distributed in the Philippines, in thickets and secondary forests at low and medium altitudes.

Com. name – *Buyok-buyok* (Tag.).

Exsicc. – *Gates* CA 2649, 2650; *Lugod* CA 8228, 8229 (CAHP); *BF* 23798, 1376089 (US).

111. LYTHRACEAE

Herbs, shrubs or trees. Branches often 4-angled. Leaves opposite, seldom alternate, occasionally whorled, simple, entire; stipules usually subulate. Inflorescences axillary or terminal, mostly in dichasia, racemes or heads, solitary or in panicles; flowers bisexual, regular or irregular; calyx tube free, persistent, 3- to 6-lobed, valvate lobes often appendiculate; petals as many as calyx lobes or absent, valvate or corrugate in bud; stamens few or many, usually twice as many as calyx segments, inserted upon calyx tube; ovaries superior, free and at bottom of tubular calyx, 2- to 6-celled or by abortion or partition, 1-celled; styles long; stigmas capitate or rarely bilobed; ovules numerous along placenta which is usually axial. Fruits dehiscent or indehiscent; seeds many, rounded, angular or winged.

Genera 22, species 450; in the tropics especially America, few in temperate countries; 6 genera and 15 species in the Philippines.

1. Trees or shrubs
 2. Flowers small, 4-merous; stamens usually 8, rarely 4-9 or 13 1. *Lawsonia*
 2. Flowers large, 6-merous; stamens 15 or more, often unequal 2. *Lagerstroemia*
1. Low annual or suffrutescent herbs
 3. Annual, low herbs; flowers absent or small; lowland weeds
 4. Walls of capsule with dense and horizontally minute striations under a lens 3. *Rotala*
 4. Walls of capsule without striations 4. *Ammannia*
 3. Annual or perennial, suffrutescent herbs; flowers large, pale purple or white (in ours); cultivated ornamentals 5. *Cuphea*

1. LAWSONIA Linnaeus

Shrubs erect or trees small, often with reduced, thorny branchlets. Leaves glabrous, shiny on upper side, obscurely punctate beneath, obovately elliptic, up to 3 cm long and one half as wide as its length, obtuse, minutely pointed, base sub-attenuate appearing short-petioled, midrib evident, nerves faint, coriaceous. Panicles terminal, glabrous, erect or nearly so, lower branches subtended by reduced bracts; buds numerous bract-subtended; flowers moderately small, numerous, yellow or yellowish white to brick red; pedicels slender; calyx tube campanulate, 4 lobes ovate; petals obovate, exceeding calyx segments in length; stamens usually 8, mostly inserted in pairs between petals, sometimes fewer; ovaries sessile, 2- to 4-celled with long styles. Capsules coriaceous, smooth, globose, irregularly breaking up; seeds angular, smooth.

Monotypic. Tropics of both hemispheres.

1. *Lawsonia inermis* L., Sp. Pl. 349, 1753; Merr., En. Philip. 3: 138, 1923.

Characteristics. (Refer to genus description).

Cultivated as an ornamental tree in most gardens in the Philippines, but scarcely naturalized.

Com. name – Henna (Engl.).

Exsicc. – *Foxworthy* CA 1948; *Pinga* CA 1949; *Halos* CA 1950 (CAHP).

2. LAGERSTROEMIA Linnaeus

Shrubs or trees, rarely scandent. Leaves opposite or upper ones alternate. Panicles usually trichotomous, sometimes dense; peduncles and pedicels bracteate at their ends; flowers often large, showy, regular; calyx tube funnel-shaped, thick, smooth, grooved, angular or narrowly winged, lobes usually 6, ovate and subacute; petals 6, sometimes 7-9, clawed, thin, wrinkled, margins crisply erose or fimbriate, stamens indefinite; filaments long-exserted; ovaries sessile, 3- to 6-celled; styles long, bent; stigmas capitate. Capsules partly adnate to calyx, coriaceous, smooth, 3- to 6-valved; seeds flat, elongated, winged at summit.

Species 30; chiefly Indo-Malaysian, few in China and Australia; 4 in the Philippines.

1. Trees; panicles rigid, central stalk becoming woody; flowers lilac to purple; capsules 2-3.5 cm long 1. *L. speciosa*
1. Shrubs; panicles not rigid or becoming woody; flowers white or pink (in ours); capsules 1-1.25 cm long 2. *L. indica*

1. *Lagerstroemia speciosa* (L.) Pers., Syn. 2: 72, 1807; Furtado & Montien, Gard. Bull. Sing. 24: 264, f. 29A, 1969. – *Munchausia speciosa* L. in Munch., Hausv. 1: 357, t. 2, 1770.

Trees medium-sized. Leaves oblong or ovately elliptic, 18 x 6 cm, midrib ridged beneath with 7-12 pairs of ascending nerves, obtuse and short-pointed, base obtuse or rounded; petioles 1 cm long, canaliculate. Panicles terminal, elongate, rigid, central stalk becoming woody in fruiting state; branchlets short, scurfy-brown; flowers 6-merous; calyx grooved, densely yellowish brown, scurfily stipitate, lobes divergent or reflexed, persistent in fruit; petals lilac to purple, obovate, 3.25 cm long, spreading. Capsules ligneous, ellipsoid or obovate, 2-3.5 cm long, subtended by or adnate to thickened, flat calyx cup, opening from apex to base.

India to southern China through Malesia to tropical Austratia. In the Philippines, widely distributed in dry woods or among shrubberies; here and there utilized as an ornamental tree in parks and gardens.

Com. name -- *Banaba* (Tag.).

Exsicc. – *Champhaka* CA 8084, *Gates* CA 1945, 1946, 1947; *Espiritu* CA 8207 (CAHP), *Sulit & Columbres* s.n. (A); *Sulit* 1 (A), 8170; *Lagrimas* 479 (PNH).

2. *Lagerstroemia indica* L., Syst. ed. 10, 1759; Furtado & Montien, Gard. Bull. Sing. 24: 190, f. 1A-G, 1969.

Shrubs erect. Leaves obovately elliptic, 5 x 2 cm, midrib with 5-8 ascending nerves, much paler green beneath, obtusely rounded, base broadly obtuse, subsessile. Panicles terminal, freely rebranched, glabrous; flowers less than 4 cm across; calyx green, smooth, subcoriaceous; petals pink to whitish, outer ones orbicular or reniform, lobed, strongly crisped; stamens interlaced. Capsules ovately globose, 1-1.25 cm long, calyx teeth triangularly elongated, distant.

Himalayan regions, China, Indochina, Japan and other parts of the world where it is cultivated. In the Philippines, cultivated in most towns for its exceedingly handsome flowers.

Com. name – *Milendres* (Sp.).

Exsicc. – *Orlido* CA 10311; *Llena* CA 2782; *Palacpac* CA 4571; *Beltran* CA 2879; *Capinpin* CA 2669; *Quisumbing* CA 633 (CAHP), 90374 (US).

3. ROTALA Linnaeus

Annual herbs erect, low, simple or branched, glabrous, in wet places. Leaves decussate or verticillate, rarely alternate, sessile or subsessile. Flowers 3- to 6-merous, small, mostly sessile, axillary, solitary or axillary spikes or racemes, usually 2-bracteolate; calyx campanulate to hemispheric. 3- to 6-lobed, lobes usually with a setiform appendage; petals small or wanting; stamens 1-6; ovaries sessile or subsessile; styles short or elongated. Capsules septicidally 2- to 5-valved, cartilaginous, walls densely and minutely horizontally striate under a lens.

Species 20; chiefly in tropical Asia and Africa, a few in Australia, Europe and America; 4 in the Philippines.

1. Leaves at least partly in whorls of 3; stamens 2-4, inserted at base of calyx tube; styles absent. 1. *R. mexicana*
1. Leaves decussate; stamens 4 or 5, inserted at least halfway calyx tube; styles present
2. Calyx with distinct interlobal appendages 2. *R. catholica*
2. Calyx without interlobal appendages 3. *R. indica*

1. *Rotala mexicana* Cham. & Schlecht., Linnaea 5: 567, 1830; Merr., En. Philip. 3: 135, 1923.

Herbs small, glabrous, erect, usually less than 3-4 cm in height, generally branched from base. Leaves linear-oblong, in three's or four's, somewhat close, 5 mm long or less, obtuse, truncate or 2-pointed. Flowers axillary, solitary,

less than 1 mm long, 4- or 5-merous, calyx teeth triangular; petals none; stamens 2 or 3, rarely 4. Capsules subglobose, 1 mm in diameter.

Pantropic. In the Philippines, a common weed in old rice paddies.

Com. name – Fire weed (Engl.).

Exsicc. – *Pancho CA 20045, 20241* (CAHP).

2. *Rotala catholica* (Cham. & Schlecht.) B. van Leeuwen. *Blumea* 19: 54, 1971. – *Ammannia catholica* Cham. & Schlecht., *Linnaea* 2: 378, 1927, *pro A. catholica philippinensis*. – *Rotala ramosior* (L.) Koehne in Mart., *Fl. Bras.* 13: 194, 1877; Merr., *En. Philip.* 3: 135, 1923. – *Ammannia ramosior* L., *Sp. Pl.* 120, 1753. **Figure 144**

Herbs erect, slender, simple or branched, glabrous, 8-25 cm high, stems somewhat 4-angled, usually purplish. Leaves oblanceolate to linear-lanceolate, 1.5-3 cm long, obtuse, base narrowed to short petiole. Flowers small, axillary, solitary, sessile, bracteoles as long as calyx, at time of flowering 2.5-3 mm long, appendages longer than lobes, spreading, lanceolate-acuminate, lobes triangular-ovate, acute or acuminate; petals elliptic or oblong-elliptic, pale pink, 1 mm long. Capsules ovoid, 3-4 mm long.

Native of North and South America. In the Philippines, widely distributed and thoroughly naturalized in rice fields.

Com. name – Fire weed (Engl.).

Exsicc. – *Bardenas CA 10555, 10559; Guantes CA 10696**; *Lugod CA 5025*(CAHP).

3. *Rotala indica* (Willd.) Koehne in Engl., *Bot. Jahrb.* 1: 172, 1880; Merr., *En. Philip.* 3: 134, 1923. – *Peplis indica* Willd., *Sp. Pl.* 2: 244, 1799. **Figure 145**

Herbs erect, simple or branched, glabrous, 6-35 cm high; stems obscurely 4-angled. Leaves sessile or subsessile, oblong, elliptic or ovate, 8-15 mm long, acute or obtuse, mucronate, nerves prominent on lower surface, margins cartilaginous. Spikes axillary, solitary, numerous, 8-15 mm long; flowers subsessile, numerous axils of much-reduced leaves or sometimes spikes wanting and flowers strictly axillary in axils of normal leaves; petals absent; calyx 2-2.5 mm long, subcampanulate, green; lobes lanceolate, acuminate. Capsules ellipsoid, 1.6 mm long, 2-valved.

Caucasian regions through India, Sri Lanka to Japan, southward to Java. Throughout the Philippines, in open wet grasslands and wastelands; a common weed.

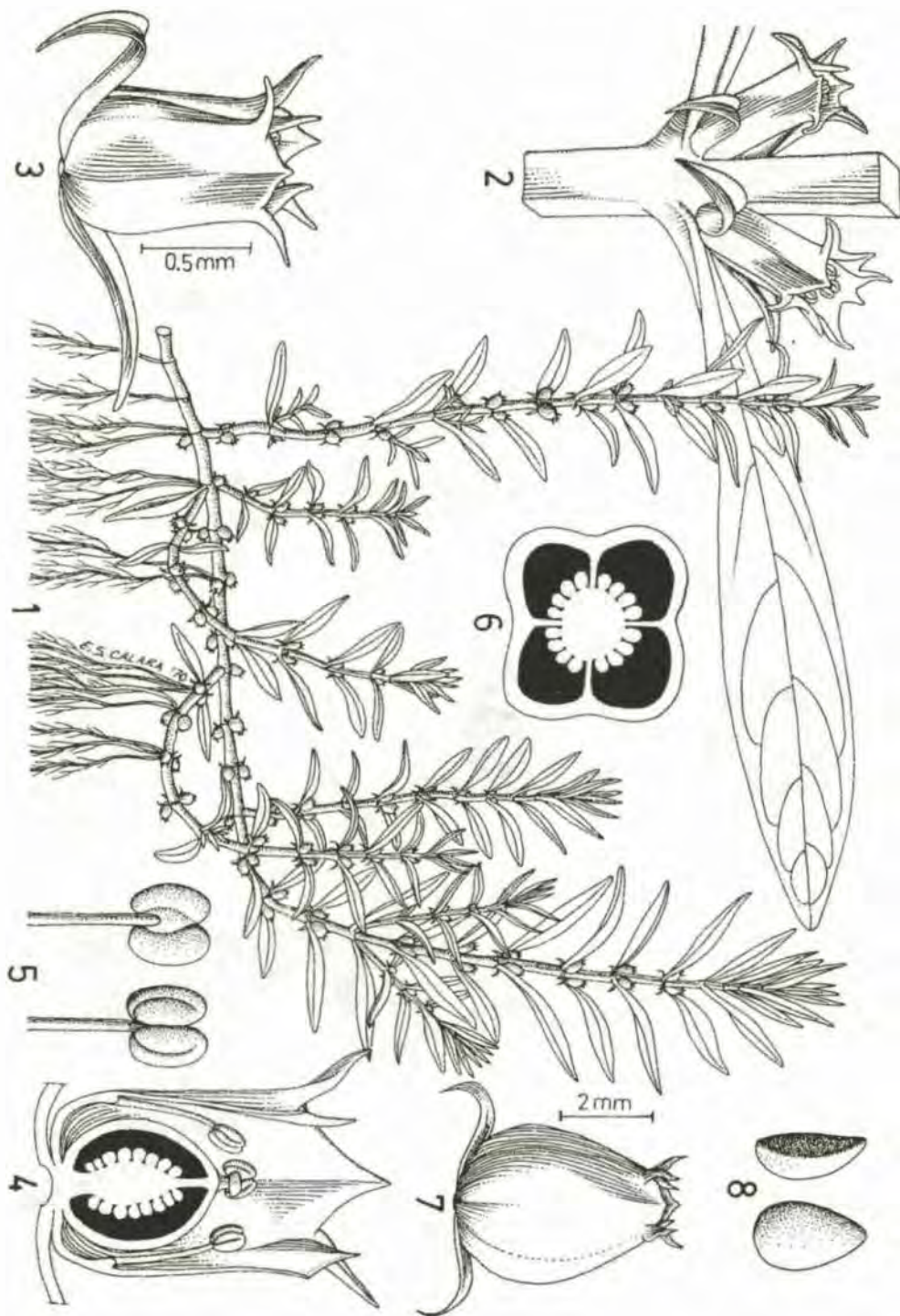


Figure 144. *Rotala catholica*: 1. habit; 2. portion of stem with flowers and leaf enlarged; 3. flower; 4. flower, vertical section; 5. stamen, 2 views; 6. ovary, cross section; 7. capsule; 8. seed, 2 views.

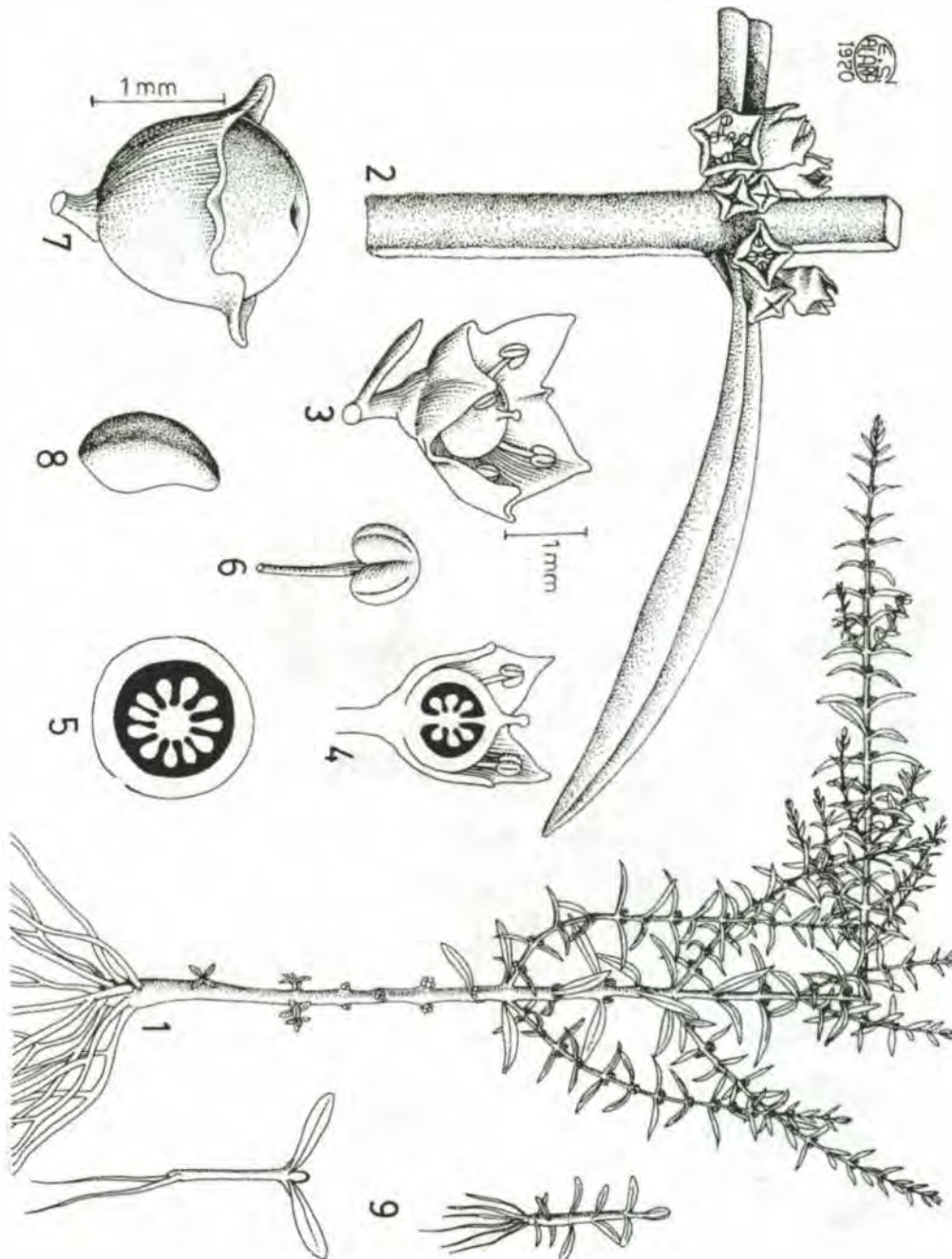


Figure 145. *Rotala indica*: 1. habit; 2. portion of stem with leaf and flowers; 3. flower; 4. ovary, vertical section; 5. ovary, cross section; 6. stamen; 7. capsule; 8. seed; 9. seedlings.

Com. name – Fire weed (Engl.).

Exsicc. – *Pancho CA 20147, 20349** (CAHP).

4. **AMMANNIA** Linnaeus

Annual herbs, slender, erect, branched, glabrous, in wet places. Leaves decussate, alternate, sessile. Flowers small, in dense axillary clusters, 4-merous; calyx campanulate or urn-shaped, after flowering becoming globose, 4-lobed, lobes usually not appendaged; petals absent or when present 4, small; stamens 2-8, inserted on calyx tube; ovaries sessile. Capsules globose or ellipsoid, thinly membranaceous, bursting irregularly, walls not horizontally striate.

Species 20; of wide distribution in the tropics, chiefly in Africa and Asia; 3 in the Philippines.

1. *Ammannia baccifera* L., Sp. Pl. ed. 2, 175, 1762; Merr., En. Philip. 3: 135, 1923.

Herbs erect, branched, glabrous, slender, 10-50 cm high, usually more or less purplish; stems somewhat 4-angled. Leaves oblong, oblanceolate or narrowly elliptic, those of stems 3.5 cm long, those of branches very numerous, small, 1-1.5 cm long. Flowers in dense axillary clusters, pedicelled, 1.2 mm long, green or purplish; calyx lobes 4, triangular, acute, 0.6 mm long; petals none; stamens 4. Capsules depressed-globose, 1.2 mm in diameter, purple, irregularly circumsciss above middle.

Tropical Africa and Asia through Malaysia to Australia. Throughout the Philippines, a common weed in old rice fields.

Com. name – *Apoy-apoyan* (Pang., Tag.).

Exsicc. – *Bardenas CA 10573, 10574, 10582; Gates CA 1942; Lugod CA 4698; Obligado CA 9797; Pedro CA 9174* (CAHP).

5. **CUPHEA** P. Browne

Herbs annual or perennial, rarely shrubs. Leaves opposite, rarely verticillate. Racemes often leafy, flowers zygomorphic, 6-parted, alternate or opposite; calyx tubular, often calcarate at base; petals 6, rarely 2, 4 or none; stamens 11, rarely 9 or 6; ovaries sessile, usually with basal, dorsal or rarely cupuliform disc or disc sometimes absent; ovules numerous or few, often 3, rarely 2. Capsules dehiscent by emergent, reflexed placentae; seeds lentiform, narrowly winged.

Species 200, in tropical America; 2 in the Philippines.

1. *Cuphea hyssopifolia* H.B.K., Nov. Gen. & Sp. 2: 199, 1823; Standl. & Williams, Fl. Guatemala 24: 247, f.39, 1962.

Shrubs low, branched, 20-50 cm high; stems pubescent to appressed-hispidulous, often glabrous. Leaves subsessile, crowded, linear or nearly so, 1-3 cm long, suberect or spreading, glabrous or with few scattered hairs on costa, 1-nerved; floral leaves not reduced; pedicels 2-7 mm long, bracteolate at apex; calyx glabrous or with few short hairs, 6-8 mm long; petals purple or white; ovules 5-8.

Recently introduced in the Philippines; rare and cultivated only.

Com. name – False heather (Engl.).

Exsicc. – Pancho CA 20406 (CAHP).

112. CRYPTERONIAEAE

Trees large. Leaves opposite, entire, estipulate. Flowers in axillary and terminal panicles with elongate, spike-like branches, small, bisexual or by reduction unisexual or polygamous; calyx persistent, tube cup-shaped with 4-5 valvate, acute, lobes; corolla and disc absent; stamens or staminodes alternating with calyx lobes; ovaries 2- to 3-celled with numerous ovules on axile or parietal placentae; ovaries superior, incompletely 2-celled with 2 deeply protruding parietal placentae; styles persistent; stigmas broad. Capsules depressed-globose, loculicidally 2-valved; seeds numerous, minute without endosperm.

Genera 5, species 11; Indo-Malaysia, South Africa, Bolivia and Peru; 1 genus and 2 species in the Philippines.

1. CRYPTERONIA Blume

Trees stocky, evergreen. Nodes of twigs usually enlarged. Leaves ovate to oblong. Flowers in elongate panicles or racemosely branched spikes, small, dingy white or greenish, with short, linear bracts at base or pedicels; calyx-tube short or long and subspherical; stamens inserted near top of calyx tube; ovaries free, globose; styles long; stigmas capitate or obscurely bifid; ovules many on central placentae. Capsules 2-celled, mostly hairy, crowned by persistent style, dehiscent at vertex across dissepiment so as to divide style; pedicels deflexed; seeds long-ellipsoid, testa produced at each end.

Species 6, Indo-Malaysia; 2 in the Philippines.



Figure 146. *Crypteronia paniculata* var. *paniculata*: 1. flowering branch; 2. flower; 3. ovary, vertical section; 4. ovary, cross section; 5. stamen; 8. fruit; 7. seed.

1. *Crypteronia paniculata* Bl., Bijdr. 1151. 1827; Mus. Bot. Lugd.-Bat. 2: 123, t. 42, 1856; Merr., En. Philip. 3: 140, 1923, *cum syn.* van Beus.-Osinga, Fl. Mal. I, 8: pt. 2, 194, f. 4, 1971.

var. *paniculata*

Figure 146

Leaves 8-14 x 5-6 cm, midrib with 7-10 pairs of ascending curved nerves, glabrous, acute, base obtuse or rounded; petioles 1 cm long. Flowers yellowish green, terminal or subterminal, oppositely branched, densely crowded along spicate racemes, finely pubescent; pedicels right angled, minutely bract-subtended; calyx lobes acuminate; styles much exceeding few sterile stamens; fertile stamens of staminate flowers long and interlaced. Fruits ovately globose, 3 mm long, subvelutinous, opening at top into equal halves, subtended by persistent style.

Continental Southeast Asia to Malesia. Philippines: northern Luzon to Palawan and Mindanao; in forests at low and medium altitudes; in Mt. Makiling, Luzon, in the vicinity of Mudspring, around 300 m. altitude.

Com. name – *Tiaui* (Tag.).

Exsicc. – *Pancho CA 20244, 20392** (CAHP).

113. MYRTACEAE

Trees or erect shrubs. Leaves opposite, rarely alternate or whorled, simple, often pellucid-dotted, estipulate or stipules small, deciduous. Flowers regular, bisexual, solitary or in axillary spikes, corymbs or heads, with or without involucre; calyx 4- or 5-toothed, limb persistent or deciduous; petals free or united into disc-like operculum, alternating with calyx lobes, rarely wanting; stamens numerous, inserted in several rows with petals upon calyx rim; filaments free or coherent toward base; anthers small, roundish; ovaries inferior or nearly so, 1- to many-celled; ovules numerous; styles simple. Fruits fleshy or capsular, dehiscent or indehiscent; seeds solitary, numerous.

Genera 80, species 3000; tropical and subtropical regions of both hemispheres; 12 genera and 250 species in the Philippines.

1. Fruits capsular, dehiscent
 2. Upper part of flower bud circumscissile and falling off lid or operculum at anthesis 1. *Eucalyptus*
 2. Upper part of flower bud otherwise; calyx lobes and petals separate at anthesis
 3. Stamens free or rarely shortly connate at base; filaments red 2. *Callistemon*
 3. Stamens united in 5 bundles at base opposite petals; filaments otherwise 3. *Melaleuca*

1. Fruits baccate, indehiscent
 4. Embryo hippocrepiform, curved or often coiled, cotyledons not concealing hypocotyl; testa hard
 5. Locules with false partitions 4. *Decaspermum*
 5. Locules without false partitions
 6. Calyx limb closed or open at apex of bud and tearing into lobes at flowering; inflorescence a 1- to 3-flowered cyme 5. *Psidium*
 6. Calyx with definite lobes; inflorescence paniculate
..... 4. *Decaspermum*
 4. Embryo not hippocrepiform nor coiled; cotyledons practically concealing hypocotyl; testa membranous, of a crumbly texture
 7. Embryo undivided or pseudomonocotyledonous; anther sacs parallel or divaricate, opening longitudinally or by terminal slit
 8. Seed coat free from pericarp; anther sacs parallel, opening longitudinally 6. *Eugenia*
 8. Seed coat loosely or closely adhering to pericarp; anther sacs divaricate, opening by a terminal slit or pore 7. *Acmena*
 7. Embryo divided with distinct cotyledons; anther sacs parallel, opening longitudinally
 9. Calyx calyptrate, not lobed, upper part circumscissile and falling off as a calyptra 8. *Cleistocalyx*
 9. Calyx not calyptrate, lobes distinct both in bud and in flower
..... 9. *Syzygium*

1. EUCALYPTUS L' Heritier

Trees or shrubs, often with slender and drooping branchlets. Leaves in young trees often opposite, alternate or distichous in old ones, coriaceous, pinnately nerved. Flowers in axillary or lateral, peduncled, solitary umbels, sometimes solitary or in 2- to 3-flowered fascicles; calyx tube obconic, campanulate or oblong, adnate to ovary, truncate, entire or with 4 minute teeth; petals forming a conical, hemispheric or elongate, thin or thick, fleshy or woody operculum which covers stamens in bud, falling off entirely; ovaries inferior, flat at top, convex or conical, 3- to 6-celled. Fruits composed of hardened calyx enclosing capsule, opening at apex by as many radiating slits as there are cells; seeds few to many, small.

Species 600, all Australian except a few in Malesia; 3 in the Philippines.

1. Inflorescence many-flowered panicle; pedicels angular 1. *E. deglupta*
1. Inflorescence stalked umbel; pedicels compressed 2. *E. robusta*

1. *Eucalyptus deglupta* Bl., Mus. Bot. Lugd.-Bat. 1: 83, 1849; Merr., En. Philip. 3: 183, 1923. – *Eugenia binacag* Elm., Leafl. Philip. Bot. 7: 2351, 1914.

Trees, up to 30 m high. Leaves alternate, subsistent, ovately oblong or smaller ones broadly lanceolate, 12 x 5 cm, recurved apex acute to acuminate, obtuse or obtusely rounded at base; petioles 1.25 cm long, stout, compressed. Panicles profuse, erect, 10-20 cm or longer, lower branches subtended by leaves, opposite branchlets freely rebranched; flowers umbellately clustered at distal ends of branchlets; pedicels angular, 3-4 mm long, ebracteolate; calyx glabrous, 3 mm high; petals mucronately pointed, caducous, enclosing stamens and inserted upon calyx rim; inner stamens much shorter, reflexed in bud, spreading at anthesis; anthers auriculate at base, versatile; ovaries sunken in calyx cup; stigmas terminal, about as thick as styles. Fruits flatly globose.

Celebes, Moluccas, New Guinea and the Bismarck Archipelago. Philippines: Mindanao (Agusan, Zamboanga, Cotabato); in primary forests especially along streams, from sea level to 600 m altitude; in Mt. Makiling, Luzon, introduced in plantations.

Com. name – *Bagras* (Tag.).

Exsicc. – *Pancho CA 20083, 20249* (CAHP).

2. *Eucalyptus robusta* J.E. Smith, Trans. Linn. Soc. 3: 283. 1797; Merr., En. Philip. 3: 184. 1923.

Trees with persistent bark. Leaves alternate, broadly lanceolate to ovately oblong, 15 x 5 cm, rigidly coriaceous, compressed midrib strong with numerous fine, divaricate nerves, tip acuminate to caudate, obtuse or obtusely rounded at base; petioles 1.5-3 cm long. Flowers whitish, terminally clustered; peduncles 1-2 cm long, stoutly compressed, axillary; calyx thick, subterete, turbinate elongate, 1 cm long, sharply truncate at top; corolla cup-shaped, caducous, inserted upon calyx rim; stamens incurved in bud, ultimately widely spreading. Fruits hard, roundly thickened, opening by 3 large cells at apex.

Australia. This is one of the few recently introduced species in plantations in the Philippines; it flowers and bears fruits in middle and northern Luzon.

Com. name – *Swamp mahogany* (Engl.).

Exsicc. – *Pancho CA 20267, 20423* (CAHP).

2. CALLISTEMON R. Brown

Trees or erect shrubs. Leaves spirally arranged, linear or linear-lanceolate, midrib prominent, pellucid-dotted. Flowers in leaf axils or defoliated twigs, in terminal spikes with axis afterwards developing into a leafy branch;

calyx tube ovoid, campanulate or urceolate, produced beyond ovary; lobes 5, caducous; petals 5, spreading, soon falling off; stamens exerted, free or shortly connate at base; filaments brightly colored; anthers dorsifixed; ovaries inferior with flat or convex, pubescent apex, 3-to 4-celled; ovules numerous; styles filiform; stigmas small. Fruits sessile, loculicidally dehiscent at apex; seeds linear-cuneate.

Species 25, Australia; 1 in the Philippines.

1. *Callistemon citrinus* (Curt.) Stapf, Bot. Mag. t.9050, 1924. – *Metrosideros citrina* Curt., Bot. Mag. t.260, 1794. – *Callistemon lanceolatus* DC., Prodr. 3: 223, 1828.

Shrubs or small trees. Young branchlets covered with spreading, long, thin hairs. Leaves lanceolate, pubescent when young, glabrous with age, 2-12 x 0.5-25 cm, 3-nerved, two lowest nerves close to margin; petioles 0.5-0.75 cm long. Calyx tube campanulate, finely pilose, 3 mm high, lobes erect and 1.25 mm long; filaments free or shortly connate at base, red, 1.25-2.5 cm long. Fruits campanulate.

Introduced recently in the Philippines as an ornamental; in Mt. Makiling, Luzon, cultivated in commercial nurseries.

Com. name – Red bottlebrush (Engl.).

Exsicc. – *Novero* CA 7070; *Velasco* CA 1992 (CAHP).

3. MELALEUCA Linnaeus *nom. cons.*

Trees or shrubs. Leaves alternate, 3- to many-veined. Flowers sessile in axils of bracts, in dense or elongate spikes or occasionally solitary; calyx lobes 5, deciduous; petals 5, white, orbicular, spreading at anthesis; stamens united in 5 bundles opposite petals; ovaries 3-locular, each locule with numerous ovules, hypanthium extending beyond ovary. Fruits loculicidal capsules, dehiscent at top, crowned by hypanthium.

Species 100, Australia; one introduced species in the Philippines.

1. *Melaleuca leucadendra* L., Mant. 1: 105, 1767; Backer & Bakh. f., Fl. Jav. 1: 347, 1963.

Trees with thick, spongy bark, branches often pendulous. Leaves elliptic or oblong, 4-8 x 1.5- 5 cm, with 3-7 parallel veins and numerous veinlets, tapering at both ends. Flowers creamy white in terminal, 5-15-cm long spikes, axis of which grows into a leafy shoot after flowering; staminal bundle nearly 1 cm long with 5-8 filaments at end. Capsules almost round, 0.5 cm across.

Philippines: Luzon (Benguet, Laguna); introduced on the University campus, Mt. Makiling, Luzon; also grown in Benguet, Luzon.

Com. name – Paper bark tree (Engl.).

Exsicc. – *Pancho CA 20363, 20503* (CAHP).

4. DECASPERMUM J.R. & G. Forster

Shrubs erect or small trees. Leaves opposite, pinnately nerved, glandular-dotted beneath. Flowers in axillary cymes or racemes, rarely solitary from leaf axils, often forming terminal panicles; main branches subtended by small leaves, pedicels by bracts; calyx tube campanulate, scarcely or not produced above ovary with 4 or 5 spreading, short, broad lobes; petals white and reddish tinged; stamens in several series; filaments free, filiform; anthers small, versatile, with parallel cells opening longitudinally; ovaries 4- or 7-celled, with 1 or 2, rarely more ovules in each cell, cells often divided by spurious dissepiments; styles filiform; stigmas peltate. Berries globular, crowned by calyx lobes; seeds few, reniform, small.

Species 10, Bengal to Queensland and the Fiji Islands; 3 in the Philippines.

1. Leaves oblong-elliptic, up to 6 cm long; inflorescences axillary, cymosely few-branched 1. *D. blancoi*
1. Leaves oblong-ovate, up to 9 cm long; inflorescences terminal, paniculately branched 2. *D. fruticosum*

1. *Decaspermum blancoi* Vid., Phan. Cuming. 112, 172, 1885; Merr., En. Philip. 3: 155, 1923. – *D. grandiflorum* Elm., Leaf. Philip. Bot. 4: 1481, 1912.

Shrubs erect or small trees. Leaves ovately elliptic or elliptically oblong, 3-6 x 1.5 cm, midrib conspicuous beneath, acute but tip blunt, base obtuse, shortly petioled. Flowers upon ascending, pubescent stalks from uppermost leaf axils, lower peduncles up to 2 cm long, subtended by much-reduced leaves, bearing few flowers toward top; calyx cinereous, usually subtended by a pair of punctate bracts, pedicelled, broadly triangular lobes nearly glabrous except margins; petals much longer, spreading; stamens erect, about as long as petals. Fruits flatly globose, less than 5 mm thick in dry state, smooth and reddish when old or fully ripe.

Philippines: Central to southern Luzon; in thickets at low and medium altitudes, up to 100 m.

Com. name – *Patalsik-pula* (Tag.).

Exsicc. – *Ramos BS 13717, 714693* (US).

2. *Decaspermum fruticosum* Forst., Char. Gen. 74, t.37, 1776; C.B. Rob., Philip. J. Sc. 6(Bot.): 364, 1911; Merr., En. Philip. 3: 155. 1923.

Shrubs or small trees. Leaves oblong-ovate, 9 x 3 cm, midrib prominent beneath with obscure divaricate nerves, often silky when young, slenderly acuminate to subcaudate with a sharp point, acute obtuse at base; petioles short, finely pubescent. Panicles terminal or from upper leaf axils, freely branched, branchlets and pedicels subtended by variable bracts; calyx grayish, strigose, broadly rounded lobes almost glabrous; petals spreading; stamens ascending. Fruits globose, 5-8 mm across, terminated by calyx crown, turning red when ripe.

India and China through Malesia to tropical Australia and Polynesia. In the Philippines, abundant from sea coasts to alpine regions; in Mt. Makiling, Luzon, at 200-600 m.

Com. name – *Patalsik* (Tag.).

Exsicc. – *Gutierrez CA 1993, 1994 (CAHP); Elmer 17772, 1237319; Santos BF 24238, 1294272; Brown BS 18996, 1376504; McGregor BS 22893, 898266 (US).*

5. PSIDIUM Linnaeus

Shrubs erect or small trees. Leaves opposite, entire, not glandular dotted, pinnately nerved, lateral nerves nearly parallel, arcuately interarching near margins. Flowers in axillary 1- to 3-flowered cymes; calyx urceolate or obovate, limb 4- or 5-lobed, entirely closed before anthesis; petals as many as calyx segments, free, falling off early; stamens numerous; ovaries 2- or more-celled, inferior; ovules many in each cell. Berries many-seeded, globose to ellipsoid or obovoid, fleshy, crowned by calyx lobes; seeds embedded in meaty pulp.

Species 150, in tropical and subtropical America; 4 in the Philippines.

1. Leaf nerves divaricate; 15-20 pairs; blades gray-pubescent or glabrescent beneath 1. *P. guajava*
 1. Leaf nerves ascending, 7-10 pairs; blades soft-brown-pubescent beneath 2. *P. guineense*

1. *Psidium guajava* L., Sp. Pl. 470, 1753; Merr., En. Philip. 3: 155, 1923; Soetopo, PROSEA 2: 266, f.s.n., 1991.

Shrubs or small trees. Leaves elliptic or elliptically oblong, 10 x 5 cm, ridged midrib with 15-20 pairs of pinnate nerves, impressed on upper glabrous side, lower much paler, sparsely cinereous when young, rounded at base, shortly petioled. Peduncles 1- to 3-flowered, terminal or axillary, 2-3 cm long, glabrate in fruiting state; flowers white; calyx green, segments 1.25 cm long, hairy on upper side; petals broad, somewhat longer. Fruits globose to

short-ellipsoid, 3-8 cm in diameter; thick, roughened, aromatic rind yellowish, soft when ripe, meat surrounding numerous seeds pink.

Of American origin, now widely distributed and naturalized in the Old World tropics. Throughout the Philippines, cultivated and wild.

Com. name – Guava (Engl.).

Exsicc. – *Gates CA 2010; Gutierrez CA 2008, 2009, 2011; Orlido CA 10932, 10933, 10934, 10935* (CAHP).

2. *Psidium guineense* Sw., Prodr. 77, 1788; McVaugh, Fl. Guatemala 24: 394, 1963. – *P. molle* Bertol., Nov. Comm. Acad. Bonon. 4: 422, 1840.

Shrubs or occasionally small trees; twigs angular, soft-brown-pubescent. Leaves elliptic to obovate, 9-14 x 4-7 cm, midrib with 5-8 pairs of ascending nerves, dark green above, soft-brown-pubescent beneath, broadly obtuse or rounded at apex, abruptly narrowed to rounded base; petioles short-pubescent. Peduncles mainly axillary, bearing 1-3 similarly pubescent flowers; calyx base densely hairy, nearly 1-cm long and broad segments less pubescent, reflexed; petals punctate, hairy toward broad apex; filaments glabrous, anthers linear.

Native of Guatemala. In Mt. Makiling, Luzon, recently introduced on the University campus.

Com. name – Sour guava (Engl.).

Exsicc. – *Hernaez CA 12438; Pancho CA 4095, 10376* (CAHP).

6. EUGENIA Linnaeus

Trees or shrubs. Leaves opposite. Inflorescences racemose, terminal flower of axis usually wanting, axis sometimes shortened, inflorescence then resembling axillary fascicles, umbels or glomerules; petals 4, orbicular, ovate or obovate, white, spreading at anthesis; stamens numerous; free anthers versatile, splitting longitudinally; ovaries 2-locular, each locule with numerous ovules, hypanthium extending slightly beyond ovary or not at all. Fruits 1-seeded (rarely 2-seeded) berries, crowned by persistent lobes of calyx; embryo undivided with thick, fleshy, fused cotyledons.

Species 500, mostly in the tropics of the New World; 1 in the Philippines.

1. *Eugenia uniflora* L., Sp. Pl. 470, 1753; Merr. & Perr., J. Arn. Arb. 19: 203, 1938; Rifai, PROSEA 2: 165, *f.s.n.*, 1991.

Shrubs or small trees glabrous. Leaves ovate to ovate-lanceolate, 3-5 cm long, lucid, dark green above, acuminate, base rounded, nearly sessile. Flowers solitary on ends of long peduncles, or several together in axils of

leaves, 1 cm across, white. Fruits a pendulous berry, depressed globose in outline, oblate, 1-4 cm across, 7- to 8-ribbed, crimson to blackish when ripe, edible; skin thin; flesh orange-red, juicy, acid to sweet, slightly resinous. Seeds large if only 1, or 2-3 smaller ones, flattened.

Brazil. Introduced in the Philippines recently for ornamental purposes; in Mt. Makiling, Luzon, cultivated in commercial nurseries.

Com. name – *Pitanga* (Tag.).

Exsicc. – *Valencia CA 9200* (CAHP).

7. **ACMENA** De Candolle

Trees glabrous. Leaves opposite or sub-opposite, dark-dotted below, pinnately nerved. Flowers in terminal, long-peduncled, strongly branched panicles, sessile, 3 or rarely more, together in axis of each panicle; calyx tube produced beyond ovary, stipitate at base, lobes short; petals minute, free, soon caducous; filaments 1 mm long; anthers subglobose, apically dehiscent by short slit or poricidal; ovaries inferior, 2- to 3-celled, few-ovuled; styles short, not exerted from calyx tube. Berries depressed-globose, 1-seeded; cotyledons connate.

Species 11; Andaman Islands, Tenasserim, Thailand, southeastern China through Malesia to Solomon Islands and northern, eastern and southern Australia; 1 in the Philippines.

1. *Acmena acuminatissima* (Bl.) Merr. & Perr., J. Arn. Arb. 19: 12, 1938; Merr., Philip. J. Sc. 79: 361, 1950. – *Myrtus acuminatissima* Bl., Bijdr. 1088, 1827.

Trees, up to 30 m high. Leaves opposite, oblong to broadly lanceolate, 10 x 3 cm, midrib sunken above with obscure nerves, darker green, sublucid on upper surface, sharply acuminate to subcaudate, base obtuse; petioles 5 mm long. Panicles 10 cm or less long, freely and divaricately rebranched; ultimate branchlets short, angularly compressed; calyx broadly cup-shaped, 4 mm wide, 1-2 mm long, stipitate or appearing pedicellate, curing blackish brown, truncate; petals yellowish white, caducous, rotund; stamens short, inwardly curved when young, bearing minute anthers. Fruits hard, obovoidly globose, 2 cm across, brown or when ripe purplish black; calyx vestiges small, usually sunken.

Tenasserim, Andaman Islands to southern China through Malay Peninsula to Sumatra, Java, Borneo, Timor and the Solomon Islands. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Binaloan* (Tag.).

Exsicc. – *Orlido CA 10385, 12384; Cadiz CA 1988; Pancho CA 3268; Estioko, Jr. CA 1089, 1990; Soliven CA 3283; Rivera CA 2784* (CAHP); *Rivera*

2212541; McGregor BS 23934, 1238999; Mabesa BF 23490, 1375113, Robinson BF 20143, 568366 (US).

8. CLEISTOCALYX Blume

Trees glabrous. Leaves opposite or subopposite, coriaceous, pellucid-dotted, pinnately nerved. Flowersterminal or axillary, in peduncled panicles or cymes, calyx tube produced beyond ovary, lip entirely closed before anthesis, circumsciss and falling off as a calyptra; petals 3-5, white; stamens in 2 or more rows; filaments filiform; anthers dorsifixed; ovaries inferior, 2-celled, many-ovuled; styles filiform-subulate; stigmas small. Berries subglobose, thick, fleshy; seeds 1-2; cotyledons free, enclosing radicle.

Species 21, Burma, Indochina, Hainan and southeastern China, Sumatra, Java, Borneo, New Guinea, northern Australia, Lord Howe Island, New Caledonia and Fiji; 3 in the Philippines.

1. Inflorescences sparingly branched, terminal or from upper leaf axils 1. *C. arcuatinervius*
 1. Inflorescences with many branches and flowers, lateral in axils of old or fallen leaves, rarely axillary or solitary 2. *C. operculatus*

1. *Cleistocalyx arcuatinervius* (Merr.) Merr. & Perr., J. Arn. Arb. 18: 333, pl. 215, f. 16-18, 1937; Merr., Philip. J. Sc. 79: 363, 1950. – *Eugenia arcuatinervia* Merr., Philip. J. Sc. 1: Suppl. 104, 1906.

Trees, up to 20 m high. Leaves opposite, oblong to subelliptic or ovately lanceolate, 12 x 5 cm, midrib stout with about 10 pairs of nerves with tips united forming a vein 3-5 mm from margin, slenderly acuminate, base acute or subobtuse often slightly decurrent; petioles 1.5 cm long, channeled. Inflorescences usually terminal, sometimes solitary from uppermost leaf axils, angle peduncles 10 cm long, sparingly branched; flowers solitary, paired or fascicled toward ends of branchlets, white, fragrant, 1.5 cm long; calyx cup-shaped, 5-6 mm long and wide across mouth, narrowed toward 2- to 3-cm long pedicels, closed in bud, apical portion falling off transversely; petals 4, punctate; stamens interlaced; styles thick. Fruits hard, short-ellipsoid, 1.75 cm long, with small, flat calyx rim.

Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling Luzon, at 100-350 m.

Com. name – *Birakbak* (Neg.).

Exsicc. – *Villamil* CA 1998 (CAHP).

- 2 *Cleistocalyx operculatus* (Roxb.) Merr. & Perr., J. Arn. Arb. 18: 337, pl. 215, f. 41-48, 1937, cum syn. – *Eugenia operculata* Roxb., Hort. Beng. 37, 1814, *nomen nudum*; Fl. Ind. ed. 2, 2: 386, 1832.

Trees. Leaves elliptic-oblong, 8-16 x 4-6 cm, lateral nerves distant, ends forming an intermarginal nerve 2-4 mm from margin, acuminate, base acute; petioles 1-1.5 cm long. Panicles mostly in axils of fallen leaves, broadly pyramidal, many-flowered, 8-15 cm long, flowers in triads on ultimate branches or panicles, subsessile, calyx tube 3-4 mm long; calyptra minutely apiculate, petals 3-4, coherent; stamens in 2-3 rows, 5-7 mm long. Berries globose, crowned by narrow calyx limb, red.

Southern China, Indo-Malesia and Australia. Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, mostly in lowland forests.

Com. name – *Malaruhat* (Tag.).

Exsicc. – *Pancho CA 20365, 20511* (CAHP).

9. SYZYGIVM J Gaertner, *nom. cons.*

Trees or shrubs. Leaves opposite, sometimes 3-verticillate or sub-opposite, penninerved. Flowers in racemes, cymes or panicles; calyx tube globose or elongate, lobes 4 or 5; petals 4 or 5, free, spreading or united in a calyptra; stamens in many rows; free or connate into 4 bundles; filaments filiform; anthers small; ovaries 2- to 3-celled; styles filiform; stigmas small; ovules numerous in each cell. Berries drupaceous, crowned by persistent calyx limb; seeds few, globose or variously compressed; cotyledons thick, fleshy, free, enclosing radicle.

Species 860, in the tropics of the Old World; 200 in the Philippines.

1. Inflorescences cauline or along branches
 2. Inflorescences cauline
 3. Leaves 20 cm long or more; midrib, nerves and submarginal veins prominent 1. *S. curranii*
 3. Leaves 15 cm long or less; midrib, nerves and submarginal veins obscure
 4. Foliage curing grayish brown beneath, with 5-8 pairs of nerves; inflorescence rigid 2. *S. whitfordii*
 4. Foliage curing reddish brown beneath, with 7-12 pairs of nerves; inflorescence lax 3. *S. mananquil*
 2. Inflorescences along branches
 5. Flowers deep red 4. *S. malaccense*
 5. Flowers whitish
 6. Calyx tubularly elongate 5. *S. claviflorum*
 6. Calyx not tubularly elongate

7. Fruits longitudinally striate or subsulcate 6. *S. conglobatum*
 7. Fruits not as above
8. Branchlets angular 7. *S. polycephaloides*
 8. Branchlets not angular
9. Leaves rounded at base; stamens crookedly interlaced; fruits edible 8. *S. cuminii*
 9. Leaves not rounded at base; stamens otherwise; fruits inedible
10. Pedicels and flowers subtended by acute bracts; petioles 1 cm long 9. *S. polyanthum*
 10. Pedicels and flowers without acute bracts; petioles twice as long as 1 cm 10. *S. simile*
1. Inflorescences terminal or from leaf axils
11. Calyx lobes inconspicuous, not more than 2 mm high
12. Leaves rounded or often with short acumen at apex 11. *S. densinervium*
 12. Leaves pointed at apex
13. Flowers scattered and pedicellate in numerously branched inflorescence 12. *S. pallidum*
 13. Flowers clustered and sessile at ends of few-branched inflorescence
14. Blades conspicuously punctate beneath 13. *S. calcicolum*
 14. Blades not punctate beneath
15. Leaves caudate, marginal veins 2 14. *S. alvarezii*
 15. Leaves not caudate, marginal vein solitary
16. Leaf nerves close, 18-25 pairs 15. *S. roseomarginatum*
 16. Leaf nerves more distant, 7-12 pairs 16. *S. nitidum*
11. Calyx lobes conspicuous, 3 mm high or more
17. Flowers few and short-stalked or solitary and long-pedicellate
18. Flowers solitary, slenderly pedicellate
19. Calyx lobes arranged in 2 unequal decussate pairs 17. *S. bataanense*
 19. Calyx lobes not arranged in decussate pairs 18. *S. tenuipes*
18. Flowers few, subsessile or short-stalked
20. Twigs sharply angular 19. *S. phanerophlebium*
 20. Twigs smooth or terete
21. Leaves linear to narrowly oblong or elliptic-ovate to lanceolate-ovate, punctate beneath
22. Leaves linear to narrowly oblong; flowers in short lateral or terminal cymose clusters 20. *S. xanthophyllum*

- 22. Leaves elliptic-ovate to lanceolate-ovate; flowers in terminal racemes 21. *S. robertii*
- 21. Leaves lanceolately oblong or narrowly oblong, not punctate beneath 22. *S. crassipes*
- 17. Flowers numerous upon elongate and mostly rebranched stalks
 - 23. Leaf nerves numerous and closely set..... 23. *S. longiflorum*
 - 23. Leaf nerves not numerous nor closely set
 - 24. Flowers pedicellate
 - 25. Leaves lance-oblong, rounded or subcordate at base 24. *S. samarangense*
 - 25. Leaves lanceolate or subelliptic to obovately oblong, acute or shallowly cordate at base
 - 26. Leaves lanceolate, 10-20 x 2-6 cm, acute at base; fruits globose, 2.5 cm across 25. *S. jambos*
 - 26. Leaves subelliptic to obovately oblong, 10 x 3.5 cm, acute or shallowly cordate at base; fruits compressed-globose, 1.5 cm across 26. *S. tripinnatum*
 - 24. Flowers sessile
 - 27. Pubescent branches angular or nearly so..... 27. *S. bordenii*
 - 27. Pubescent branches not angular
 - 28. Peduncles rebranched 28. *S. calubcob*
 - 28. Peduncles unrebranched
 - 29. Leaves lance-oblong, rounded or subcordate at base; calyx tube conspicuously dotted with minute glands 24. *S. samarangense*
 - 29. Leaves oval to obovate or subelliptic, short-acute and decurrent at base; calyx tube otherwise 29. *S. philippinensis*

1. *Syzygium curranii* (C.B. Rob.) Merr., Philip. J. Sc. 79: 386, 1950. – *Eugenia curranii* C.B. Rob., Philip. J. Sc. 4(Bot.): 351, 1909.

Trees erect, medium-sized. Young branches angularly winged. Leaves opposite, oblong, 30 x 6 cm, ridged midrib with 15-20 pinnate pairs whose ends form a prominent vein 5 mm below margin, abruptly acute, base rounded and shallowly cordate; petioles 5-8 mm, reddish. Flowers upon very short tubercles along stem; peduncles paniculately branched, 5-8 cm long, glandular; pedicels slender, 1-2 cm long, quadrangular with bracts at both ends; calyx tube broadly turbinate, 1 cm long and wide across top, 4 ovate lobes wider than long; petals pale white, 7.5-10 mm long; staminal disc thickened, numerous; ovaries 2-celled; styles terete, 1.5 cm in length. Fruits subglobose or short-ellipsoid, 2.5 cm across, whitish.

Endemic. Philippines: Luzon (Laguna, Camarines Sur) and Samar; in forests at medium altitudes; in Mt. Makiling, Luzon, at 150-400 m.

Com. name – *Curran's lipote* (Tag.)

Exsicc. – *Gates CA 1000* (CAHP); *Elmer 17900, 1237235* (US).

2. *Syzygium whitfordii* (Merr.) Merr., Philip. J. Sc. 79: 423, 1950. – *Eugenia whitfordii* Merr., Gov. Lab. Philip. 35: 49, 1906.

Trees small, erect up to 10 m high. Leaves narrowly oblong, 10 x 3 cm, midrib with 5-8 pairs of ascending nerves, acute at both ends or sometimes obtuse at base, shortly petioled. Flowers clustered from very short tubercles or woody excrescences, 3-7 cm long, occasionally very short-branched toward end, bearing few flowers: calyx jointed to pedicel, turbinate, thick, 1 cm long with rounded lobes; petals pale white, orbicular, 7 mm in diameter; filaments numerous, interlaced, twice as long as corolla; styles slender, 2-3 times length of stamens. Fruits turning whitish, ovoidly globose, 2 cm across, somewhat constricted below broad calyx rim.

Endemic. Philippines: central to southern Luzon; in forests at low altitudes, up to 600 m; in Mt. Makiling, Luzon, at 150-500 m.

Com. name – *Whitford's malaruhat* (Tag.).

Exsicc. – *Pancho CA 20417* (CAHP).

3. *Syzygium mananquil* (Blco.) Merr., Philip. J. Sc. 79: 402, 1950. – *Myrtus mananquil* Blco., Fl. Filip. 431, 1837. – *Eugenia livida* Elm., Leaf. Philip. Bot. 7: 2349, 1914.

Trees slender, up to 10 m high. Leaves opposite, broadly lanceolate to oblong, 10 x 4 cm, midrib with 7-12 pairs of nerves whose tips form a submarginal vein, obscurely punctate, acuminate, base acute, short-petioled. Flowers clustered in cymes upon woody, cauline excrescences; peduncles 3-12 cm in length, slender, glabrous, usually several; calyx stipitate to pedicellate, usually subtended by minute, sharply pointed bracts, upper half of subglobose portion divided into broad almost petaloid lobes; petals nearly twice as long as petaloid lobes, broadly rounded, marginal portion much thinner, yellowish white; stamens exceeding corolla. Fruits flatly globose, 1.5 cm across, constricted below calyx crown, whitish to light red or purplish.

Endemic. Throughout the Philippines, in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 100-500 m.

Com. name – *Manangkil* (Tag.).

Exsicc. – *Pancho CA 4453* (CAHP); *Ramos BS 13676, 837386* (US).

4. *Syzygium malaccense* (L.) Merr. & Perr., J. Am. Arb. 19: 215, 1938; Panggabean, PROSEA 2, 293, 1991. – *Eugenia malaccensis* L., Sp. Pl. 470, 1753; Henders., Gard. Bull. Sing. 12: 46, f. 6a, 1949. **Figure 147**

Trees low with round, dense crown. Leaves opposite, oblong 18 x 8 cm, stout midrib impressed along upper side with 10-18 pairs of nerves interarching 5 mm from margin, obtuse to acuminate or acuminate at apex, base acute to obtuse or obtusely rounded; petioles 1 cm long, stout. Flowers clustered along branches below leaves, deep dull red throughout, upon short, rigid stalks; calyx slenderly turbinate 2 cm long, pseudostalk articulated at short pedicel with broadly rounded lobes; petals 1.25 cm long, narrowed toward base; stamens exceeding corolla, nearly straight; filaments flattened toward base; styles even longer. Fruits fleshy, depressed-turbinate or pyriform or irregularly subglobose, up to 5 cm long, pale white to bright shining red, crowned by incurved calyx lobes. Seed 1 per fruit, globose, 2.5-3.5 cm in diameter, brown.

Indo-Malesia. Introduced in all of our islands but nowhere abundant; in the vicinity of human habitations in Mt. Makiling, Luzon; fruits edible.

Com. name – *Yambu* (Tag.).

Exsicc. – *Pancho CA 20048, 20276** (CAHP).

5. *Syzygium claviflorum* (Roxb.) Cowan & Cowan, Trees North Bengal 67, 1929; Merr. & Perr., J. Arn. Arb. 19: 221, 1938. – *Eugenia claviflora* Roxb., Hort. Beng. 37, 1814, *nom. nud.*, Fl. Ind. ed. 2, 2: 488, 1832, *descr.*

Trees medium-sized to large. Leaves opposite, mostly terminal, narrowly oblong or broadly lanceolate, 10 x 3 cm long, midrib ridge beneath with numerous fine, lateral nerves, sublucid, dark green above, sparingly punctate beneath, acute to acuminate, base obtuse, subsessile or shortly petioled. Flowers few or numerous clustered in axils of leaf scars below foliage, sometimes from lower leaf axils, upon very short, minutely bracteate stalks; calyx slenderly stipitate at base, gradually thickened toward truncate top which bears very short lobes, tubular, 1.5 cm long, often longitudinally striate, glabrous; petals broadly overlapping, punctate; stamens oblong with subversatile anthers; styles thick, fleshy, equaling stamens. Fruits elongate, fleshy, narrowed toward base, shiny bright red when mature.

Sikkim and Bengal to Burma, Thailand, Indochina, southern China, Malay Peninsula, Anambas Island, Java and Borneo. Luzon to the Visayan islands, Philippines; in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Kurasam* (Ibn.).

Exsicc. – *Orlido CA 10248; Pancho CA 3275, 3396; Francia CA 9062; Champhaka CA 8091; Espiritu CA 8096; Pefia de la CA 8178; Hemaes CA 12449* (CAHP); *Mabesa BF 24918, 1375535* (US).



Figure 147. *Syzygium malaccense*: 1. portion of flowering twig; 2. branch tip; 3. fruit cluster; 4. flower; 5. flower, petals removed; 6. flower, petals and stamens removed; 7. stamen.

6. *Syzygium conglobatum* (C.B. Rob.) Merr., Philip. J. Sc. 79: 383, 1950.
 – *Eugenia conglobata* C.B. Rob., Philip. J. Sc. 4(Bot.): 359, 1909.
 – *E. subsulcata* Elm., Leaf. Philip. Bot. 8: 3095, 1919.

Trees slender, up to 20 m high. Leaves opposite, oblong to sub-elliptic, 10-15 x 5 cm, prominent midrib with 5-7 pairs of ascendingly curved nerves, apex abruptly short-acute, base obtuse to broadly so; petioles 1 cm long, nearly black. Flowers subsessile, usually few-fascicled from axils of fallen leaves below foliage; calyx short-stipitate, thick; flat, cup-shaped portion 5-8 cm across, 4 equal lobes well separated, broadly rounded, 3 mm long, wider; petals whitish, pellucid-dotted, alternating calyx segments, narrowed at base; ovary disc flat, glabrous; styles fleshy, terete, curved, exceeding numerous stamens. Fruits upon short, gray, thick stalks, obscurely oblique, subglobose, 2.5 cm across, longitudinally striate or subsulcate.

Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Bulagsog* (Bik.).

Exsicc. – *Pancho CA 20170, 20275* (CAHP).

7. *Syzygium polycephaloides* (C.B. Rob.) Merr., Philip. J. Sc. 79: 410, 1950.
 – *Eugenia polycephaloides* C.B. Rob., Philip. J. Sc. 4(Bot.): 399, 1909.

Trees burly with angularly winged twigs. Leaves oblong or small ones subelliptic, 10-25 x 5-15 cm, strong midrib with 14-18 pairs of nerves whose tips form a definite submarginal vein, apex contracted into a short acumen, narrowed base auriculate round, subsessile or shortly petioled. Inflorescences from branches below leaves, di- or trichotomously cymose, 5-10 cm in length; peduncles very short with broad bracts; flowers whitish, usually in 3's, sessile, subtended by bracteoles; calyx turbinate, 5 mm long, 4 lobes short or twice as wide than long; petals rounded, apparently calyptrate, 5 mm across; stamens up to 15 mm in length; filaments filiform, terminated by 0.5-mm long anthers. Fruits irregularly globose, fleshy, red to purple; skin fleshy.

Endemic. Philippines: Luzon to Samar and Leyte; in forests at low altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Lipote* (Tag.).

Exsicc. – *Pancho CA 20287* (CAHP).

8. *Syzygium cumini* (L.) Skeels, Bull. U.S. Dept. Agr. 248: 25, 1912; Merr., En. Philip. 3: 164, 1923; Coronel, PROSEA 2: 294, *f.s.n.*, 1991. – *Myrtus cumini* L., Sp. Pl. 471, 1753.

Trees stocky. Leaves opposite, orbicular to subelliptic, 8-14 x 6 cm, keeled midrib with numerous obscure lateral nerves, shiny and deeper green

on upper side, usually rounded at apex, sometimes abruptly short-acute, base broadly obtuse, occasionally rounded; petioles 1-2 cm long. Cymose panicles chiefly lateral, clustered below foliage, seldom terminal or axillary, frequently on short, leafless branches, 3-10 cm long, ebracteolate; flowers dingy white, sessile, terminally clustered; calyx funnel-shaped, 4 mm long, lucid, truncate or minutely toothed; petals cohering, falling off early as small discs; stamens crookedly interlaced, as long or longer than calyx. Fruits oval to ellipsoid, dark purple to nearly black, fleshy; seeds large, greenish, astringent.

India through Malesia to Australia. Naturalized in most parts of the Philippines; in Mt. Makiling, Luzon, in the vicinity of human habitations, sometimes growing wild.

Com. name – *Duhat* (Tag., P. Bis.).

Exsicc. – *Madjus* CA 2971; *Ilagan, Jr.* CA 3363; *Beltran* CA 2785; *Hernaez* CA 12486; *Gates* CA 2001 (CAHP); *Sulit* 36219 (PNH), 2276996 (US).

9. *Syzygium polyanthum* (Wight) Walp., Repert. 2: 180, 18431; Merr., Philip. J. Sc. 79: 409, 1950. – *Eugenia polyantha* Wight, Ill. 2: 17, 1841; Henders., Gard. Bull. Sing. 12: 211, f.40a, 1949. – *E. atropunctata* C.B. Rob., Philip. J. Sc. 4(Bot.): 385, 1909.

Trees medium-sized. Leaves mainly toward ends of twigs, obovately oblong, 4-12 x 3.5 cm, ridged midrib with 10-15 pairs of nerves whose tips are united into a marginal line, minutely punctate beneath, abruptly acute to acuminate, base subcuneate to obtuse. Cymes clustered from axils of leaf scars below foliage, sometimes from lower leaf axils, up to 5 cm long, subangular branches nearly at right angles with acute bracts; flowers 2.5 mm long, mostly in 3's, terminal, sessile, yellowish white or sometimes tinged with red, fragrant; calyx stipitate, spreading at top at anthesis, 4 lobes very short but broad; filaments 3 mm long; anthers very short. Fruits small, subglobose, yellowish.

Burma, Thailand, Indochina through the Malay Peninsula to Sumatra, Java and Borneo. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Sagimsim* (S.-L. Bis.).

Exsicc. – *Mabesa* BF 25372, 1293726; *Canicosa* 2245882 (US).

10. *Syzygium simile* (Merr.) Merr., Philip. J. Sc. 79: 414, 1950. – *Eugenia similis* Merr., Philip. J. Sc. 1: Suppl. 106, 1906.

Trees, up to 15 m high. Leaves opposite, oblong or smaller ones subelliptic, 9-12 x 4-6 cm, midrib raised beneath, sunken above with 12-15 pairs of divaricately obscure nerves, minutely and numerous punctate beneath, bluntly acuminate, base obtuse to acute, sometimes slightly decurrent; petioles

2 cm long. Cymose panicles clustered along branches, mostly below foliage, sometimes between leaves, up to 6 cm long, branchlets divaricately spreading, short ultimate ones subangular, subtended by bract vestiges; flowers whitish, in clusters of 3, sessile at ends of branchlets, 5-7 mm long; calyx broadly turbinate to subcampanulate with 4 broadly triangular lobes; petals 4 mm across, united into a hood; stamens with small anthers. Fruits subglobose, 5-8 mm long, constricted below calyx rim, purplish to nearly black when fully mature.

Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Panglongbuyen* (Ilk.).

Exsicc. – *Pancho CA 20281, 20418* (CAHP).

11. *Syzygium densinervium* (Merr.) Merr., Philip. J. Sc. 79: 387, 1950.
 – *Eugenia densinervia* Merr., Philip. J. Sc. 1: Suppl. 105, 1906.
 – *E. silvestrei* Elm., Leaf. Philip. Bot. 8: 3095, 1919.

Trees slender, up to 25 m high. Leaves oppositely clustered toward distal ends of twigs, obovately oblong to subelliptic, 15 x 5 cm, midrib keeled beneath with indistinct parallel nerves whose ends are obscurely united 2-3 mm from margin, apex broad and often with short acumens, base acute or cuneate; petioles 1.5 cm long, canaliculate. Corymbose panicles terminal, 5-6 cm long, erect; branches ascending, stout, angular, subtended by short bracts; flowers white or yellowish white, often tinged with red, 1 cm long, crowded toward or from end of ultimate short branchlets, usually 5- clustered, sessile, subtended by short, bluntly rounded, thick bracteoles; petals connivent into circular calyptra, 5.5 mm across. Fruits subglobose or short-ellipsoid, 1.5 cm long, purplish red.

Endemic. Philippines: central to southern Luzon and Mindanao; in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 100-350 m.

Com. name – *Salakadan* (Tag.).

Exsicc. – *Pancho CA 20366, 20444* (CAHP).

12. *Syzygium pallidum* Merr., Publ. Gov. Lab. Philip. 17: 17, 1906, En. Philip. 3: 174, 1923. – *Eugenia perpallida* Merr., Philip. J. Sc. 1: Suppl. 106, 1906.

Trees small, bushy. Leaves opposite, oblong or broadly lanceolate, 2.5 x 7 cm, prominent midrib with numerous closely set obscure nerves, shiny on upper side, perpallid or ash-gray on lower surface, caudately pointed, base obtuse to acute; petioles 5-8 mm long, canaliculate. Panicles equaling foliage, terminal, rather freely, slenderly rebranched; flowers whitish, many-scattered or in small terminal clusters; pedicelled or slenderly stipitate; calyx turbinate

truncate; petals circular, disc-like, pushed off by stamens and styles; stamens crinkled. Fruits smooth, globose, 7.5 mm in diameter, terminated by small, flat calyx rim; exocarp thin with 2 or 3 large, angular seeds.

Endemic. Throughout the Philippines, in forests at medium altitudes, up to 1000 m; in Mt. Makiling, Luzon, mostly in the dipterocarp forest.

Com. name – *Panglongbuyen-labang* (Ilk.).

Exsicc. – *McGregor BS 23193, 898129* (US).

13. *Syzygium calcicolum* (Merr.) Merr., *Philip. J. Sc.* 79: 380, 1950. – *Eugenia calcicola* Merr., *Philip. J. Sc.* 10(Bot.): 209, 1915.

Trees small. Leaves opposite, broadly lanceolate to ovately oblong, 5-8 x 2-3.5 cm, conspicuously punctate beneath, midrib conspicuous beneath with scarcely visible lateral nerves. Slenderly acuminate to caudate, base narrowed into slender, 1-cm long petiole. Inflorescences terminal, cymosely paniculate, equaling or exceeding foliage; flowers short-pedicelled or subsessile, usually in terminal clusters of 3, white; calyx stipitate, truncate, cupular, 4 x 2 mm; petals rotund, thin, overlapping in bud, caducous; stamens nearly straight. Fruits globose, 7.5 mm in diameter; calyx rim small, flat, purplish black when mature.

Endemic. Philippines: northern to southern Luzon; in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly at low elevations.

Com. name – *Kalogkog* (Tag.).

Exsicc. – *Mabesa BF 26764, 1375520* (US).

14. *Syzygium alvarezii* (C.B. Rob.) Merr., *Philip. J. Sc.* 79: 375, 1950. – *Eugenia alvarezii* C.B. Rob., *Philip. J. Sc.* 4(Bot.): 390, 1909. – *E. maquilingensis* Elm., *Leaflet Philip. Bot.* 8: 3096, 1919.

Trees stocky. Leaves oppositely scattered, subelliptic to oblong, 10 x 4 cm, midrib ridged beneath with 8-10 pairs of nerves forming submarginal nerve 3 mm from margin, abruptly caudate, base broadly obtuse to obtusely rounded; petioles 8 mm long. Peduncles few, terminal, mostly shorter than foliage, rigid; few short, thick branches compressed, articulating without subtending bracts; flowers white, usually sessile, terminally clustered; calyx turbinate, 4 mm long, nearly as wide across truncate apex; corolla falling off together; styles thick, short, arising from deep cavity; stigmas pointed.

Endemic. Philippines: northern to central Luzon and Mindoro; chiefly in mossy forests, up to 2400 m; in Mt. Makiling, Luzon, in the mossy forest.

Com. name – *Alvarez' malaruhat* (Tag.).

Exsicc. – *Pancho CA 20071, 20268* (CAHP).

15. *Syzygium roseomarginatum* (C.B. Rob.) Merr. & Perr., Mem. Am. Acad. Arts Sci. 18: 191, 1939. – *Eugenia roseomarginata* C.B. Rob., Philip. J. Sc. 4(Bot.): 390, 1909.

Trees small to medium-sized. Leaves broadly lanceolate to ovately oblong, 3-8 x 1.5-3.5 cm, prominent midrib with 18-25 pairs of obscure nerves whose tips form a marginal line, reddish tinged along margin, acuminate to caudate, much-recurved, base obtuse or acute, often decurrent; petioles 3-5 mm long. Inflorescences terminal or subterminal, equaling or much shorter than leaves, usually with 3 peduncles from base, short terminal branchlets similarly arranged, branches thick, ebracteolate; flowers small, whitish with red margins, sessile clustered at ends of short ultimate branches; calyx 2.5 x 2 mm across truncate apex; corolla minute, calyptra 2 mm in diameter; stamens small. Fruits unknown.

Borneo. Philippines: Luzon (Ilocos Norte to Laguna); in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-400 m.

Com. name – *Magkai* (Tag.).

Exsicc. – *Mabesa* BF 25729, 24071, 1375524, 126092 (US).

16. *Syzygium nitidum* Benth. in Hook., Lond. J. Bot. 2: 221, 1843; Merr., En. Philip. 3: 159, 1923. – *Eugenia benthamii* A. Gray, Bot. Wilkes U.S. Explor. Exped. 520, 1854.

Trees. Leaves opposite, oblong to subelliptic, 9 x 3 cm, stout midrib ridged beneath with 7-12 pairs of nerves forming a submarginal line, gradually acute to acuminate, obtuse or broadly cuneate at base; petioles 5 mm long, nearly black. Inflorescences terminal, one half as long as leaves, rigid, usually 3-pedunculate from near base, ultimate branches short; flowers white, sessile, densely clustered terminally; calyx 4 mm long, turbinate, truncate; corolla calyptrate; stamens much crinkled. Fruits green, hard, ellipsoid, 2 cm long, a trifle oblique.

New Guinea. In the Philippines, widely distributed in Luzon extending to Mindoro, in forests at low altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Makaasim* (Bik.).

Exsicc. – *Elmer* 18104, 18262, 1237681; *Mabesa* BF 25729, 1294133, 235537 (US).

17. *Syzygium bataanense* (Merr.) Merr., Philip. J. Sc. 79: 377, 1950. – *Jambosa bataanensis* Merr., Publ. Gov Lab Philip. 17: 36, 1904.

Trees small. Leaves oppositely scattered, broadly lanceolate or narrowly oblong, 7-10 x 2-3 cm, less conspicuous midrib with 7-10 pairs of nerves, long-acuminate, base acute or broadly obtuse, subsessile. Flowers white, often mixed with pink, solitary, terminal, seldom lateral, 3 cm long, 4-5 cm wide across top when open; pedicels slender, 1-1.5 cm long, calyx one half as

long as pedicels, broadly turbinate, 4 lobes in 2 unequal decussate pairs; petals orbicular, 1 cm in diameter; filaments 2.25 cm long, reddish toward base; styles 4 cm in length. Fruits subglobose, 3 cm across, with flattened calyx rim; seeds few, unequal.

Endemic. Philippines: central Luzon to Mindoro and Mindanao; in forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-400 m.

Com. name – *Bataan malaruhat* (Tag.).

Exsicc. – *Pancho CA 20173, 20242* (CAHP).

18. *Syzygium tenuipes* (Merr.) Merr., Philip. J. Sc. 79: 417, 1950. – *Eugenia tenuipes* Merr., Philip. J. Sc. 7(Bot.): 316, 1912.

Trees small. Leaves opposite, broadly lanceolate to narrowly oblong, 5-12 x 1.5-3 cm, midrib prominent beneath with irregular or distant 6 pairs of nerves, acuminate, base sub-attenuate or acute, sometimes obtusely rounded, subsessile or shortly petioled. Flowers large, white, axillary or terminal, occasionally lateral; pedicels slender, 4-12 cm in length with a pair of bracteoles toward base; calyx thick, broadly turbinate, basal pseudostalk jointed to pedicellate, 2 cm long, nearly as wide as 2 cm, distinct lobes broadly rounded; petals free; stamens as long as calyx. Fruits ovoidly globose, constricted below broad calyx rim.

Endemic. Philippines: northern and central Luzon to Mindoro; in forests at low altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Tikoi* (Mang.).

Exsicc. – *Pancho CA 20291, 20446* (CAHP).

19. *Syzygium phanerophlebiurn* (C.B. Rob.) Merr., Philip. J. Sc. 79: 408, 1950. – *Eugenia phanerophlebia* C.B. Rob., Philip. J. Sc. 4(Bot.): 353, 1909.

Trees small. Leaves oppositely scattered, oblong, 6-18 cm, keeled midrib with 10-15 pairs of pinnate ascending nerves whose tips form a vein 5-8 mm from margin, acute to acuminate, base subcordate to broadly obtuse or rounded, petioles 5-8 mm long. Inflorescences terminal or rarely on branches below leaves, 1- to 3-flowered; pedicels short, thick; calyx campanulately turbinate, 2 cm long, nearly as thick as 2 cm, with 4 unequal, broadly rounded lobes; petals whitish, as many as calyx lobes, falling off separately, 7-10 mm long; stamens 2.25 cm in length; styles longer. Fruits globose, constricted below broad calyx rim, rose-red or purplish blue, with 2 or 3 large, angular seeds.

Endemic. Throughout the Philippines, in forests at low and medium altitudes.

Com. name – *Malayambo* (Tag.).

Exsicc. – *Pancho CA 20261, 20512* (CAHP).

20. *Syzygium xanthophyllum* (C.B. Rob.) Merr., Philip. J. Sc. 79: 424, 1950.
– *Eugenia xanthophylla* C.B. Rob., Philip. J. Sc. 4(Bot.): 370, 1909.

Trees small to large. Leaves opposite, linear to narrowly oblong, 6-29 x 2-5 cm, ridged midrib with 15-25 pairs of nerves whose ends form a distinct submarginal vein, glandular-punctate on lower surface; petiole 3-8 mm long. Flowers few to several, in short, cymose clusters, lateral or terminal, whitish; pedicels 2-12 mm long, with a pair of deciduous bracts at apex; calyx turbinate, 1.75 cm long, truncate at top; petals frequently tinged with red, ovate, 1 cm long; stamens as long as calyx. Fruits campanulately globose, 2-3 cm across, narrowed below broad, open calyx rim, reddish when ripe.

Endemic. Philippines: Luzon to Negros; in forests at low altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Malatampoi* (Bis., Tag.).

Exsicc. – *McGregor BS 22914, 898268; Ramos BS 22468, 1050794* (US).

21. *Syzygium robertii* Merr., Philip. J. Sc. 1: Suppl. 106, 1906. – *Eugenia succulenta* Elm., Leaf. Philip. Bot. 1: 327, 1908.

Trees stocky, medium-sized. Leaves opposite, elliptic-ovate to lanceolate-ovate, 5-10 x 2.5-5 cm, midrib stout with obscure nerves, pale green and punctate beneath, short or abruptly acuminate; petioles 5-8 mm long, somewhat compressed. Inflorescences racemose, terminal or in upper leaf axils, 3-5 cm long; flowers white, fragrant; calyx upon thick, sometimes glandular pedicel, funnel-shaped, obscurely glandular, 1.5 cm long including 4 broadly rounded lobes; petals 4, free, sub-orbicular; stamens as long as calyx or outer ones longer; anthers oblong, 1.25 mm in length. Fruits globose, at least 2 cm in diameter, with flat, large calyx rim, seeds 2 or 3, stone-like, unequal in size.

Endemic. Philippines: Luzon (Benguet to Quezon), Lubang, Sibuyan; in forests at medium altitudes, up to 1500 m; in Mt. Makiling, Luzon, mostly in the dipterocarp forest.

Com. name – *Kiyugkug* (Tag.).

Exsicc. – *Mabesa BF 23793, 1375517; Elmer 17486, 1237120* (US).

22. *Syzygium crassipes* (C.B. Rob.) Merr., Philip. J. Sc. 79: 385, 1950.
– *Eugenia crassipes* C.B. Rob., Philip. J. Sc. 4(Bot.): 361, 1909.

Trees small. Leaves opposite, lanceolately oblong or narrowly oblong, 20 x 7 cm, stout ridged midrib with 9-12 pairs whose ends form a prominent vein 5-8 mm along margin, acute to sub-acuminate, base obtuse to subacute; petioles 5 mm long. Cymes terminal, short but stoutly peduncled and pedicellate, usually with 5 large flowers; calyx tube turbinate, 1-1.5 cm long, 4 lobes twice as broad as long; petals white, sub-orbicular or narrowed toward base, 8 mm

across; stamens 1.5 cm long; styles over twice as long as stamens. Fruits campanulately globose, 3 cm across, constricted below broad calyx rim, purplish blue or lilac.

Endemic. Philippines: northern to southern Luzon; in forests at low altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Barukbak* (Ilk.).

Exsicc. – *Mabesa* BF 23791, 1375112, BS 9909, 714446 (US).

23. *Syzygium longiflorum* Presl, Bot. Bemerk. 70, 1844; Merr., Philip. J. Sc. 79: 398, 1950.

Trees small to medium-sized. Leaves subelliptic to elliptic-oblong, 6-10 x 3-4.5 cm, ridged midrib grooved on upper side, obscure nerves numerous, forming a line close to margin, abruptly but sharply acuminate, base acute to obtuse; petioles 5-8 mm long, canaliculate. Panicles to 5 cm long and as wide, congested, terminal from uppermost leaf axils; flowers 2 cm long, subsessile, whitish, fragrant, stalks thick, yellowish; calyx 7.5 mm long, narrowed toward base, with broadly rounded 4 segments; petals rounded, 5 mm across; stamens up to 1.5 cm in length, falling off early. Fruits globose, 1.5 cm across, crowned by calyx rim, with few hard, unequal seeds.

Thailand, Indochina, Malay Peninsula, Borneo and Sumatra. Throughout the Philippines, in forests at low and medium altitudes.

Com. name – *Lagi-lagi* (Bis.).

Exsicc. – *Mabesa* BF 1294651; *Elmer* 1237341, 17802, 123734 (US).

24. *Syzygium samarangense* (Bl.) Merr. & Perr., J. Arn. Arb. 19: 115, 216, 1938; Panggabean. PROSEA 2: 293, f.s.n., 1991. – *Myrtus samarangensis* Bl., Bijdr. 1048, 1827. – *Eugenia javanica* Lam., Encycl. 3: 200, 1789.

Trees up to 15 m high, with short and crooked trunk, 25-50 cm diameter. Leaves opposite, elliptic to elliptic-oblong, 12-25 x 5-12 cm, aromatic when crushed, base rounded or subcordate; petioles 3-5 mm long, conspicuously differentiated on dorsal side. Inflorescences terminal or in axils of fallen leaves, 3- to 30-flowered; flowers 3-4 cm diameter; calyx tube 1-1.5 cm, ventricose at apex, lobes 3-5 mm long; petals 4, orbicular to spatulate, 10-15 mm long, yellow-white; stamens numerous, 1.5-3 cm long; style up to 3 cm long. Fruit a berry, broadly pyriform, crowned by fleshy calyx with incurved lobes, 3.5-5.5 x 4-5.5 cm, light red to white; flesh white, spongy, juicy, aromatic, sweet-sour. Seeds 1-2, mostly suppressed, globose, up to 8 mm in diameter.

Malay Peninsula to Malesia. In the Philippines, cultivated; sometimes wild.

Com. name – *Makopa* (Bik., Tag.).

Exsicc. – *Fortunado* CA 10227; *Lantican* CA 8863, 8990; *Velasco* CA 10559; *Hernaez* CA 12446 (CAHP).

25. *Syzygium jambos* (L.) Alston, Fl. Ceyl. (Suppl.) 6: 115, 1931; van Lingen, PROSEA 2: 296, *f.s.n.*, 1991. – *Eugenia jambos* L., Sp. Pl. 470, 1753.

Trees, up to 15 m high. Leaves lanceolate, 10-20 x 2-6 cm, pellucid-dotted, ends of lateral nerves forming an inter-marginal nerve 4-6 mm from margin, apex acuminate, base acute; petioles 5-8 mm. Inflorescences mostly terminal, 3- to 10-flowered; flowers solitary, pedicels up to 1.5 cm long at apex of axis; calyx tube obconical, greenish white or reddish, 1-1.5 cm high, lobes unequal; petals greenish white, 1.5-2.5 cm long; filaments yellowish-white; styles 3-4 cm long. Berries globose, 2.5 cm across, fleshy, crowned by calyx limb, yellow or pinkish, 1-to 2-seeded.

Native of the Indo-Malaysian regions, now pantropic. Widely cultivated in most parts of the Philippines.

Corn. name – *Tampoi* (Tag., Bik.).

Exsicc. – *Cabantac CA 10228*; *Ballesteros CA 8032* (CAHP).

26. *Syzygium tripinnatum* (Blco.) Merr., Philip. J. Sc. 79: 419, 1950. – *Myrtus tripinnata* Blco., Fl. Filip. 421, 1837. – *Eugenia tripinnata* (Blco.) C.B. Rob., Philip. J. Sc. 4 (Bot.): 357, 1909; Merr., En. Philip. 3: 179, 1923.

Trees small. Leaves opposite, lower ones appearing alternate, subelliptic to obovately oblong, 10 x 3.5 cm, midrib with 8-12 pairs of rather obscure nerves whose ends form a submarginal vein, slenderly acute to acuminate, base acute or shallowly cordate; petioles 5 mm long. Cymes terminal or lateral, 3- to 5-flowered, 4-10 cm long; peduncles and pedicels slender, opposite, latter often glandular; calyx 1 cm long with basal pseudostalk, 4 lobes slightly unequal; petals white, 8 mm long, rounded at apex; stamens longer than calyx; styles long, filiform. Fruits whitish to red, compressed-globose, 1.5 cm in diameter, crowned by prominent calyx.

Endemic. Philippines: Luzon to northern Mindanao; in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly at low elevations.

Com. name – *Hagis* (Bik.).

Exsicc. – *Mabesa BF 125004, 1294652*; *Villamil BF 21398, 903105* (US).

27. *Syzygium bordenii* (Merr.) Merr., Philip. J. Sc. 79: 378, 1950. – *Eugenia bordenii* Merr., Publ. Gov. Lab. Philip. 35: 47, 1906.

Trees, up to 25 m high. Leaves elliptically oblong to broadly lanceolate, 8-14 x 3-6 cm, midrib with 8-12 pairs of obscure nerves with tips faintly interarching, bluntly acute, base obtuse to subcuneate; petioles 5 mm long. Panicles chiefly terminal, seldom lateral, 6 cm long, densely flowered. Short stalks thick, rigid, yellowish gray, more or less angulate or ridged, divaricate; flowers white, subsessile; calyx funnel-shaped, 1 cm long with 4 broadly rounded, punctate segments; petals as many as calyx segments, broadly ovate, coarsely glandular-dotted; styles longer than stamens. Fruits globose, 1.5 cm across, crowned by persistent calyx, hard.

Endemic. Philippines: northern Luzon to Mindanao and Basilan; in forests at low altitudes; in Mt. Makiling, Luzon, mostly at low elevations.

Com. name – *Malaruhat-puti* (Tag.).

Exsicc. – *Pancho CA 20084, 20183* (CAHP).

28. *Syzygium calubcob* (C.B. Rob.) Merr., Philip. J. Sc. 79: 380, 1950.
– *Eugenia calubcob* C.B. Rob., Philip. J. Sc. 4(Bot.): 364, 1909; Merr.,
En. Philip. 3: 161, 1923.

Trees small to large. Leaves elliptically oblong, 16 x 6 cm, midrib with 10-15 pairs of nerves more or less anastomosed toward ends, apex with short blunt acumens, base obtusely and frequently cordate; petioles 5 mm long. Inflorescences arising from any part of branches but mostly terminal, 5-20 cm in length, few branches smooth, glandular, opposite, slender; flowers solitary or 3-clustered, subsessile or short-pedicelled; calyx turbinate, at least 1 cm long and as wide across broadly lobed top; petals free, white, punctate, ovately orbicular. Fruits subglobose, 3 cm in diameter, with large, flat calyx rim, yellow.

Endemic. Philippines: Batanes Islands to northern Mindanao; in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly along creeks at low altitudes.

Com. name – *Kalubkub* (Tag.).

Exsicc. – *Gates CA 1919* (CAHP); *Whitford BF 19713, 900108*; *Elmer 18304, 18415, 1237710, 1237755* (US).

29. *Syzygium philippinensis* (C.B. Rob.) Merr., Philip. J. Sc. 79: 409, 1950.
– *Eugenia philippinensis* C.B. Rob., Philip. J. Sc. 4(Bot.): 378, 1909.

Trees, up to 20 m high. Leaves oval to obovate or subelliptic, 10 x 5 cm, midrib sunk on upper side with 8-14 pairs of nerves, ends forming a submarginal line, apex contracted into a narrow, acute point, base short-acute and decurrent; petioles 1 cm long. Inflorescences terminal, solitary or often fascicled, 3-9 cm in length; peduncles angled, usually unbranched; flowers dingy white; in subsessile clusters at or toward distal ends; calyx constricted at base, apex with 2 pairs of unequal, decussate lobes; petals similar to calyx segments. Fruits hard, obovately globose, 1-1.5 cm across; apex small, circular.

Endemic. Philippines: northern Luzon to Samar and Leyte; in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly at low elevations.

Com. name – *Bagohian* (Tag.).

Exsicc. – *Pancho CA 20263* (CAHP).

114. SONNERATIACEAE

Trees. Leaves simple, entire, opposite, estipulate. Flowers small or large, solitary or few, when numerous, arranged in panicles, regular, bisexual or unisexual; calyx tube slightly united with ovary, its segments 4-8, valvate; petals none or as many as and alternating with calyx lobes; stamens mostly many, sometimes 12, episepalous, often many-seriate; filaments inwardly bent in bud, thread-like; anthers basifixed, introrse, lateral cells longitudinally dehiscent; ovaries flatly ellipsoid, rarely completely 2- to 20-celled, superior, placentae at first parietal but often extending to axis, each cell with numerous ovules in many rows; styles with capitate or umbrella-like stigmas. Fruits dry or fleshy, indehiscent or loculicidally dehiscent; seeds many, minute, exalbuminous.

Genera 2, species 10; tropical East Africa, southeastern Asia and Malesia to Queensland and Polynesia; 2 genera and 3 species in the Philippines.

1. DUABANGA Buchanan-Hamilton

Trees tall, buttressed. Leaves cordately oblong, glaucous beneath, short-petioled. Panicles large, terminal with opposite branches, few-flowered; flowers large; calyx tube broad, lobes thick, 4-7; petals 4-7 clawed, obovate, crisp, undulate, nearly white or yellowish tinged; stamens 12 or many, inserted upon a perigynous ring; ovaries conical, 4- to 8-celled; styles bent, elongated, terminated by a 4- to 8-lobulate stigma; ovules numerous. Capsules loculicidally 4- to 8-valved; seeds tailed at both ends by produced testa.

Species 3, southeastern Asia and Malesia; 1 in the Philippines.

1. *Duabanga moluccana* Bl., Mus. Bot. Lugd.-Bat. 1: 109. 1849; Backer & van Steenis, Fl. Mal. I, 4: 268, 1951; Jayaweera, J. Arn. Arb. 48: 91, f. 1a-k, 1967. **Figure 148**

Young branchlets angular or angularly winged, becoming terete with age. Leaves oblong, 8-18 cm, midrib thick with 10-15 pairs of nerves whose tips form a submarginal vein, acute to acuminate, base broadly rounded or subcordate; petioles short, stout. Panicles rigid, 15 cm long, glabrous; flowers on thick pedicels, dingy white; calyx campanulate, leathery, 1.5 cm long without stipe, articulate at base. 4 triangular lobes erect; petals thin, soon withering, exceeding and alternating with calyx segments; stamens much longer; filaments flattened toward base; styles 4 cm long. Capsules 2 cm long, tapering toward both ends, rigidly chartaceous, 4-angled, valves persistent after opening, closely attached at base of calyx; seeds dark brown, shiny.

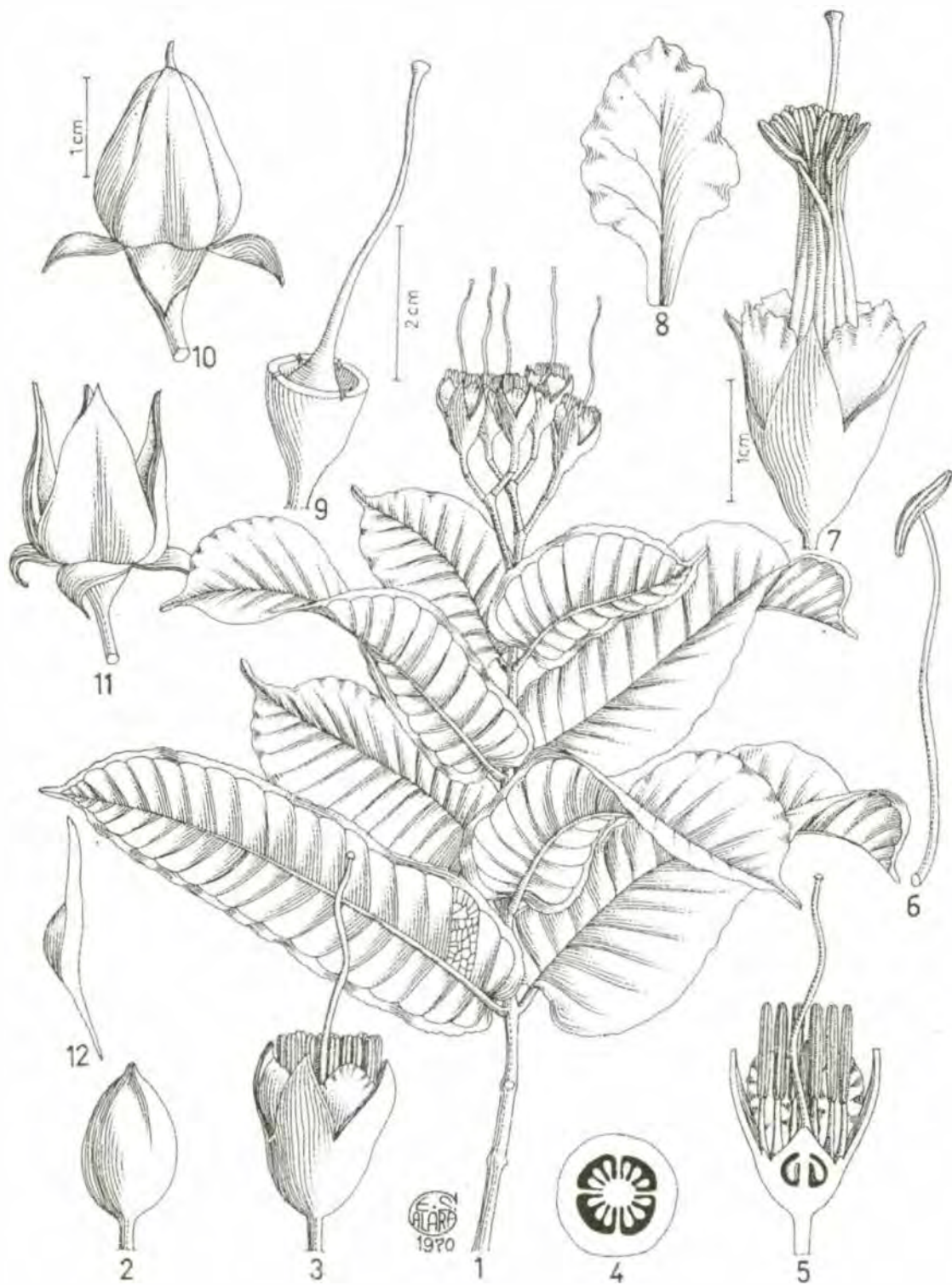


Figure 148 *Duabanga moluccana*: 1. flowering branch, 2. flower bud, 3. flower, about to open; 4. ovary, cross section; 5. ovary, vertical section; 6. stamen; 7. flower, fully open; 8. petal; 9. flower, petals and sepals removed; 10. capsule, undehiscent, 11. capsule, dehiscent, 12. seed.

Throughout Malesia. Throughout the Philippines, in forests along streams at low altitudes, up to 1200 m; in Mt. Makiling, Luzon, mostly along streams at low altitudes.

Com. name – *Loktob* (Tag., S.-L. Bis.).

Exsicc. – *Pancho CA 4380, 4381**; *Whitford CA 1952* (CAHP); *Amarillas BF 25123, 1294263*; *Mabesa BF 23559, 1375262*; *Elmer 18275* (US).

115. PUNICACEAE

Shrubs or small trees. Branchlets often spinescent. Leaves opposite, subopposite or clustered, entire. Flowers solitary or few together at ends of branchlets, large, bisexual, regular, short-pedicelled, reddish, calyx tube funnel-shaped, thickly coriaceous, adnate to ovary below, enlarge above ovary, 4-7 lobes persistent; petals as many as and inserted between calyx segments, thin, lanceolate, wrinkled; stamens numerous, inserted around mouth of calyx tube, inwardly bent in bud, spreadingly interlaced at anthesis; ovaries united with calyx tube, inferior, cells many, biseriately superposed; styles long, slender, bent; stigmas, capitate; ovules numerous in each cell. Fruits globose or short-ellipsoid, inferior berries with thick pericarp, crowned by persistent calyx segments; seeds triquetrous, brown, numerous.

Monotypic. Native of the Mediterranean region, but cultivated for its fruits in most tropical and subtropical regions.

1. *PUNICA* Linnaeus

Characteristics (Refer to family description).

1. *Punica granatum* L., Sp. Pl. 472, 1753; Merr., En. Philip. 3: 141, 1923; Sudiarto & Rifai, PROSEA 2: 270, f. s.n., 1991. **Figure 149**

Leaves thinly coriaceous, narrowly oblong or broadly oblong-lanceolate, 6 x 2 cm or smaller, midribs conspicuous beneath, obscure lateral nerves faintly united at ends, obtusely rounded, base narrowed into a short petiole. Flowers glabrate; calyx fleshy, turbinate or campanulately elongated, shiny, reddish tinged, toothed, up to 2 cm in length; petals much longer, red or orange-yellow; styles thick, curved, exceeding stamens. Fruits fleshy, 5 cm in diameter, dull red, soft when mature; seeds angular, embedded in juicy meat.

Introduced early in the Philippines by the Spaniards; in most towns or farm settlements; in Mt. Makiling, Luzon, cultivated in commercial nurseries at Los Baños, Laguna.

Com. name – *Granada* (Sp.).

Exsicc. – *Gates CA 1954*; *Lugod CA 7027** (CAHP).

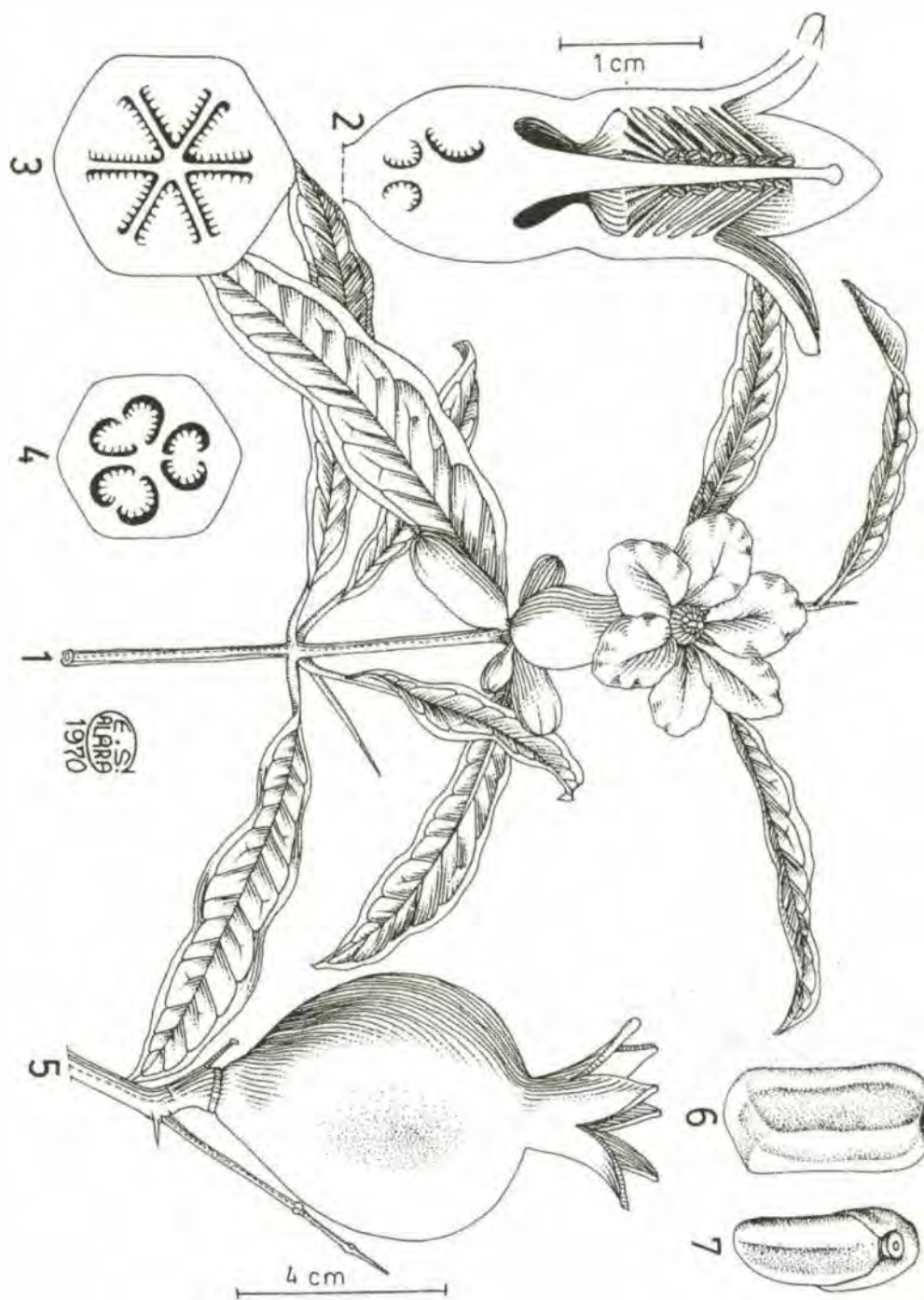


Figure 149. *Punica granatum*: 1. flowering branch; 2. flower, vertical section; 3. ovary, cross section at midportion; 4. ovary, cross section at lower half; 5. fruit; 6. seed, with mucilage; 7. seed, without mucilage.

116 LECYTHIDACEAE

Trees or shrubs. Leaves simple, alternate, not gland-dotted but sometimes with large glands on margins; stipules very rarely present. Flowers rather large and showy, actinomorphic or zygomorphic, bisexual; calyx 4- to 6-lobed; lobes valvate or slightly imbricate; petals 4-6, free; stamens numerous, in several series, either monadelphous and equally arranged all around disk and all bearing fertile anthers, or more often diadelphous and united into two separate, very unequal bundles, one much larger than other and ligulate and mostly curved and forming a hood over gynoecium, all fertile in both bundles or those of ligulate bundle mostly all sterile or partly so; anthers basifixed, opening at side by a slit; ovaries inferior or semi-inferior, 2- or more-locular; ovules 1 to many on axile placentae sometimes toward apex of loculi; styles mostly simple. Fruits woody, fibrous or fleshy, indehiscent or operculate at top; seeds without endosperm.

Genera 16, species 200; mostly in tropical America; 2 genera and species in the Philippines

1. COUROUPITA Aublet

Trees. Leaves crowded at apices of branches, entire or shallowly crenate. Flowers cauliflorous along trunk or thick branches in racemiform inflorescences; calyx turbinate; petals 6, unequal; disk with numerous stamens developed into broad, fleshy lobe overarching ovary; stamens unequal, all fertile; ovaries part inferior, 5- to 7-celled, cells with numerous ovules; styles short with 6-radiate stigma; fruits globose, large, with hard pericarp, indehiscent, many-seeded.

Species 9, in tropical South America and the West Indies; 1 species in the Philippines.

1. *Couroupita guineensis* Aubl., Pl. Gui. 2: 708. t.282, 1775. **Figure 150**

Leaves oblong-obovate, base acute, apex acute, obtuse or shortly acuminate, 10-25 x 3-10 cm; petioles 1-2 cm long. Flowers cauliflorous; racemes numerous, obliquely drooping; rachis woody with caducous scales at base; pedicels 2.5-3.5 cm long; petals obovate, broadly rounded, convex, red with yellow base outside, 4.5-7 x 3.5-5 cm; disk pale; filaments inserted on apex of disk lobe, 6-12 mm long. Fruits 15-20 cm in diameter with very distant calyx lobes near middle.

Native of French Guyana. In Mt. Makiling, Luzon, cultivated on the College of Forestry and Natural Resources campus as an ornamental tree.

Com. name – Cannon-ball tree (Engl.).

Exsicc. – *Hernaez CA 17960**, 17961 (CAHP).

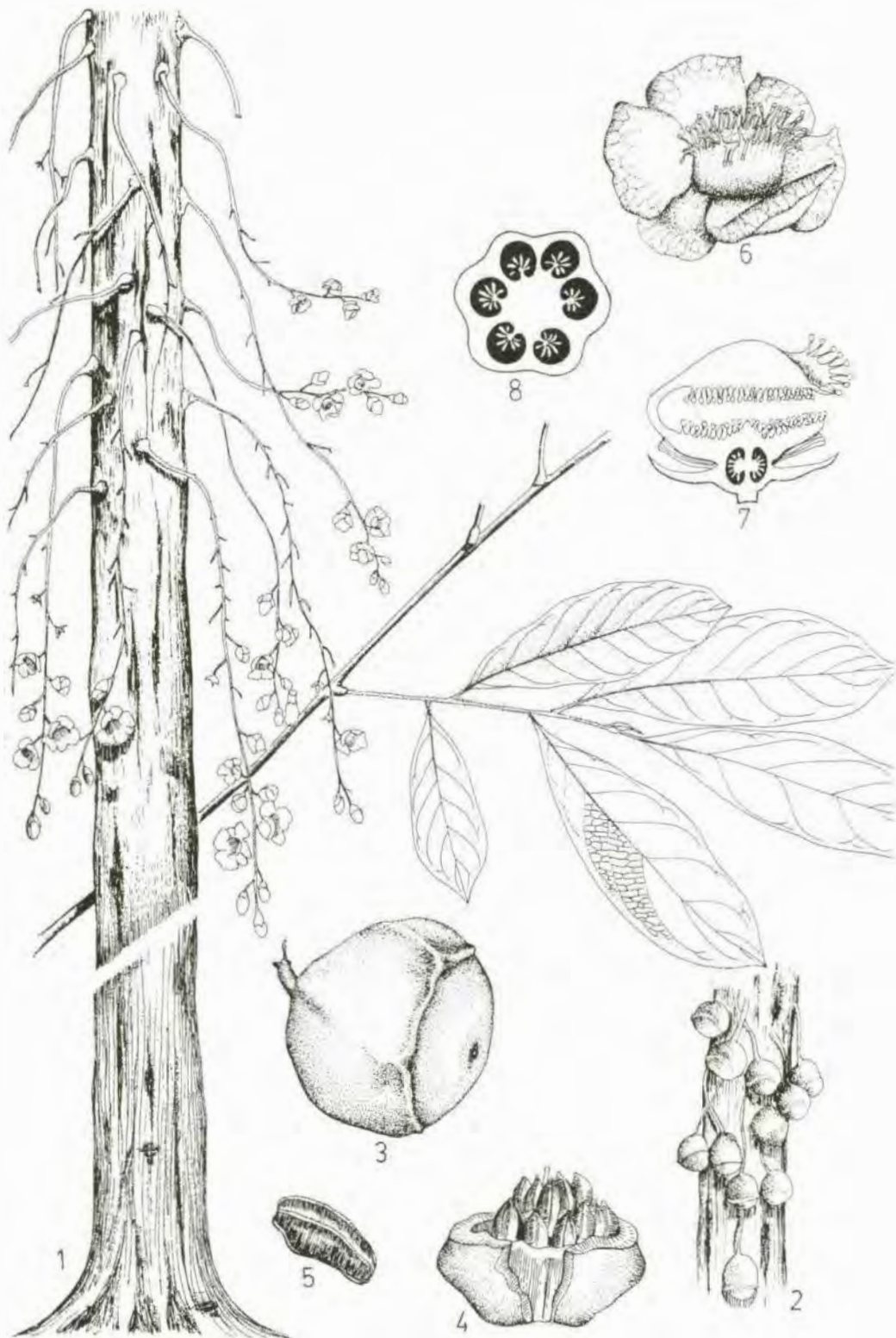


Figure 150. *Couroupita guineensis*: 1. trunk with cauliflorous flowers; 2. portion of trunk with fruits; 3. fruit; 4. fruit, opened; 5. seed; 6. flower; 7. flower, vertical section; 8. ovary, cross section.

117. BARRINGTONIACEAE

Trees or shrubs. Leaves alternate, often large, mostly elongated, usually subsessile and crowded at ends of branchlets, estipulate. Flowers bisexual, actinomorphic, mostly racemose, racemes axillary or terminal; calyx 4-5, rarely 2- to 3-lobed, imbricate; petals free, usually 4, rarely 5 or absent; stamens numerous in several series; filaments free or mostly united at base; anthers basifixed, 2-locular, opening by slits lengthwise; ovaries inferior, rarely semi-inferior, mostly 2- to 4-locular; ovules 1 to many in each locule. Fruits drupaceous or berry-like, crowned by persistent sepals.

Genera 7, species 50, in the tropics of the world; 3 genera and 10 species in the Philippines.

- 1. Fruits broadly winged; pedicels ebracteolate, 3 mm long 1. *Petersianthus*
- 1. Fruits not winged; pedicels bracteolate, more than 3 mm long, bracts large or small
 - 2. Bracteoles large, not caducous before corolla is shed; calyx tube produced above ovary; racemes erect 2. *Planchonia*
 - 2. Bracteoles small, soon caducous; calyx tube not or hardly produced above ovary; racemes or spikes drooping or erect 3. *Barringtonia*

1. PETERSIANTHUS Merrill

Trees. Leaves glabrous, acuminate, with attenuate base; lamina extends to petiole making leaves sessile; midrib raised, prominent beneath. Inflorescences terminal, up to 15 cm long, paniculate-corymbose; flowers white; pedicels 3 mm long, stamens many-seriate, subequal; filaments up to 1 cm long, anthers elliptic, 2-celled, cells opening by longitudinal slits; ovaries inferior, 4-celled, nearly as wide including wings; wings four, equal, thinly coriaceous or membranaceous, transversely nerved, seed bearing portion narrow, thin-walled, 5 mm thick; seeds brown, oblong, 5-7 mm long.

A typical African genus; 2 species in Africa, 1 in the Philippines. This is one case of extra -African distribution presented by the Philippine flora.

- 1. *Petersianthus quadrialatus* (Merr.) Merr., Philip. J. Sc. 11: 200, 1916; En. Philip. 3: 141, 1923; Kartawinata, *Kalikasan*, Philip. J. Biol. 11: 388, f. 1, 1982. – *Terminalia quadrialata* Merr., Philip. J. Sc. 4(Bot.): 301, 647, 1909. – *Combretodendron quadrialatum* (Merr.) Merr., Philip. J. Sc. 15: 32, 1936. Figure 151

Characteristics. (Refer to genus description).

Endemic in the Philippines. Distributed in the central and southern part of the country [Sorsogon (Luzon), Masbate, Samar (Visayas), Agusan



Figure 151. *Petersianthus quadrialatus*: 1. flowering branch; 2. flower; 3. flower, vertical section; 4. stamens; 5. stamen, enlarged; 6. style; 7. fruit, 2 views; 8. seed.

Agusan (Mindanao)]. In Mt. Makiling, Luzon, introduced on the College of Forestry and Natural Resources campus.

Com. name – *Toog* (most Philippine dialects).

Exsicc. – *Hernaez CA 20010**, *20811* (CAHP); *Rosenbluth BS 12558* (K); *Sulit 14416* (PNH).

2. **PLANCHONIA** Blume

Trees. Leaves crowded toward ends of branches, crenulate, pinnately nerved. Racemes short, terminal, few-flowered; flowers greenish yellow or whitish, tinged with pink; calyx tube turbinate with 4 imbricating lobes; petals as many; stamens numerous, innermost circle without anther, slightly connate at base; ovaries 3- to 4-celled, crowned by annular disc; styles long, bearing minute stigmas; ovules many in each cell, sessile along 2 longitudinal rows of inner angle. Fruits 1- to 3-celled, large, ovoid to subellipsoid, fibrous; seeds several, elliptic, in pulpy mass without albumen.

Species 2; India, Andaman Islands to Australia, 1 in the Philippines.

1. *Planchonia spectabilis* Merr., Publ. Gov. Lab. Philip. 17: 30, 1904, En. Philip. 3: 143, 1923. – *P. valida* Vid., Sinopsis 26, t. 50, f. D, 1883 non Bl.

Leaves obovate, 16 x 7 cm, conspicuous midrib with 9-12 pairs of pinnate nerves, abruptly acute to acuminate, base cuneate; petioles 2 cm long. Flowers in terminal, erect 1- to 3-flowered racemes; flowers glabrous, 7 cm long, faintly fragrant, pinkish white; calyx tube funnel-shaped, 1 cm long; petals obovately oblong, whitish except red base, divaricately spreading, deciduous; stamens interlaced; filaments thread-like, 6 cm long or half as long as stamens, terminated by oval anthers, usually erect or ascending, pink toward base, otherwise white; styles slender, longer than stamens. Fruits ovately ellipsoid, not angled, 3 x 4.5 cm; seeds irregularly compressed.

Endemic. Throughout the Philippines, along ridges in forests at low and medium altitudes; in Mt. Makiling, Luzon, scattered, sometimes locally numerous in forest borders

Com. name – *Lamog* (Pamp., Tag.).

Exsicc. – *Pancho CA 20121*, *20178* (CAHP).

3. **BARRINGTONIA** J.R. & G. Forster, *nom. cons.*

Trees or shrubs. Leaves mostly toward ends of branches. Flowers terminal or lateral, in erect or pendulous racemes or spikes; limbs of calyx tube 3-5, free or closed before anthesis, soon splitting into 2-4 lobes, persistent; petals 4, rarely 5-6, basally adhering to staminal tube; stamens tubular at

at base, inner ones anantherous; ovaries 2- to 4-celled; ovules 2-8 in each cell. Fruits with fleshy, fibrous exocarp and woody endocarp, 1-seeded.

Species 39; Eastern Africa, tropical Asia, Malesia, Australia and Polynesia; 5 in the Philippines.

1. Flowers in erect, few-flowered racemes; stamens 10 cm or more long 1. *B. asiatica*
1. Flowers in drooping or pendulous racemes; stamens 5 cm or less long
 2. Racemes drooping; calyx 2 or 3, ovate; petals oblong-ovate to lanceolate, 2-2.5 cm long 2. *B. racemosa*
 2. Racemes pendulous; calyx 4, obtuse; petals narrowly oblong, 7 mm long 3. *B. acutangula*

1. ***Barringtonia asiatica*** (L.) Kurz. J. As. Soc. Beng. 45: 131, 1876; Merr., En. Philip. 3: 142, 1923; Payens, Blumea 15: 184, photo 1, 2, f.1a-c, B-C, 1967. – *Mammea asiatica* L., Sp. Pl. 512, 1753.

Trees, up to 15 m high. Leaves obovate or obovate-oblong, 20-40 cm long, entire, thick, lucid above, obtuse, narrowed toward sessile base. Flowers large, in short, erect, few-flowered racemes; calyx tube 1 cm long, lobes 2 or 3, oblong-ovate, 2.5 x 3-4 cm, concave, green, deciduous; stamens numerous, united at base, 10-12 cm long, white below, shading purple above; anthers small, yellow; styles slender, 13 cm long, purplish. Fruits obovoid, 8-14 x 8-12 cm, sharply 4-, rarely 5-angled, 1-seeded.

Tropical Asia to Polynesia. Throughout the Philippines, along shorelines; in Mt. Makiling, Luzon, cultivated in commercial nurseries in Los Baños, Laguna.

Com. name – *Botong* (Bik., Tag.).

Exsicc. – Gates CA 1964 (CAHP).

2. ***Barringtonia racemosa*** (L.) Spreng., Syst. Veg. 3: 127, 1826; Bl. ex DC., Prodr. 3: 288, 1828; Merr., En. Philip. 3: 142, 1923; Payens, Blumea 15: 192, 1967. – *Eugenia racemosa* L., Sp. Pl. 471, 1753. **Figure 152**

Trees small. Leaves obovately oblong, 15-40 x 5-15 cm, crenately serrate, acuminate, narrowed toward sessile base. Racemes terminal or from axils of fallen leaves, solitary, drooping, 20-60 cm long; flowers white or pink; calyx closed in bud, splitting irregularly into 2 or 3, ovate, concave segments; petals oblong-ovate to lanceolate, 2-2.5 cm long, slightly connate at base; stamens numerous, 3-4 cm long. Fruits ovoid to oblong-ovoid, 5-6 cm long, somewhat 4-angled, crowned by persistent calyx, pericarp coriaceous.

India to Malesia and Polynesia. Throughout the Philippines, in open lowlands and thickets; in Mt. Makiling, Luzon, mostly in wet places in the lowlands.

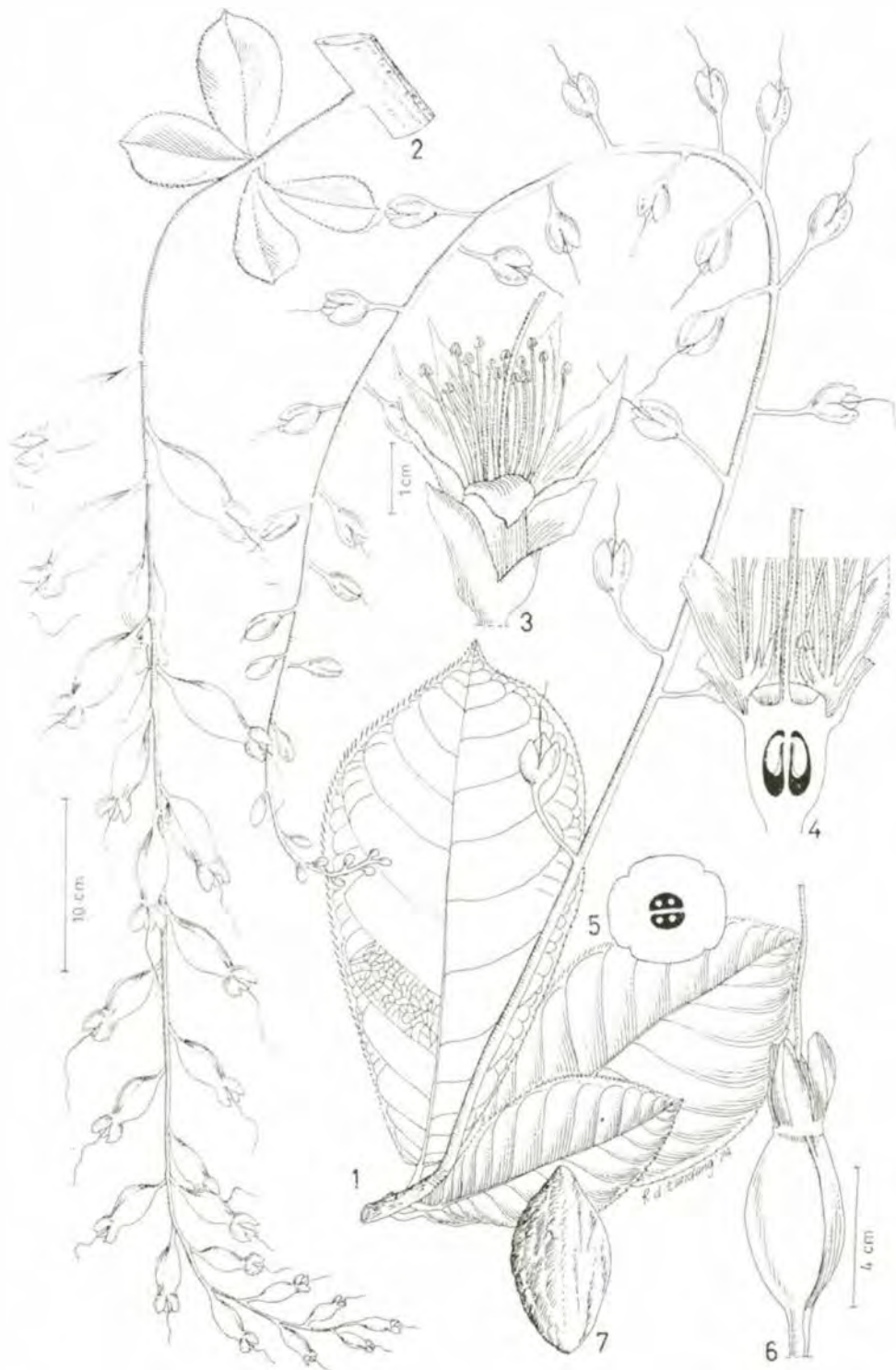


Figure 152. *Barringtonia racemosa*: 1. flowering branch; 2. fruiting branch; 3. flower; 4. ovary, vertical section; 5. ovary, cross section; 6. fruit; 7. seed.

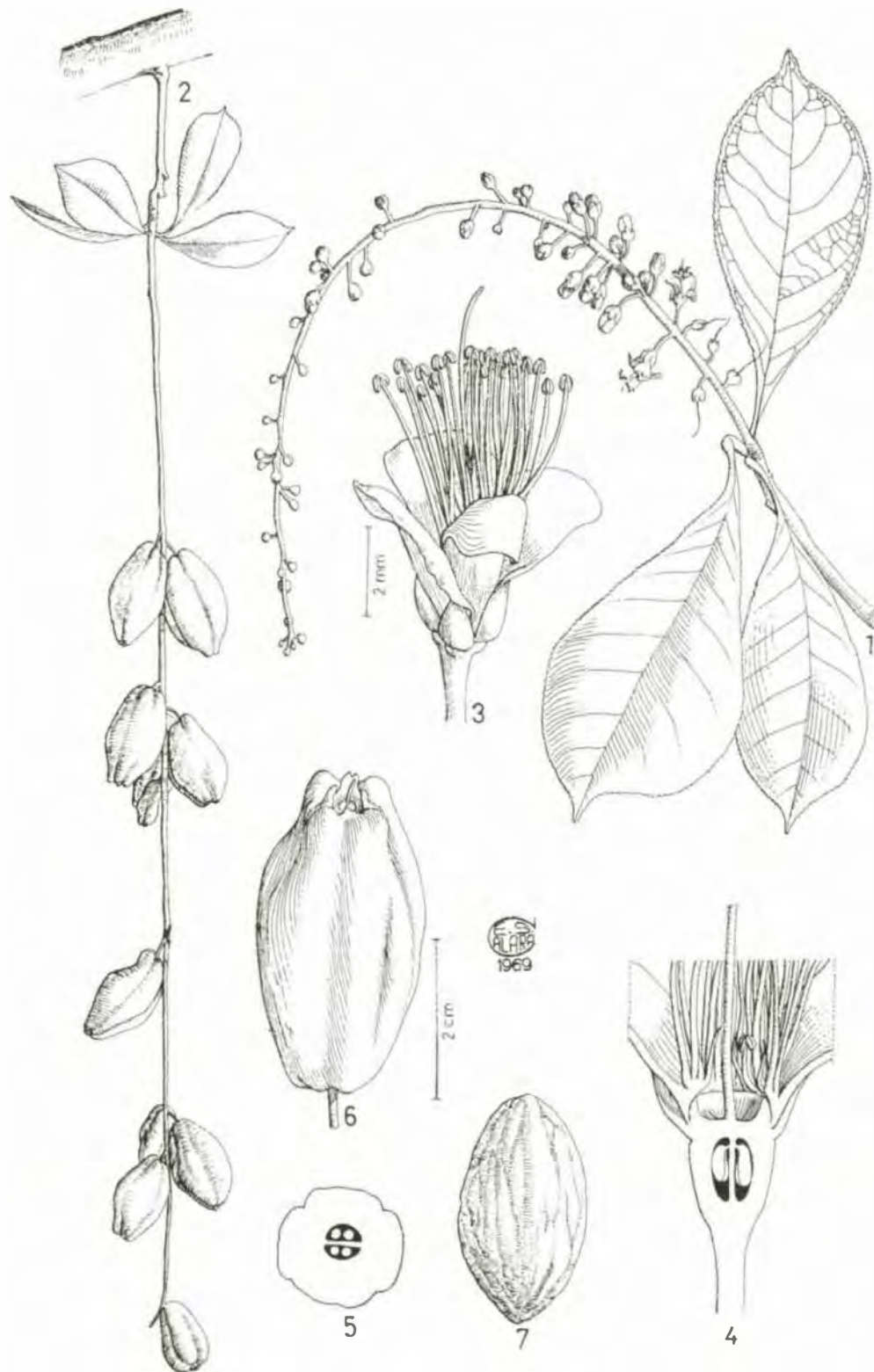


Figure 153. *Barringtonia acutangula* ssp. *acutangula*: 1. flowering branch; 2. fruiting branch; 3. flower; 4. flower, vertical section; 5. ovary, cross section; 6. fruit; 7. seed.

Com. name – *Putat* (Tag., Bik., S.-L. Bis., P. Bis., Sul., Mag.).

Exsicc. – *Foxworthy CA 1960; Orlido CA 10357, 10360**; *Hernaez CA 12465; Lugod CA 11026; Gates CA 1961* (CAHP).

3. *Barringtonia acutangula* (L.) Gaertn., *Fruct.* 2: 97, t. 101, 1791; Merr., *En. Philip.* 3: 141, 1623. – *Eugenia acutangula* L., *Sp. Pl.* 471, 1753. – *Barringtonia luzonensis* Rolfe, *J. Bot.* 23: 213, 1885. – *B. reticulata* Miq., *Fl. Ind.-Bat.* 1: 498, 1885.

ssp. *acutangula*

Figure 153

Trees, up to 12 m high. Leaves oblong-obovate, 6-14 cm long, uniformly and finely toothed, acuminate, narrowed toward short-petioled base. Racemes axillary, pendulous, 10-45 cm long, slender; flowers numerous, short-pedicelled, pink to red; calyx lobes 4, short, obtuse; petals narrowly oblong, 7 mm long. Fruits oblong-ovoid, 3-4 x 1.5 cm, 4-angled, pointed.

India through Malaysia to tropical Australia. Throughout the Philippines, in thickets at low and medium altitudes; in Mt. Makiling, Luzon, common, mostly at low altitudes.

Com. name – *Kalambuaya* (Ilk.).

Exsicc. – *Quisumbing CA 1963; Gates CA 1955, 1958; Almajera CA 10349; Magnaye CA 1957; Valencia CA 1956; Palis CA 3127; Balaoing CA 19359; Velasco CA 1962** (CAHP).

118. MELASTOMATACEAE

Trees, herbs, erect or climbing shrubs, sometimes epiphytic. Leaves opposite to verticillate, simple, curvinerved, rarely 1-nerved or pinnately nerved, estipulate. Flowers bisexual, regular, in lateral, axillary or terminal fascicles or panicles, rarely solitary; calyx tubes united by vertical walls to ovary, seldom free, limb when present usually 4- or 5-lobed, sometimes 3- or 6-lobed, occasionally falling off as a whole; petals as many as calyx segments, often imbricately twisted, usually contorted in bud, inserted upon margin of calyx rim; stamens as many or twice as many as petals or numerous, alternate ones often shorter, sometimes rudimentary; filaments bent inwardly in early state; anthers opening by apical pores, rarely by lateral slits, connective often appendaged near base of bristles, tubercles or true spurs; ovaries inferior or half-inferior, sometimes superior, 1- to many-celled; styles simple, filiform, rarely short; ovules 2 to many in each cell. Fruits included in calyx tube, capsular or berry-like, breaking up irregularly or by slits through top of cells; seeds minute, numerous or solitary.

Genera 150, species 4000; in all tropical or warm countries, few in temperate regions; 19 genera and 232 species in the Philippines.

- 1. Leaves pinnatinerved; fruits with 1, rarely 2 large seeds 1. *Memecylon*
- 1. Leaves longitudinally veined; fruits with numerous small seeds
 - 2. Fruits dry and capsular
 - 3. Stamens very numerous, unequal; calyx segments long and pointed 2. *Astrocalyx*
 - 3. Stamens twice as many as petals, equal; calyx segments short and rounded 3. *Astronia*
 - 2. Fruits juicy and berry-like
 - 4. Calyx covered with numerous imbricating, scaly bracts; seeds curved through half a circle 4. *Melastoma*
 - 4. Calyx without scaly bract; seeds ovoid or subfalcate 5. *Medinilla*

1. MEMECYLON Linnaeus

Trees or shrubs. Leaves opposite, short-petioled or sessile, coriaceous, pinnatinerved, rarely apparently 3-veined, ovately lanceolate or suborbicular, entire. Flowers in lateral, rarely terminal, simple or paniced cymes or umbels or sessile in compact fascicles; calyx tube campanulate, glabrous, with dilated, truncate or merely 4-lobed limb, petals as many as calyx segments; stamens 8; anthers upon long filaments, opening by slits along front, connectives ending in a rear horn; ovaries inferior, 1-celled, top swollen or depressed, glabrous, epigynous disc with 8 radiating ribs; styles simple, filiform, fleshy, purplish blue, crowned by calyx margin, 1- or rarely 2-seeded; seeds large.

Species 320; tropical Africa, India, Malay Peninsula, Polynesia and tropical Australia; 4 in the Philippines.

- 1. Branchlets angularly winged 1. *M. paniculatum*
- 1. Branchlets terete
 - 2. Peduncles umbellately rebranched; leaves sessile 2. *M. cumingii*
 - 2. Peduncles not rebranched; leaves short-petioled
 - 3. Leaf base cuneate to subattenuate; fruits globose 3. *M. lanceolatum*
 - 3. Leaf base rounded; fruits ellipsoid 4. *M. floribundum*

- 1. *Memecylon paniculatum* Jack, Mal. Misc. 2: 62, 1982; Merr., En. Philip. 3: 216, 1923.

Trees small, young branches angularly winged. Leaves oblong, 15 x 5 cm, ridged midrib with 10 pairs of nerves, margins subinvolute when dry, acute to acuminate, base usually rounded to slightly cordate, subsessile. Inflorescences lateral, glabrous, 3-5 cm long, umbellately compound, angular and radiating branches arising from short, thick peduncles, puberulent along grooved sides, all subtended by bracts; flowers pale blue, pedicellate, subtended

by persistent bracteoles; calyx short, turbinate, subtruncate; petals 4, early falling off, conically pointed in bud; stamens twice as many as petals, equal, curved and horned anthers upon elongated filaments. Fruits globose, 5-8 mm across, purplish deep blue and grayish dotted.

Sumatra and Java. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, scattered in midmontane forests.

Com. name – *Pasagit* (Tag.).

Exsicc. – *Pancho CA 20046, 20279* (CAHP).

2. *Memecylon cumingii* Naud., Ann. Sc. Nat. Bot. III, 18: 273, 1852 (*cummingii*); Merr., En. Philip. 3: 213, 1923.

Shrubs or small trees. Leaves lanceolately oblong, 20 x 6-7 cm, much smaller below, keeled midrib with 15-20 pairs of divaricate nerves forming a vein 5 mm below margin, acuminate, base broadly rounded to slightly cordate, sessile. Inflorescences umbellately compound, usually clustered, lateral, seldom terminal, 5-8 cm long, branches puberulent, not angled; flowers pedicelled, glabrous, subtended by bracteoles, pale white and bluish tinged; calyx coriaceous, short-turbinate, truncate; petals 4, small, caducous; anthers upon elongated, somewhat flattened filaments; ovaries radially winged. Fruits globose, 5-8 mm in diameter, purplish blue, with large, solitary seed.

Endemic. Philippines: northern to southern Luzon; in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 250-500 m.

Com. name – *Kagigai* (Ibn.).

Exsicc. – *Pancho CA 20330* (CAHP).

3. *Memecylon lanceolatum* Blco., Fl. Filip. 301, 1837; Merr., En. Philip. 3: 214, 1923.

Shrubs or small trees. Leaves oblong to subelliptic, 9 x 3 cm, midrib conspicuous beneath, lateral nerves scarcely visible, acuminate to subcaudate, base cuneate to subattenuate; petioles 5 mm long, canaliculate. Inflorescences lateral or from lower leaf axils, usually clustered, 1-3 cm long, longer peduncles rebranched, branches usually puberulent; flowers blue, subumbellately clustered, slenderly pedicelled, subtended by persistent bracteoles; calyx campanulate, rim-like at top; anthers large, curved, upon much-exserted filaments; ovary top radially winged; petals 4, deciduous. Fruits globose, 7.5 mm in diameter, deep blue.

Endemic. Throughout the Philippines, in thickets and second-growth forests at low and medium altitudes; in Mt. Makiling, Luzon, in open wooded areas at 150-300 m.

Com. names – *Kulis* (Tag.); *Digeg* (Ibn.).

Exsicc. – *Stern CA 12340*; *Madarang CA 10289, 10290*; *Orlido CA 10649* (CAHP).

4. *Memecylon floribundum* Bl., Mus. Bot. Lugd.-Bat. 1: 361, 1851; Bakh. f., Rec. Trav. Bot. Neerl. 40: 265, 1943-45.

Shrubs, 3-5 m high. Leaves oblong, ovate-oblong or broadly lanceolate, 6-15 x 2-7 cm, midrib and lateral nerves hardly conspicuous, acute, broadly rounded at base; petioles 3-7 mm long. Inflorescences axillary, short-cymose, bracteate; flowers whitish, distinctly pedicellate, bibracteate at base; calyx broadly funnel-shaped, truncate; petals free, reflexed, early falling off; stamens exerted, bearing large, curved anthers; styles straight, subpersistent. Fruits bluish, ellipsoid, 1 cm long when dry, terminated by calyx rim.

Com. name – Pink-flowered Memecylon (Engl.).

Exsicc. – *Jovellanos CA 2041*; *Rola CA 2042, 2044*; *Magnaye CA 2043*; *Estioko, Jr. CA 2045, 2046* (CAHP).

2. ASTROCALYX Merrill

Trees, 5-20 m high. Main branches crooked, twigs slender, terete, when young covered with brown-furfuraceous indumentum. Leaves opposite, elliptic to elliptic-oblong, 15 x 5 cm, subcoriaceous, abruptly acute at both ends, 3-plinerved, cross bars conspicuous, midribs and veins with deciduous brown scales; petioles stout, dirty brown-scurfy, 1-2 cm long. Panicles terminal, large, reddish brown-furfuraceous, ebracteolate; flowers medium-sized, 1- to 3-clustered at ends of branchlets, short-pedicelled or subsessile, bract-subtended; calyx similar in vesture, campanulate with 5 divergently spreading, narrowly toothed, persistent calyx segments; petals as many as calyx segments, prominently pointed, pink; stamens numerous, unequal; anthers basifixed, opening through dilated slits at apex; styles longer, cylindrical. Top of flat capsule bordered by a bead-like rim; seeds small, numerous.

Monotypic. Endemic in the Philippines.

1. *Astrocalyx calycina* (Vid.) Merr., Philip. J. Sc. 8(Bot.): 335, t.11, 1913; En. Philip. 3: 211, 1923; Maxw. & Veldk., Blumea 35: 75, 1990. – *Astronia calycina* Vid., Rev. Pl. Vasc. Filip. 136, 1866.

Characteristics. (Refer to genus description).

Philippines: central Luzon to Leyte: in damp forests at low and medium altitudes, ascending to 1700 m; in Mt. Makiling, Luzon, in forests at low altitudes.

Com. name – *Tanghau* (S.-L. Bis.).

Exsicc. – *Elmer 18032, 1237516; McGregor BS 23063, 1050803* (US).

3. **ASTRONIA**, Blume

Shrubs or trees. Branches terete, occasionally angular or winged. Leaves opposite, usually paler or subglaucous green beneath, 3- to 7-plinerved. Flowers in terminal and axillary panicles, small, white, yellow or purple; calyx tubes campanulate, glabrous or puberulous, limbs irregularly truncate, 3- to 8-toothed; petals 4 or 5; stamens 8-12, equal; filaments short, broadened; anthers introrse, short, dehiscent by 2 lateral slits, connective spurred at base or entirely unappendaged; ovaries inferior, 2- to 5-celled, glabrous at apex, grown to calyx; styles short, cylindrical or columnar; stigmas capitate; placentae arising from basal cellaxil. Capsules leathery, tardily breaking irregularly; seeds numerous, linear, light brown, ascending from excurrent raphe.

Species 70, Indo-Malesian and Pacific Islands; 33 in the Philippines.

1. Leaves 5-veined
 2. Leaf base broadly or narrowly obtuse; petioles stout, scaly, canaliculate, 3-5 cm long; petals obovately oblong, white, often tinged with red 1. *A. lagunensis*
 2. Leaf base acute; petioles densely brown-furfuraceous, 3 cm long; petals orbicular, yellowish 2. *A. williamsii*
1. Leaves 3-veined
 3. Inflorescences as long as or shorter than foliage
 4. Inflorescences equaling foliage
 5. Leaves glaucous beneath 3. *A. cumingiana* var. *bicolor*
 5. Leaves brown or minutely scurfy beneath
 6. Leaves brown beneath; inflorescences oppositely rebranched; petals yellowish brown 4. *A. cumingiana*
 6. Leaves minutely scurfy beneath; inflorescences profusely rebranched from below middle; petals yellowish white 5. *A. rolfei*
 4. Inflorescences shorter than foliage
 7. Leaves glaucous or subglaucous beneath
 8. Leaves glaucous beneath; petioles 3-5 cm long; cross bars obscure 3. *A. cumingiana* var. *bicolor*
 8. Leaves subglaucous beneath; petioles 3-5 cm long, canaliculate, cross bars prominent 6. *A. candolleana*
 7. Leaves brown beneath

9. Leaves elliptically oblong; petioles 3 cm long, yellowish-brown-lepidote; petals yellowish brown 4. *A. cumingiana*
 9. Leaves oblong; petioles 3-5 cm long, scaleless; petals red..... 7. *A. meyeri*
 3. Inflorescences exceeding foliage 8. *A. pulchra*

1. ***Astronia lagunensis*** Merr., Philip. J. Sc. 1: Suppl. 213, 1906; En. Philip. 3: 200, 1923; Maxw. & Veldk., Blumea 35: 109, 1990.

var. *lagunensis*

Shrubs erect or small trees. Leaves terminally crowded, narrowly oblong to subelliptically elongated, 16 x 7 cm, 5-veined from base, cross bars prominent beneath, minutely scurfy, sharply cuneate, base broadly or narrowly obtuse; petioles 3-5 cm long, canaliculate, scaly. Bud inflorescences with caducous foliaceous bracts, terminal, half as long as leaves, coarse, dark scaly branches angularly ridged; flowers shortly pedicelled, usually few-clustered, bract-subtended in early state; calyx copper-brown, constricted below rim; petals imbricately twisted in bud; obovately oblong, greenish white, often tinged with red. Fruits 5 mm across, terminated by calyx rim.

Endemic. Philippines: Luzon (Laguna and Sorsogon); in primary forests at 700-1000 m altitudes; in Mt. Makiling, Luzon, on exposed ridges at 350-800 m.

Com. name – *Bungao bundok* (Tag.).

Exsicc. – *Baker* CA 2020; *Desamparo* CA 10820. *Orlido* CA 10811, 10821, 10822; *Gabriel* CA 10812 (CAHP).

2. ***Astronia williamsii*** Merr. ex C.B. Rob., Philip. J. Sc. 6(Bot.): 214, 1911, Merr., En. Philip. 3: 211, 1923; Maxw. & Veldk., Blumea 35: 114, 1990. – *A. merrillii* Elm., Leaf! Philip. Bot. 8: 3091, 1919.

var. *williamsii*

Shrubs, up to 5 m high. Leaves mostly terminal, oblong to subelliptic, 10-20 x 5-10 cm, green and sublucid above, lower surface yellowish gray with brown-scurfy nerves, 5-veined, inner pair arising 7.5 mm above base, cross bars prominent, sharply acuminate, base acute; petioles 3 cm long, densely brown-furfuraceous. Panicles terminal, brown-lepidote, 3-9 cm long and as wide as 3-9 cm across top; flowers umbellately disposed from ultimate branchlets; pedicels subtended by bracteoles; calyx campanulate, 5-toothed; petals orbicular, yellowish, caducous. Fruits 4 mm long, reddish brown-lepidote especially about calyx rim.

Endemic. Philippines: central Luzon to Mindoro and Mindanao (Zamboanga); in primary forests ascending to 800 m altitude.

Com. name – *Dungao* (Tag.).

Exsicc. – *Pancho* CA 13589, 13590, 13591; *Baker* CA 2021; *Gates* CA 2022; *Valencia* CA 2023, 2024 (CAHP).

3. *Astronia cumingiana* Vid. var. *bicolor* (Merr.) Maxw. & Veldk., *Blumea* 35: 107, 1990. – *A. bicolor* Merr., *Philip. J. Sc.* 8(Bot.): 350, 1913; *En. Philip.* 3: 207, 1923. – *A. discolor* Merr., *Philip. J. Sc.* 8(Bot.): 352, 1913; *En. Philip.* 3: 208, 1923. – *A. foxworthyi* Elm., – *A. maquilingensis* Elm., *Leafl. Philip. Bot.* 8: 3092, 1919.

Shrubs or small trees. Leaves mostly terminal, 5-10 cm long, glaucous beneath, deep green on upper side, prominently 3-plinerved beneath with faint submarginal lines, cross bars obscure, abruptly acute to subacuminate, base obtuse to subcuneate; petioles 1.5 cm long. Panicles laxly and oppositely rebranched, as long as or shorter than foliage, terminal; flowers small, numerous, copper-colored, lepidote, terminally fascicled, short-stalked, usually bract-subtended; calyx-short, cup-shaped, truncate; petals 5, dull yellow, free, early falling off; stamens nearly twice as many as petals; filaments flat, fleshy. Fruits ovoidly globose, 3 mm across.

Endemic. Originally discovered in the cloud-belt forest of Mt. Makiling, Luzon, very little known outside of Laguna Province.

Com. name – *Dungao puti* (Tag.).

Exsicc. – *Pancho* CA 20172, 20350 (CAHP).

4. *Astronia cumingiana* Vid., *Phan. Cuming.* 114, 174, 1885; *Rev. Pl. Vasc. Fil.* 130, 1886; Merr., *En. Philip.* 3: 207, 1923; Maxw. & Veldk., *Blumea* 35: 107, 1990.

var. cumingiana

Trees small. Leaves mainly terminal, elliptically oblong or nearly oblong, 16 x 6 cm, sublucid above, brown beneath, 3-plinerved with faint cross bars, acuminate, base obtuse to obtusely rounded; petioles 3 cm long, yellowish brown-lepidote. Panicles terminal, as long as or shorter than foliage, finely brown-scurfy, oppositely rebranched; flowers short-pedicelled, small, numerous at ends of short, ultimate branches; calyx shallowly cup-shaped, entire or 5-apiculate, grayish brown, scaly; petals 5, yellowish brown, caducous. free; stamens twice as many, short; anthers large, curved; styles erect, fleshy. Fruits subglobose, 4 mm in diameter, yellowish green to brown, rim of calyx thickened; seeds indefinite, light brown, linear, falcate.

Endemic. Throughout the Philippines, in primary and secondary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 250-500 m.

Com. name – *Badling* (Tag.).

Exsicc. – *Calma* CA 9236 (CAHP).

5. *Astronia rolfei* Vid., Phan. Cuming. 174, 1885; Merr., En. Philip. 3: 210, 1923; Maxw. & Veldk., Blumea 35: 112, 1990. – *A. lucbanensis* Elm., Leaf. Philip. Bot. 4: 1201, 1911. – *A. rolfei* Vid. var. *furfuracea* Merr., Philip. J. Sc. 8(Bot.): 345, 1913.

Shrubs to small trees. Leaves chiefly at ends of twigs, elliptically or broadly oblong, upper much deeper green, surface usually marked with cystoliths, 16 X 6 cm or smaller, prominently subtrinermed with faint submarginal lines, veins and cross bars minutely scurfy, abruptly but sharply acuminate; petioles 2-4 cm long. Panicles terminal, profusely rebranched from below middle, equaling foliage and about as wide as foliage, scurfy-brown; flowers shortly pedicelled, densely brown-lepidote, campanulate-tubular, obscurely dentate; petals small, yellowish white. Fruits flatly globose, 4 mm in diameter, covered with scales.

Endemic. Philippines: middle Luzon to northeastern Mindanao; in damp subalpine forests especially along streams; in Mt. Makiling, Luzon, in the humid rainforests.

Com. name – *Dungao pula* (Tag.).

Exsicc. – *Pancho* CA 20066, 20528 (CAHP).

6. *Astronia candolleana* Cogn. in DC., Mon. Phan. 7: 1099, 1891; Merr., En. Philip. 3: 207, 1923; Maxw. & Veldk., Blumea 35: 107, 1990. – *A. platyphylla* Merr., Philip. J. Sc. 8(Bot.): 355, 1913. Merr., En. Philip. 3: 209, 1923. – *A. tetragona* Merr., Philip. J. Sc. 12(Bot.): 341, 1917; Merr., En. Philip. 3: 210, 1923.

Shrubs or small trees. Leaves mostly crowded at ends of branches, oblong to obovately oblong, 25 x 9 cm, 3-plinerved with faint submarginal line, veins and prominent cross bars brown-scurfy, shiny above, subglaucous beneath, acute, base subcuneate; petioles 3-5 cm long, brown, canaliculate. Corymbose panicles shorter than foliage, terminal, densely scurfy; flowers terminally crowded; calyx stalked, cup-shaped, obscurely 5-toothed, brown-lepidote, glandularly lenticelled; petals tinged with red, little exceeding calyx; stamens short; styles columnar with enlarged stigmas. Fruits subglobose, 5-8 mm across, truncate at calyx rim; pedicels brown, grayish brown, ultimately becoming shredded from apex base.

Endemic. Philippines: northern to southern Luzon, in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 150-400 m altitudes.

Com. name – *Talanak* (If.).

Exsicc. – *Gates CA 2019* (CAHP).

7. *Astronia meyeri* Merr., Publ. Gov. Lab. Philip. 35: 51, 1906, En. Philip. 3: 209, 1923; Maxw. & Veldk., Blumea 35: 111 1990.

Trees small. Leaves mostly terminal, oblong, 18 x 8 cm, 3-nerved with faint submarginal lines, right angled cross bars evident beneath, subacuminate, base obtuse or obtusely rounded; petioles 3-5 cm long, scaleless. Inflorescences scurfy-brown, half as long as foliage, corymbosely paniculate; flowers 1- to 3-clustered terminally, stalked; calyx ovoidly compressed, constricted below 5-acute teeth; petals blood-red, forming a flat cone, easily falling off; stamens twice as many. Fruits 7.5 mm in diameter, smooth and tobacco-brown.

Endemic. Philippines: middle Luzon to Mindoro; in humid flats or ravines of subalpine forests; in Mt. Makiling, Luzon, on exposed ridges in the mossy forest.

Com. name – *Meyer's dungao* (Tag.).

Exsicc. – *Pancho CA 20483* (CAHP).

8. *Astronia pulchra* Vid., Rev. Pl. Vasc. Filip. 136, 1886; Merr., En. Philip. 3: 209, 1923; Maxw. & Veldk., Blumea 35: 111, 1990. – *A. cuernosensis* Elm., Leafl. Philip. Bot. 4: 1204, 1911. – *A. pulchra* Vid. var. *obovata* Merr., Philip. J. Sc. 8(Bot.): 350, 1913; En. Philip. 3: 210, 1923.

Shrubs or small trees. Leaves usually terminally clustered, leaving large scars after falling off, oblong or smaller ones broadly lanceolate, 15 x 5 cm, cinnamon-brown-lepidote beneath, almost 3-nerved, few cross bars relatively faint, sharply acute to long-acuminate, base obtusely narrowed; petioles 1-2 cm long, scurfy. Panicles elongated, exceeding foliage, reddish brown-scurfy, ultimate short branches divaricate; flowers in small terminal clusters, pedicelled; calyx campanulate, as long as pedicel, slightly larger rim toothed; petals small, caducous, yellowish brown. Old fruits almost without scales, 5-apiculate, subglobose, 3-4 mm in diameter across truncate apex.

Endemic. Throughout the Philippines; in mossy forests of high mountains; in Mt. Makiling, Luzon, at 800-950 m altitudes.

Com. name – *Balugigan* (Bik.).

Exsicc. – *Pancho CA 20379* (CAHP).

4. MELASTOMA Linnaeus

Shrubs erect or small, slender trees. Leaves opposite, 3- to 7-nerved. Flowers terminal, solitary, clustered or paniculate, 5- rarely 4- or 6-merous; calyx tube with simple, seldom penicellate hairs, lobes deciduous; petals as many as calyx lobes; stamens twice as many as petals, unequal, alternate longer ones with purplish anthers, connective long, produced toward base, terminating into 2 lobes, shorter ones with yellow anthers, connective not produced toward base, terminating into a pair of tubercles; ovaries more or less united to calyx tube, 5- rarely 4- or 6-celled; apex with bristles; styles filiform, simple; ovules numerous, arranged in radiating placentae. Berries with fleshy pericarp ultimately bursting irregularly; seeds minute, numerous.

Species 70; southeastern Asia to Malesia, Australia and Polynersia; 14 in the Philippines

1. *Melastoma malabathricum* L., Sp. Pl. 390, 1753; F.-Vill., Novis. App. 87, 1880; Merr., En. Philip. 3: 186, 1923. – *M. fuscum* Merr., Philip. Gov. Lab. Publ. 17: 39, 1904.

Shrubs erect, up to 3 m high. Leaves elliptically oblong or smaller ones broadly lanceolate, 9 x 3 cm, 5-veined though outer veins, faint, pale beneath, roughened with setulose hairs, acute to subacuminate, base obtuse or subrounded; petioles 1 cm long, scale-covered. Inflorescences less than half the length of foliage, subtended by lanceolate, deciduous bracts; flowers usually clustered, short-pedicelled; calyx and stalks densely covered with yellowish brown, sharply pointed and minutely ciliate bracteoles; calyx segments setosely pointed; petals 2.5 cm long, purplish, spreading, narrowed toward base, rounded at top. Fruits when ripe bursting, leaving the red meat with minute seeds exposed.

Similar to *M. polyanthum* Bl., but differs in its much larger bracts which usually exceed and enclosed the calyx.

India. Indochina through Malesia. Throughout the Philippines, in dry shrubberies among grasslands at low and high altitudes; in Mt. Makiling, Luzon, in open shrubberies at low elevations, ascending to 850 m.

Com. name – *Malatungao* (Tag.).

Exsicc. – Baker CA 2033; Davao CA 10819; Ortido CA 10817; Desamparo CA 10810; Gates CA 1835; Curio CA 10053; Cabrera CA 5073; Francis CA 14069; Pancho CA 4574; Hernaez CA 12402 (CAHP); Bañaga 33384 (PNH), 2212430 (US); Navarro 09575 (PNH), 2125037 (US); Robinson BS 17103, 901671; Serviñas BS 16904, 900662; McGregor BS 23983, 1050813; Elmer 17623, 1050206; Mabesa BF 24069, 1375544 (US).

5. MEDINILLA Gaudichaud-Beaupre

Shrubs branching, erect or scandent, sometimes epiphytic. Branches slender, terete or often ridged and angularly winged. Leaves opposite or whorled, entire, 3- to 9-nerved. Flowers in terminal panicles or lateral cyme, with or without bracts, 4-, 5- or 6-merous; calyx tube ovoid or cylindric, limb truncate or obscurely toothed; stamens twice as many as petals, equal or nearly so; anthers opening at top through a single pore; connective not or very shortly produced at base with 2 tubercles in front and spur behind; ovaries inferior, 4- to 6-celled, glabrous at apex; styles filiform; ovules numerous, along axillary placentae. Berries crowned by calyx limb; seeds ovoid or subfalcate, raphe often thickened, excurrent.

Species 400, worldwide, exhibiting a bicentric pattern of distribution. One center is Madagascar with a few species scattered in tropical Africa; the second center is in Asia, ranging from India, Sri Lanka, Burma, Thailand, South China, and islands of Southeast Asia and New Guinea extending to northern Australia, Micronesia, Solomon Islands, Vanuatu up to Fiji; 80 species in the Philippines (Regalado 1995).

1. Branches, lower leaf surface and inflorescences scurfy or ciliate
 2. Blades cordate at base 1. *M. cordata*
 2. Blades broadly obtuse to rounded at base
 3. Leaves often in 3's at ends of branchlets, brown-ciliate beneath especially along midrib; young stems ciliate 2. *M. ternifolia*
 3. Leaves opposite, never in 3's; young stems and neither surface of leaf brown-stellate-pubescent 3. *M. venosa*
1. Branches, foliage and inflorescences glabrous
 4. Inflorescences terminal
 5. Leaves verticillate 4. *M. pendula*
 5. Leaves opposite
 6. Leaves sessile, base obtuse or cordate
 7. Inflorescences pendent; leaves elliptic to oblong, 25 x 15 cm or more, base obtuse 5. *M. magnifica*
 7. Inflorescences erect or subpendent; leaves subelliptic to ovate, 15 x 8 cm or less, base cordate 6. *M. multiflora*
 6. Leaves petioled, base rounded or obtuse 7. *M. astronioides*
 4. Inflorescences axillary
 8. Leaves sessile or subsessile
 9. Inflorescences in drooping racemés 5. *M. magnifica*
 9. Inflorescences fascicled or cymose
 10. Inflorescences fascicled 8. *M. ramiflora*
 10. Inflorescences cymose 9. *M. myrtiformis*
 8. Leaves petioled

11. Flowers 4-merous; leaves with solitary pair of nerves, whorled
 10. *M. quadrifolia*
 11. Flowers 5-merous; leaves 5- to 7-veined, opposite 11. *M. merrittii*

1. *Medinilla cordata* Merr., Publ. Gov. Lab. Philip. 29: 37, 1905; Philip. J. Sc. 2(Bot): 287, 1907; *Ibid.* 5(Bot): 368, 1910; En. Philip. 3: 196, 1923; Regalado, *Blumea* 40(1): 186, 1995.— *M. macgregorii* Merr., Philip. J. Sc. 12(Bot.): 346, 1917.

Shrubs erect. Leaves with short axillary bristles, relatively many, elliptic or elliptically oblong, smaller ones subobovate, 7 x 3 cm, sparsely ciliate beneath especially along 3 nerves, abruptly acute, base completely rounded, subsessile or upon short, thick petioles covered with dirty, ciliate hairs. Inflorescences terminal or from upper leaf axils, up to 7.5 cm in length, lax, crisply pubescent, branches verticillate, gradually diminished toward top, subtended by lanceolate, membranous, 1-cm long, hairy bracts; flowers lilac, red or pink, bibracteate; calyx glabrate, truncate; corolla twice as long. Fruits 5-8 mm diameter, truncately rimmed at apex; seeds numerous.

Endemic. Philippines: northern and Central Luzon to Mindoro and Panay; in mossy forests from 2000 to 2500 m altitudes; in Mt. Makiling, Luzon, at 800-1000 m.

Com. name – *Gubangbang* (lg.).

Exsicc. – *Pancho CA 20123* (CAHP).

2. *Medinilla ternifolia* Triana, Trans. Linn. Soc. 28: 88, 1871; Merr., En. Philip. 3: 204, 1923; Regalado, *Blumea* 40(1): 176, f. 15, 1995.

Shrubs scandent or epiphytic. Leaves often in 3's at ends of branches, broadly lanceolate to ovately oblong, 7 x 3.5 cm, brown-ciliate beneath especially along midrib and 2 pairs of nerves which arise toward base, acuminate, broadly obtuse to rounded at base; petioles 5-8 mm long, ciliate. Spicate racemes terminal or axillary, pendulous, slender peduncles reddish brown-ciliate, up to 10 cm long; flowers in scattered verticels, subtended by colored, 1.5-cm long, membranous, oblanceolate bracts, all slenderly brown-ciliate; calyx bluntly toothed, stalked, bristly hairy, subtended by a pair of ovate bracts; petals relatively small, pale red or whitish. Fruits bluish purple and soft, subtended by furfuraceous bracts.

Endemic. Philippines: Luzon (Laguna, Mindoro) to Negros, Panay and Mindanao (Bukidnon); in primary forests at 600-1000 m; in Mt. Makiling, Luzon, at 700-900 m.

Com. name – *Tukulan* (lg.).

Exsicc. – *Baker CA 2029; Hernaez CA 12476* (CAHP); *McGregor BS 23008, 1050800; Elmer 17518; Merrill BS 418, 1157255* (US).

3. *Medinilla venosa* (Bl.) Bl., Flora 14: 518, 1831; Miq., Fl. Ind. Bat. 1(10): 549, 1856; Merr., Philip. J. Sc. 8(Bot): 247, 1913; En. Philip. 3: 205, 1923; Regalado, Blumea 40(1): 171, f.14, 1995. – *Melastoma venosum* Bl., Bijdr. 1075, 1826. – *Hypenanthe venosa* (Bl.) Bl., Mus. Bot. Lugd.-Bat. 1: 21, 1849. – *M. philippensis* (Cham. & Schltld.) Merr., Philip. J. Sc. 3(Bot.): 248, 1908. – *Axanthes philippensis* Cham. & Schltld., Linnaea 4: 193, 1829. – *M. luzonensis* Hook. f. ex Triana, Linn. Soc. 28: 88, 1781; Merr., Publ. Bur. Sc. Gov. Lab. 29: 38, 1905. – *M. williamsii* C.B. Rob., Philip. J. Sc. 3(Bot.): 208, 1908. **Figure 154**

Shrubs erect, up to 3 m high. Branches terete, light gray, older ones glabrous, younger parts densely covered with brown-stellate-pubescence. Leaves opposite, light green, stellate-pubescent beneath, glabrous above, oblong-ovate, base broadly obtuse to rounded, apex acute to acuminate. Inflorescences axillary or terminal, all parts brown-stellate-pubescent. Flowers 4-merous, pedicels 3-8 mm long. Calyx urceolate-campanulate, shallowly 4-lobed. Petals pink, unequal, imbricate, obliquely obovate, 8-10 mm long. Stamens 8, unequal; filaments 4-5 mm long. Fruits ovoid, 8 mm long, densely hirsute, limb with 4 broad teeth.

Philippines: (Luzon, Alabat Island, Catanduanes, Negros, Mindanao) to Sulawesi and the Moluccas. In forests at low and medium altitudes. Some authors place this species in the genus *Hypenanthe*.

Exsicc. – Pancho CA 10145, 10146; Gates CA 2031; Lantican CA 13587, 13588; Hernaez CA 12475(CAHP).

4. *Medinilla pendula* Merr., Publ. Gov. Lab. Philip. 29: 34, 1905; En. Philip. 3: 202, 1923; Regalado, Blumea 40(1): 126, 1995. – *M. elmeri* Merr., *op. cit.* 36. – *M. gitingensis* Elm., Leafl. Philip. Bot. 4: 1218, 1911. – *M. merrillii* Elm., Leafl. Philip. Bot. 4: 1219; 1911. – *M. subsessilis* Merr., Philip. J. Sc. 7(Bot.): 94, 1912.

Shrubs numerous branched. Leaves verticillate, narrowly oblong or obovately so, 12 x 4 cm wide, midrib with 2 pairs of subparallel nerves arising from below middle, short-acute, narrowed toward base; petioles 5-10 cm long, glabrate. Inflorescences nearly always terminal, glabrous, subpendent; peduncles slender, 5-15 cm long, glabrous, somewhat compressed, verticillately branched portion about as long; lower branches longer, subtended by bracts; flowers pedicelled, violaceous-purple, cymosely clustered at distal ends of divaricate branches; calyx with an expanded rim; petals at least twice the calyx in length. Berries globular, purplish black, soft, juicy.

Throughout the Philippines, in mossy forests at 1000-2000 m; in Mt. Makiling, Luzon, at 850-1000 m.



Figure 154. *Medinilla venosa*: 1. flowering branch; 2. portion of fruiting branch; 3. flower; 4. flower vertical section; 5. fruit; 6. ovary, cross section; 7. stamen; 8. seed, 2 views.

Com. name – *Baladu* (Bag.).

Exsicc. – *Pancho CA 20265* (CAHP).

5. *Medinilla magnifica* Lindl. in Paxt. Fl. Gard. 1: 55, t. 12, 1850; Merr., Publ. Bur. Sc. Gov. Lab. 29: 37, 1905; Philip. J. Sc. 2(Bot.): 287, 1907; *Ibid.* 3(Bot.): 423, 1908; En. Philip. 3: 199, 1923; Regalado, *Blumea* 40(1): 133, f.3, 1995. **Figure 155**

Shrubs epiphytic but grown in the lowlands as terrestrial. Stems crooked rebranched, compressed and angularly winged. Leaves elliptic to oblong, smaller ones subobovate, 30 x 20 cm, rigidly coriaceous, pale green beneath, upper side shiny, stout midrib with 3-5 pairs of ascendingly curved, prominent nerves, axillary bristles dark brown, obtuse at both ends, subsessile. Inflorescences pendent, terminal or lateral, glabrous, pink, as long as or much longer than leaves; peduncles and rachis angular; verticillate branches relatively short, rebranched, winged, subtended by ovately elliptic, deciduous bracts; flowers pedicelled; calyx truncate; petals 1.5 cm long, asymmetric; stamens with styles nearly as long as petals. Fruits subglobose, bright pink, dark red to purple when ripe, 6-8 mm in diameter, soft; stalks terete, 10 mm long.

Endemic. Throughout the Philippines, in humid cloud-belt forests. It is the most conspicuous ornamental *Medinilla* in the country.

Com. name – *Kapa-kapa* (Tag.).

Exsicc. – *Gates CA 2026** (CAHP); *Elmer 17517, 1237143*; *McGregor 22804* (US).

6. *Medinilla multiflora* Merr., Publ. Bur. Sc. Gov. Lab. 29: 35, 1905; Regalado, *Blumea* 40(1): 139, f.6, 1995. – *M. intermedia* auct. non Bl.: Merr., Publ. Bur. Sc. Gov. Lab. 29: 37, 1905. – *M. myriantha* Merr., Philip. J. Sc. 1: Suppl. 215, 1906; En. Philip. 3: 200, 1923. – *M. camiguinensis* Merr., Philip. J. Sc. 8(Bot.): 233, 1913. – *M. canlaonensis* Merr., Philip. J. Sc. 8(Bot.): 239, 1913. – *M. negrosensis* Merr., Philip. J. Sc. 8(Bot.): 240, 1913. – *M. confusa* Merr., Philip. J. Sc. 8(Bot.): 242, 1913. – *M. vulcanica* Merr., Philip. J. Sc. 12(Bot.): 352, 1917. **Figure 156**

Shrubs. Leaves subelliptic or smaller ones ovately so, 12 x 6 cm, glabrous, shiny green on upper side, with 7 prominent veins all arising from below middle, apex abruptly short-acuminate, subsessile base cordate. Panicles terminal, exceeding foliage, branches verticillate, similarly rebranched, angularly winged; flowers 4-merous, rose-red, slenderly pedicelled, bract-subtended; calyx truncate, minutely tubercled; petals obliquely obovate to orbicular, 7 x 5-6 mm, membranous; stamens 8, equaling petals. Fruits globose, 5-6 mm in diameter, shiny red; stalks terete, 5-7 mm long.

Endemic. Philippines: Luzon (Laguna, Rizal, Bataan), Negros and Panay; in mossy forests at 900-1000 m; in Mt. Makiling, Luzon, common in humid rainforests.



Figure 155. *Medinilla magnifica*: 1. flowering branch; 2. flower; 3. ovary, vertical section; 4. ovary, cross section; 5. stamen; 6. fruit; 7. seed.

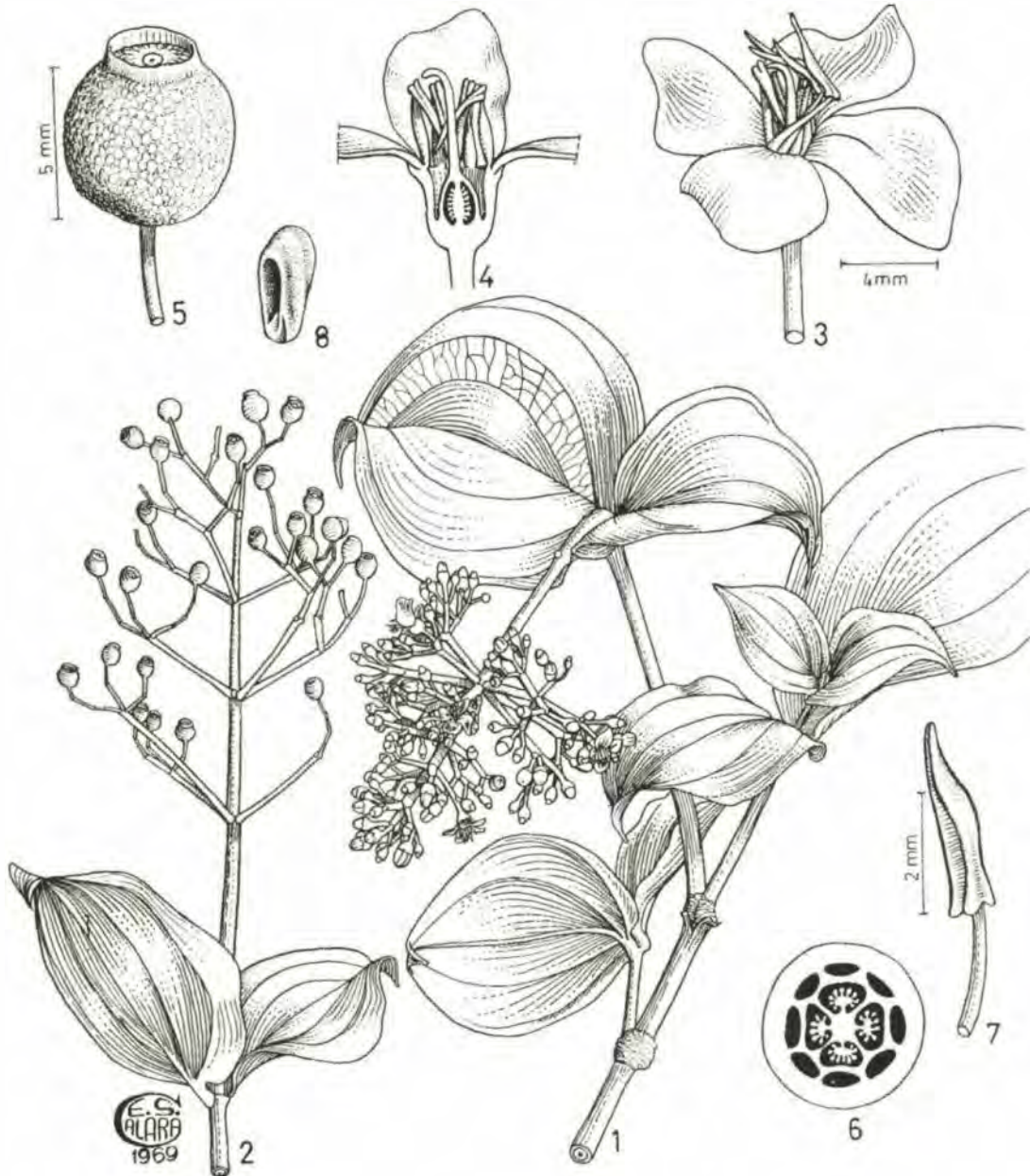


Figure 156. *Medinilla multiflora*: 1. flowering branch; 2. fruiting branch; 3. flower; 4. flower, vertical section; 5. fruit; 6. ovary, cross section; 7. stamen; 8. seed.

Com. name – *Malasaming* (Tag.).

Exsicc – Gates CA 2027; Alvaran CA 10816; Desamparo CA 10815; Orildo CA 10813, 10814; Pancho CA 4891; Curio CA 10074*; Gutierrez CA 10104; Hernaez CA 12400 (CAHP); Villamil BF 20652, 903604; Merrill 5133, 710575; Elmer 17814, 1237351 (US).

7. ***Medinilla astronioides*** Triana, Trans. Linn. Soc. 28: 88, 1871; Merr., Publ. Bur. Sc. Gov. Lab. 29: 37, 1905; Philip. J. Sc. Suppl. 1: 107, 1906; *Ibid.*, 2(Bot.): 286, 1907; En. Philip. 3: 193, 1923; Regalado, *Blumea* 40(1): 150, 1995. – *M. bolsteri* Merr., Philip. J. Sc. Suppl. 1: 214, 1906. – *M. versicolor* Elm., Leaflet. Philip. Bot. 4: 1214, 1911. – *M. acuminata* Merr., Philip. J. Sc. 8(Bot.): 238, 1913. – *M. negrito* Elm., Leaflet. Philip. Bot. 9: 3203, 1934.

Shrubs 2-3 m high. Leaves elliptically oblong or ovately so, 18 x 9 cm, midrib with 2 or 3 pairs of nerves from below midrib with conspicuous cross bars; apex acute to sharply acuminate, base rounded or obtuse; petioles 2-5 cm, long. Inflorescences terminal, sparsely flowered, 1- to 3-stalked, larger ones sometimes short-rebranched, somewhat flattened in early state, chocolate-brown-pulverulent; flowers pale red or purple, pedicelled, usually 3, terminal from each stalk with blunt caducous bracts, calyx toothed; petals twice as long as calyx, imbricately twisted in bud. Fruits globose, 5-6 mm across, bright red to purple, turning black when ripe, with truncate circle at top; stalks terete, 5-7 mm long.

Endemic. Philippines: northern to central Luzon, Mindoro and southern Mindanao, in damp forests at 800-1000 m; in Mt. Makiling, Luzon, at the cloud-belt forest.

Com. name – *Tiualos* (Bag.).

Exsicc. – Elmer 17946, 1237453, 17832, 1237365; Serviñas BS 169908, 900665(US).

8. ***Medinilla ramiflora*** Merr., Publ. Gov. Lab. Philip. 29: 35, 1905; En. Philip. 3: 203, 1923; Bakh. f., Rec. Trav. Bot. Neerl. 40: 195, 1943-45; Veldkamp, *Blumea* 24: 452, 1978; Regalado, *Blumea* 40(1): 169, 1995. – *M. weberi* Merr., Philip. J. Sc. 8 (Bot.): 235, 1913.

Shrubs epiphytic. Leaves ovately oblong to elliptic, 6 x 3 cm or much smaller, subtriplinerved, caudately acuminate with blunt tips, base sessile, obtuse to broadly rounded. Flowers in dense clusters from axils of leaf scars below foliage, glabrous, pale purplish to whitish; pedicels 5-8 mm long, subtended by numerous, short-brown, persistent bracts; calyx campanulate, bluntly toothed rim broader; corolla imbricately twisted, sharply pointed in bud, petals oblanceolate, acutely or apiculately pointed. Fruits subglobose, 5-7 mm in diameter, vermilion to red, turning dark purple when ripe.

Endemic. Throughout the Philippines, in mossy forests at 1000-2200 m; in Mt. Makiling, Luzon, in the humid rainforests.

Com. name – *Balangbang* (lg.).

Exsicc. – *Pancho CA 20139* (CAHP).

9. *Medinilla myrtiformis* (Naud.) Triana, Trans. Linn. Soc. 86, 1871; Merr., Publ. Bur. Sc. Gov. Lab. 29: 36, 1905; Philip. J. Sc. 2(Bot.): 286, 1907; En. Philip. 3: 201, 1923; Bakh. f., Rec. Trav. Bot. Neerl. 40: 196, 1943-45; Veldkamp, Blumea 24: 451, 1978; Regalado, Blumea 40(1): 167, f. 13, 1995. – *Anplectrum myrtiforme* Naud., Ann. Sc. Nat. Bot. III, 15: 305, t. 15, f. 2, 1850. – *M. monantha* Merr., Philip. J. Sc. 3(Bot.): 152, 1908; Veldk., Blumea 24: 451, 1978. – *M. cardiophylla* Merr., Philip. J. Sc. 5(Bot.): 206, 1910. – *M. bulusanensis* Elm., Leafl. Philip. Bot. 10: 3661, 1939, *nom. inval.*

Shrubs epiphytic. Leaves ovately oblong to elliptic, 7 x 3 cm, 3 conspicuous nerves depressed on upper side, glabrous, acuminate, base obtuse to broadly rounded and shallowly cordate, shortly petioled or sessile. Peduncles solitary, ascending, axillary, 1-2.5 cm in length, slender, glabrous, bibracteate at distal end with few-flowered cymes; pedicels 7.5 mm long, acutely bibracteate at middle; calyx glabrous, sharply toothed, longitudinally rugose; petals bluish, purple, twice as long as pedicels, asymmetric, pointed at apex; stamens shorter than corolla, violaceous. Fruits globose, 5 mm across, pink, wine-red to purplish black when fully ripe; stalks 6 mm long.

Sulawesi and Moluccas. Throughout the Philippines, in mossy forests at 600-1800 m altitudes; in Mt. Makiling, Luzon, in the humid rainforests.

Com. name – *Yodanon* (Mbo.).

Exsicc. – *Gates CA 2028*; *Hernaez CA 12398, 12399*; *Lantican CA 13584, 13585, 13506* (CAHP); *Serviñas BS 16917, 900673*; *Loher 6268, 713628*; *Elmer 18431, 1237761, 17602, 1237256*; *Merrill BS 419, 5234, 71056, 1157256* (US).

10. *Medinilla quadrifolia* (Bl.) Bl., Flora 14, 509, 1831; Bakh. f., Rec. Trav. Bot. Neerl. 40: 161, 1943; Furtado, Gard. Bull. Sing. 20: 118, 1963; Maxw., Gard. Bull. Sing. 31: 169, 1978; Regalado, Blumea 40(1): 157, f. 12, 1995. – *M. mindanaensis* Merr., Publ. Bur. Sc. Gov. Lab. 29: 34, 1905. – *M. verticillata* Merr., Publ. Bur. Sc. Gov. Lab. 29: 34, 1905. – *M. bagobo* Elm., Leafl. Philip. Bot. 4: 1212, 1911. – *M. doudecandra* Merr., Philip. J. Sc. 8(Bot.): 229, 1913. – *M. mirandae* Merr., Philip. J. Sc. 8(Bot.): 231, 1913. – *M. subumbellata* Merr., Philip. J. Sc. 8(Bot.): 232, 1913. – *M. affinis* Merr., Philip. J. Sc. 10(Bot.): 281, 1915. – *M. trianae* Merr., Philip. J. Sc. 12(Bot.): 352, 1917; En. Philip. 3: 205, 1923. – *M. pachyphylla* Elm., Leafl. Philip. Bot. 10: 3665, 1939, *nom. inval.*

Tree climbers large, woody. Leaves primarily at ends of branchlets in verticels, usually unequal in same whorl or obovately oblong, 12 x 5 cm long, midrib prominent with solitary basal pair of nerves, rounded at apex with short, blunt point, base bluntly obtuse to sub-attenuate; petioles 1-2 cm long; flowers 4-merous, cymosely clustered from axils of fallen leaves, smooth, shiny rose-red or pink, 2-5 cm long, larger peduncles cymosely rebranched above middle; calyx stipitate, cylindric, otherwise, truncate; petals 1.5 cm long, clawed at base. Fruits subglobose, 8-13 mm across, green turning wine-red when ripe, terminated by narrowed calyx rim; stalks stout, 5-7 mm long.

Endemic. Philippines: Luzon (Laguna and Rizal); in primary forests at low and medium altitudes; in Mt. Makiling, Luzon, at 250-600 m.

Com. name – *Triana's kapa-kapa* (Tag.).

Exsicc. – *Villamil CA 2030* (CAHP), *BF 29593, 900704*; *Brown BS 22224, 1264869* (US).

11. *Medinilla merrittii* Merr., Philip. J. Sc. 2 (Bot.): 286, 1907; En. Philip. 3: 199, 1923; Regalado, Blumea 40(1): 166, 1995. – *M. megacarpa* Merr., Philip. J. Sc. 8(Bot.): 237, 1913. – *M. piperoides* Elm., Leaflet. Philip. Bot. 10: 3668, 1939, *nom. inval.*

Tree climbers small, coarse. Leaves rotund to elliptic, 15 x 9 cm, often much smaller, 5- to 7-veined, cross bars prominent beneath, glabrous, shiny green above, curing dark brown beneath, apex terminated by short point, broadly rounded at base; petioles 2-3 cm long. Flowers 5-merous, lateral, or from axil of leaf scars, 2-4 cm long, cymosely clustered toward top or above middle, dark brown when dry, finely pulverulent; calyx stipitate, bracteate, leathery, campanulate, truncate, 1 cm long; petals widely ovate, 10-12 x 6-8 mm, whitish, tinged with red. Fruits ovoid, subglobose to cup-shaped, 10-15 mm in diameter, pink to red when ripe, rimmed at apex; stalks stout, 15-20 mm long.

Endemic. Philippines: southern Luzon (Laguna, Mindoro, Camarines, Catanduanes), Leyte and Mindanao; in forests at 900-1600 m altitude; in Mt. Makiling, Luzon, at 250-600 m altitude.

Com. name – *Merritt's kapa-kapa* (Tag.).

Exsicc. – *Elmer 17704, 1237272*; *McGregor BS 23012, 1238988* (US).

119. RHIZOPHORACEAE

Trees or erect shrubs. Leaves opposite or distichous, simple, thickly coriaceous, entire, glabrous; stipules interpetiolar, caducous. Flowers bisexual, rarely unisexual or polygamous, axillary, solitary or fascicled or in depauperate cymes with cupular bracts at base or ebracteolate; calyx more or less adnate to ovary, limb produced above into 3-16 lobes, valvate, persistent; petals as many as calyx segments, entire, notched, cleft or lacerate; stamens twice the number of petals surrounding disk; anthers 2-celled, seldom many-locellate; ovaries inferior, rarely semi-inferior or superior, 2- to 12-celled, rarely 1-celled by suppression of septum; styles solitary; ovules 1-6, mostly 2 in each cell, borne at apex or inner angle of ovary cell. Fruits coriaceous, usually indehiscent; seeds 1-7.

Genera 16, species 120; in all tropical countries; 6 genera and 16 species in the Philippines.

1. Young branches solid; flowers sessile, cymosely clustered, upon short, axillary stalks 1. *Carallia*
1. Young branches hollow; flowers pedicelled, fascicled along branches 2. *Pellacalyx*

1. **CARALLIA** A. Roxburgh, *nom. cons.*

Trees or shrubs, occasionally with stilt roots. Twigs solid. Leaves ovate or elliptic. Peduncles short, rather thick, axillary; flowers small, in short trichotomously branched cymes, sessile, often crowded; calyx minutely bracteate at base, produced into a short tube beyond ovary, acutely 5- to 9-lobed; petals as many, unguiculate, inserted upon crenulate disc lining calyx tube, clawed, orbicular, bifid, entire, subserrate or even lacerate at apex; stamens inserted in incisions of disc; filaments filiform; anthers small, oblong; ovaries inferior, usually 3- to 5- (-8)-celled with 2 ovules in each cell or 1-celled with 10-12 ovules; styles subulate-filiform; stigmas broad 3- to 5-lobed. Fruits small, berry-like, 1- to 5-seeded.

Species 10; in Madagascar, Sri Lanka, India, southeastern Asia, throughout Malesia to northern Australia and Melanesia; 1 in the Philippines.

1. *Carallia brachiata* (Lour.) Merr., Philip. J. Sc. 15: 249, 1919; En. Philip. 3: 146, 1923; Ding Hou, Fl. Mal. I, 5: 485, f.31, 32, 1958. – *Diatoma brachiata* Lour., Fl. Cochinch. 296, 1790. – *Carallia integerrima* DC., Prodr. 3: 33, 1828. **Figure 157**

Trees erect, medium-sized. Leaves mainly terminal, 4-10 cm, midrib pronounced beneath, with obscure lateral nerves, obtusely rounded or merely acute, base broadly cuneate, shortly petioled. Cymes from either leaf or leaf scar axils, shortly branched; peduncles 1 cm long. Flowers yellowish,

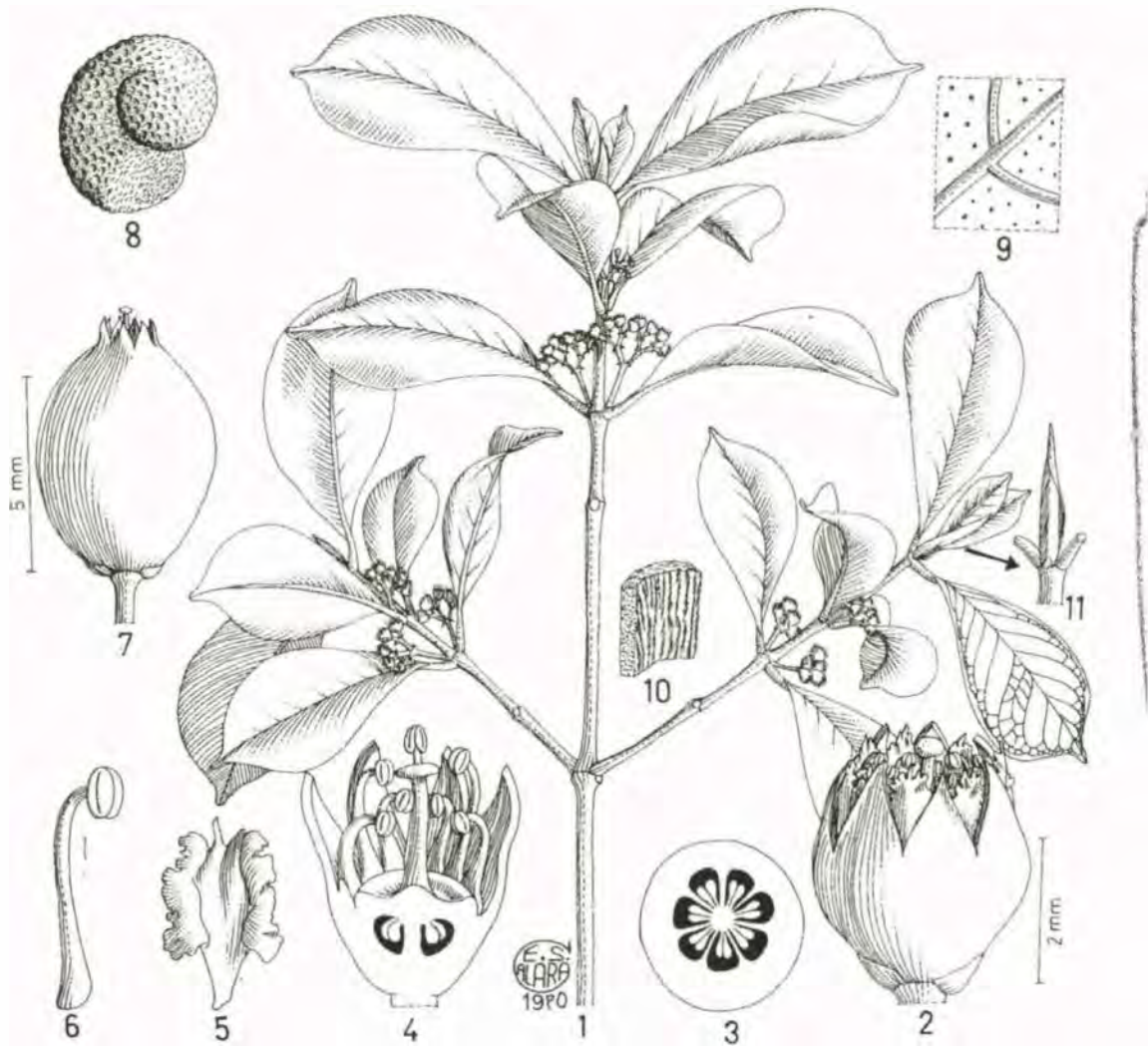


Figure 157. *Carallia brachiata*: 1. flowering branch; 2. flower; 3. ovary, cross section; 4. flower, vertical section, petals removed; 5. petal; 6. stamen; 7. fruit; 8. seed; 9. undersurface of leaf with black dots; 10. bark; 11. branch tip with bracteoles.

green, thick branches or pedicels subtended by short bracts, more or less glomerate, rigid, glutinous; calyx campanulate, usually terminated by 8 acuminate teeth; petals scarcely longer than calyx, obscurely fimbriate at broadened apex, not embracing stamens. Fruits fleshy, subglobose, 5-8 mm long, soft and dark wine-red when mature, mostly 1-seeded.

Madagascar to India, southern China, Malesia and northern Australia to the Solomon Islands. Throughout the Philippines, in secondary forests at low and medium altitudes; in Mt. Makiling, Luzon, in second-growth forests up to 350 m.

Com. name – *Bakauan-gubat* (Mang.).

Exsicc. – *Gates CA 1968; Villena CA 1969; Cadiz CA 1970** (CAHP); *Rivera 33489* (PNH), *2212547* (US); *Bañaga 33397* (PNH), *2212452* (US); *Lazo 33411* (PNH), *2212465* (US); *Rañeses 33441* (PNH), *2212492* (US).

2. PELLACALYX Korthals

Trees or shrubs. Young branches hollow. Leaves glabrous or ferruginously pubescent beneath, subentire or entire, oblong. Flowers stalked, axillary, solitary or few-fascicled, sometimes in dichotomously branched glomerules; calyx thick, ebracteolate, jug-shaped, drawn out from a tube above ovary, limb minutely 3- to 8-fid; petals 2-6, small, lacerated or wanting; stamens inserted on margin of crenulate disc lining calyx tube; filaments short, subulate, bearing small anthers; ovaries inferior, 6- to 10-celled, with many ovules to each cell; styles subulate; stigmas discoid-lobed. Fruits berry-like, pisiform to turbinate, fleshy, 5- to 10-celled, with many small seeds.

Species 8; Burma, Thailand, southern China, Sumatra, Malay Peninsula, Borneo and Celebes; 2 in the Philippines.

1. *Pellacalyx pustulata* Merr., Publ. Gov. Lab. Philip. 35: 47, 1905; En. Philip. 3: 148, 1923; Ding Hou, Fl. Mal. I., 5: 492, 1958.

Trees erect, low with spreading crown. Leaves usually a trifle wider above middle, 10-15 x 5.5 cm, conspicuous midrib with 5-8 pairs of faint, ascendingly curved nerves, pustulate beneath, rounded with short, blunt apex, base obtuse to rounded; petioles 1 cm long or shorter. Flowers in small fascicles, mainly from axils of leaf scars, subtended by acuminate, brown-puberulous, caducous bracts, greenish; pedicels as long as petioles; calyx campanulate, segments 5-valvate, ultimately spreading, acute, velvety-gray on upper side; petals 5, recurved between calyx teeth; stamens equal; ovaries 5-celled. Fruits ovoid, succulent, 2 cm long, terminated by erect calyx crown, greenish white.

Northern Celebes. Throughout the Philippines, in forests at low elevations, especially along watercourses; in Mt. Makiling, Luzon, mostly along Molawin Creek.

Com. name – *Mamatog* (Tag.)
 Exsicc. – *Villamil CA 1971* (CAHP).

120. COMBRETACEAE

Trees, shrubs or woody vines. Leaves mostly opposite, verticillate or attenuate, estipulate. Flowers regular or slightly zygomorphic, bracteolate at base, in racemes or spikes, sometimes capitate, bisexual or rarely unisexual; limbs of calyx 4-5, rarely more; petals 4 or 5 or wanting, often small, valvate or imbricate in bud; stamens as many or twice as many as calyx segments, in 2 series, inserted on calyx; anthers connective thick, often apiculate; ovaries inferior, 1-celled, mostly angular, ovules curved, usually few or 2 or 5, pendulous from apex of each cell of which only 1 usually develops; styles thread-like, solitary; stigmas entire, pointed; disc adnate to basal calyx tube, upper portion densely hairy. Fruits coriaceous or drupe-like, generally indehiscent, ovoid to ellipsoid, angular or compressed, longitudinally winged or keeled, occasionally crowned by persistent calyx, 1-seeded, without albumen.

Genera 18, species 450, of wide tropical distribution; 4 genera and 21 species in the Philippines.

- 1. Large or medium-sized trees; apetalous 1. *Terminalia*
- 1. Scandent or sprawling shrubs; petalous
 - 2. Calyx tube slenderly tubular; flowers reddish tinged 2. *Quisqualis*
 - 2. Calyx tube turbinate; flowers yellowish green 3. *Combretum*

1. TERMINALIA Linnaeus, *nom. cons.*

Trees large. Leaves alternate or subopposite, entire or slightly crenate, often crowded towards ends of branchlets, frequently with 2 or more glands at or near base of lamina or on petioles. Flowers small, in racemose spikes or few-branched panicles, bisexual or upper flowers staminate, subtended by deciduous narrow bracts; calyx tube produced above ovary into a limb, terminated by 5 triangular, deciduous teeth; petal none; stamens 10, 5 lower ones opposite calyx lobes alternating with 5 larger ones; disc hairy; ovules 2, rarely 3. Fruits ovoid, fleshy and drupe-like, sometimes dry, leathery or corky, often 2- to 5-winged.

Species 200; generally in the tropics, but chiefly in Africa, extending to northern Australia, Polynesia and tropical America; 14 in the Philippines.

- 1. Fruits broadly winged 1. *T. calamansanai*
- 1. Fruits compressed with sharp edges or ellipsoid

- 2. Fruits compressed with sharp edges
 - 3. Leaves oblanceolate; fruits 1.5 cm long 2. *T. microcarpa*
 - 3. Leaves obovate; fruits 3-6 cm long 3. *T. catappa*
- 2. Fruits ellipsoid or longitudinally ridged (in *T. citrina* when dried)
 - 4. Leaves oblong to broadly lanceolate, tessellate beneath 4. *T. citrina*
 - 4. Leaves obovate, not tessellate beneath
 - 5. Leaves obscurely pellucid-dotted above; leaf scars very dense; fruits 3 cm or less long 5. *T. pellucida*
 - 5. Leaves without pellucid dots; leaf scars not as above; fruits 3 cm or more long
 - 6. Fruits ovoidly pointed; spikes glabrous 6. *T. nitens*
 - 6. Fruits ellipsoid; spikes ferruginous 7. *T. foetidissima*

1. ***Terminalia calamansanai*** (Blco.) Rolfe, J. Linn. Soc. Bot. 21: 310, 1884; Exell, Fl. Mal. I, 4: 556, fig. 11, 1954. – *Gimbarnatea calamansanai* Blco., Fl. Filip. ed. 2, 266, 1845.

Trees medium-sized or large. Leaves alternately crowded at ends of twigs, leaving scars after falling off, obovately oblong to sub-oblong. 9-14 x 4-6 cm, lucid on upper surface, lower slightly pubescent when young, subglabrous when old, conspicuous midrib with 5-8 pairs of nerves, abruptly but sharply acute, base obtuse or cuneate; petioles 1.5 cm long, glabrous. Spikes equaling foliage, axillary, tawny-pubescent; flowers yellowish green, brown-woolly, subsessile, becoming easily detached. Fruits dry, indehiscent, fulvous-puberulent seed portion with 2 oppositely spreading, rounded wings, 1-2 x 2-4 cm.

Burma, Indochina, Thailand, Borneo, Celebes and New Guinea. Throughout the Philippines, in woods at nearly sea level; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Malakalumpit* (Tag.).

Exsicc. – *Pancho CA 20131* (CAHP).

2. ***Terminalia microcarpa*** Decne., Nouv. Ann. Mus. Hist. Nat. Paris 3: 457, 1834; Exell, Fl. Mal. I, 4: 562, 1954. – *T. edulis* Blco., Fl. Filip. ed. 2, 265, 1845; Merr., En. Philip. 3: 151, 1923.

Trees medium-sized to large, more or less deciduous. Leaves alternate, terminally crowded, ovately oblong or broadly oblanceolate, 8-10 x 3-4 cm, shiny above, lower side soft-pubescent when young, minutely punctuate, glabrous when old, acute, base obtusely elongated or subcuneate; petioles 2 cm long, brown-pubescent. Spikes ascending, axillary, equaling foliage, fulvous-pubescent; flowers greenish yellow, sessile; calyx swollen toward base, throat

with long dense hairs; stamens much-exserted; filaments slender; anthers small, oval. Fruits compressed, short-elliptic from side or pointed at apex, 1.5 cm long, sessile, heavy, stone-like, glabrous, sharply 2-edged especially in dry state, skin candy-red, usually with faint, glaucous bloom.

Throughout Malesia except the Malay Peninsula and perhaps Sumatra. Throughout the Philippines, in primary forests at low altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Kalumpit* (Tag., Sbl.).

Exsicc. – *Pancho CA 3202; Velasco CA 1985; Villamil CA 1948* (CAHP).

3. *Terminalia catappa* L., Syst. Nat. ed. 12, 2: 674, 1767; Merr., En. Philip. 3: 150, 1923; Exell, Fl. Mal. I, 4: 566, fig. 17-28, 1954.

Trees medium-sized to large. Leaves obovate or obovately elongate, coriaceous, young ones minutely punctate beneath, pellucid on upper darker green side, stout midrib keeled beneath with 7-10 pairs of nerves, rounded at apex, base broadly cuneate, often somewhat rounded; petioles short, thick. Spikes slender, usually shorter than foliage, axillary, spreading, glabrous; flowers falling off early, small, whitish, staminate short-pedicelled; calyx campanulate, 5-toothed, glabrous except hairy throat; stamens twice as long as calyx. Fruits compressed, elliptic from side, up to 3 x 6 cm, hard, heavy, sharply 2-edged, obscurely pointed especially at apex, smooth, sessile.

Tropical Asia, Malesia, northern Australia and Polynesia. Throughout the Philippines, chiefly along seacoasts and mouths of large rivers or in low country areas, at or near the sea; seedlings are sold in commercial nurseries for landscaping purposes.

Com. name – *Talisai* (Bag., Bik., Bis., Pamp., Sbl., Tag.).

Exsicc. – *Orlido CA 10353, 10355, 10356, 10358, 10647; Pancho CA 10098* (CAHP).

4. *Terminalia citrina* (Gaertn.) Roxb. ex Flem., As. Res. 11: 183, 1810; Exell, Fl. Mal. I, 4: 550, f. 14, 15, 1954. – *Myrobalanus citrina* Gaertn., Fruct. 2: 91, t. 27, f. n-s, 1791. – *Terminalia chebula* (non Retz.) Bl., Bidjr. 643, 1826. – *T. comintana* (Blco.) Merr., Philip. J. Sc. 4 (Bot.): 300, 1909; En. Philip. 3: 150, 1923. – *Bucida comintana* Blco., Fl. Filip. 856, 1837.

Figure 158

Trees large. Leaves alternate or sub-opposite, oblong to broadly lanceolate, 3-14 x 2-6 cm, minutely punctate above, tessellate beneath, midrib ridged below, with 6-9 pairs of ascendingly curved nerves, gradually acuminate, base obtuse or rounded; petioles 1-3 cm long. Inflorescences terminal or from uppermost



Figure 158. *Terminalia citrina*: 1. flowering branch; 2. portion of stem with stipules and lateral glands at base of lamina; 3. lower surface of leaf showing venation; 4. flower; 5. flower, vertical section; 6. fruit; 7. fruit, cross section.

leaf axils, short-fulvous-pubescent, exceeded by foliage, paniculately branched from middle; flowers caducous, small, branched, yellowish white; calyx broadly cup-shaped, glabrous but woolly on interior, bluntly toothed; pseudostalk thickened, pubescent, subtended in bud by acuminate bracts; stamens spreadingly interlaced, glabrous except basal portion of filaments. Fruits yellow, sessile, subellipsoid, 2.75 cm long, terete, when dry obscurely pointed at apex, longitudinally ridged.

India, Burma, Indochina, Thailand to Malesia. Throughout the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, a single tree on the College of Agriculture campus.

Com. name – *Bingas* (Tag.).

Exsicc. – *Barroga* CA 4939; *Blancaver* CA 4767; *Fortunado* CA 1982; *Pancho & Hilario* CA 8811*; *Velasco* CA 3417; *Villamil* CA 1938 (CAHP); *Sulit* 22885 (PNH), 2188109 (US).

5. *Terminalia pellucida* Presl, Abh. Kon. Bohm. Ges. Wiss. M.-N. Cl. V. 6: 574, 1851; Merr., En. Philip. 3: 152, 1923; Exell, Fl. Mal. I, 4: 575, f. 22, 38, 1954. – *T. iwahigensis* Elm., Leafl. Philip. Bot. 5: 1760, 1913.

Trees large, deciduous. Leaves spirally arranged and crowded toward end branchlets, obovate, 8-12 x 5 cm, midrib prominent beneath with 5-8 pairs of ascending nerves, obscurely pellucid on upper surface, broadly rounded at apex, base cuneate, petioles 5-15 mm long, puberulent. Spikes glabrous, usually shorter than leaves, ascending, subterminal or axillary; flowers dingy white or yellowish, caducous, upon subcompressed, glabrous stipes; calyx shallow, cup-shaped, acutely toothed, caducous, thick, glabrous except inner side with dense pale brown hairs; filaments twice as long as calyx, glabrous except toward base. Fruits ellipsoid, 3 cm long, greenish, sessile, heavy and hard, smooth, terminated by a mucro.

Endemic. Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Dalinsi* (Tag.).

Exsicc. – *Villamil* CA 1987 (CAHP).

6. *Terminalia nitens* Presl, Abh. Kon. Bohm. Ges. Wiss. M.-N. Cl. V. 6: 574, 1851; Merr., En. Philip. 3: 152, 1923; Exell, Fl. Mal. I, 4: 574, f. 22, 35, 1954. – *T. merrillii* Elm., Leafl. Philip. Bot. 7: 2581, 1915.

Trees subdeciduous. Leaves mainly toward ends of branchlets, obovate to obovately oblong, 10-15 x 5-7 cm, midrib ridged beneath with 5-10 pairs of ascendingly curved nerves, broadly rounded at apex, base cuneately extended into 5-15 mm long, glabrous to subglabrous petioles. Spikes glabrate, equaling

exceeding foliage, erect or nearly so, subterminal, few to several; flowers dingy white or yellowish, easily falling off; stipes short, swollen, bract-subtended in early state; calyx broad, cup-shaped, thick, bluntly 5-toothed, inside covered with shaggy hairs; anthers versatile, obscurely pointed at apex; filaments glabrous. Fruits fusiformly ellipsoid, hard, heavy, abruptly yet prominently pointed, greenish.

Endemic. Philippines: Luzon to Palawan and Mindanao; in forests at low altitudes; in Mt. Makiling, Luzon, mostly in the lowlands.

Com. name – *Sakat* (Pamp., Tag.).

Exsicc. – *Villamil CA 1986* (CAHP); *Elmer 18410, 1237751* (US).

7. *Terminalia foetidissima* Griff., Not. Pl. As. 4: 685, 1854; Exell, Fl. Mal. I, 4: 577, f. 22 (41), 25, 1954. – *T. oocarpa* Merr., Publ. Gov. Lab. Philip. 17: 32, 1904 ('*ovocarpa*'); En. Philip. 3: 152, 1923.

Trees large, buttressed. Leaves terminally crowded, obovate, 10-15 x 5-7 cm, midrib pronounced with 7-10 pairs of nerves, broadly rounded at apex, base cuneate; petioles 1 cm long or more. Spikes mainly terminal, brown-pubescent, equaling foliage; flowers yellowish white, staminate upon slender pedicels, toothed segments acute, throat villous, deciduous; filaments slender, hairy toward base, intermixed; anthers short, apiculate. Fruits hard, pale green, ellipsoid, up to 5 cm long.

Burma, Thailand, Malay Peninsula, Sumatra and Borneo. Throughout the Philippines, in forests at low altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Talisai-gubat* (Tag.).

Exsicc. – *Elmer 18058, 1237532* (US).

2. *QUISQUALIS* Linnaeus

Tree climbers woody, occasionally with short, thorn-like branchlets. Leaves acuminate, oblong or obovate, entire. Flowers bisexual, large, in short, axillary or terminal spikes usually bracteate, white or red, elongated; calyx tube slender, much-prolonged above ovary, deciduous, its limb 5-lobed; petals 5, imbricately twisted to the right in bud; stamens 10, short; styles filiform, adherent to calyx-tube; stigmas subcapitate; ovaries often 6-angled, 1-celled; ovules 2-4, pendulous from apex of each cell, upon strands with papillose inner connate side. Fruits dry, coriaceous, 5-angled or winged, sub-indehiscent or opening along edges at apex; seeds solitary, longitudinally sulcate.

Species 17, in tropical Asia and Africa; 1 in the Philippines.

1. *Quisqualis indica* L., Sp. Pl. ed. 2, 1: 556, 1762; Merr., En. Philip. 3: 154, 1923; Exell, Fl. Mal. I, 4: 547, f. 8, 1954.

Shrubs rambling or scandent with rusty-pubescent twigs when young. Leaves 5-10 x 2-9 cm, softly pubescent beneath when young, glabrous when old, stout midrib with 5-8 pairs of ascendingly curved nerves, acute to acuminate, base rounded; petioles 1 cm long, hairy. Inflorescences terminal from uppermost leaf axils, fulvous spikes subtended by reduced leaves, sometimes large and profuse; flowers subtended by broadened bracts, fragrant; petals oblong, 10-15 cm in length. Fruits narrowly ellipsoid, 2.75 cm long, dry, light, sharply 5-winged longitudinally.

Throughout the tropics of the Old World. Throughout the Philippines, in hot, dry gulches of *parang* formation; frequently cultivated as an ornamental woody vine; in Mt. Makiling, Luzon, mostly in the lowlands, common.

Com. names – *Tangulo* (Bik.); *Niog-niogan* (Tag.).

Exsicc. – *Catalan* CA 1978; *Estioko, Jr.* CA 1977; *Gates* CA 1979, 1981; *Hernaez* CA 12468; *Orlido* CA 10352, 10354; *Sevilla* CA 3421 (CAHP); *Sulit* 34706 (PNH), 2244131 (US).

3. COMBRETUM Loeffling, *nom. cons.*

Trees, shrubs or woody climbers. Leaves entire, opposite, seldom alternate or ternate, petioled. Flowers usually in paniced racemes or spikes, bisexual, rarely unisexual, terminal or lateral; calyx tube constricted above ovary, becoming expanded and ovoid, funnel-shaped or tubular, slender below limb, 4- or 5-toothed, deciduous; petals 4 or 5, rarely wanting, upon calyx limb and alternating with calyx segments, usually small, glabrous or pubescent; stamens twice as many as petals; disc basal, adnate to calyx, often terminating in hairy ring; ovaries with 2-5 ovules; styles subulate. Fruits with 4 or 5 wings, generally indehiscent, 1-seeded.

Species 250, in the tropics (except Australia) of both hemispheres; 4 in the Philippines.

1. *Combretum punctatum* Bl. subsp. *squamosum* (Roxb. ex Don) Exell, Fl. Mal. I, 4: 539, 1954. – *C. squamosum* Roxb. (Hort. Beng. 88, 1814, *nom. nud.*) ex Don, Trans. Linn. Soc. 15: 419, 438, 1827. – *C. distillatorium* Blco., Fl. Filip. 295, 1837; Merr., En. Philip. 3: 149, 1923. – *C. laxum* Blco., *op. cit.*, ed. 2, 206, 1845 *non* Aubl.

Tree climbers woody. Leaves elliptic or ovately elliptic, 5-10 cm long, ridged midrib with 5-8 pairs of nerves, abruptly acute, base rounded; petioles 1 cm long, densely lepidote. Inflorescences mostly terminal or from uppermost

axils, seldom lateral, sometimes much-elongated, profuse, spicate racemes usually shorter than leaves, lower ones subtended by leaf-like bracts; flowers yellowish white to green, basal pedicel-like portion angular, subtended by subulate, caducous bracts, expanded portions turbinate, hairy within, bluntly toothed; petals minute; stamens much-exserted. Fruits 2.25 cm long, broadly and equally 4-winged, elliptic from side, light brown when dry.

India to Malaya. Throughout the Philippines, in thickets and secondary forests at low altitudes.

Com. names – *Malatumbaga*, *Tagarau* (Tag.).

Exsicc. – *Gruèzo WM24004* (CAHP).

121. ONAGRACEAE

Herbs, shrubs or trees annual or perennial erect, prostrate or creeping, occasionally scandent, sometimes suffrutescent, almost exclusively inermous, sometimes subaquatic or floating, without milky latex. Leaves spirally arranged, opposite or alternate, verticillate, rarely in rosettes, simple, entire to pinnatifid, pinninerved; stipules minute or absent. Flowers basically axillary or (by reduction) pseudoterminal, mostly solitary or less common in racemes, spikes, panicles or fascicles, actinomorphic or subzygomorphic, usually 4- or sometimes 5-merous, perfect or polygamous, bracteolate or ebracteolate. Calyx tube adnate to ovary, limb 2- to 5-lobed. Petals mostly 4-5, rarely 2 or 0, sessile or clawed, valvate, nearly imbricate. Stamens inserted on or near rim of perianth limb, 4, 8-12, rarely 1 or 2, mostly as many or twice as many as petals, filaments equal or unequal; anthers 2-celled or falsely more-celled by cross-plates. Stigma clavate or capitate, often 4-lobed or 4-fid; styles simple. Ovary inferior, usually 4-celled, but from 1- to 6-celled; ovules many in each cell. Fruits a berry, a loculicidal or septicidal capsule dehiscing by 4-8 valves; a nutlet or coriaceous-woody and indehiscent; seeds 1-4 or numerous, comose, alate or exalate, small.

About 20 genera and 600 species, nearly all throughout the world (*i.e.*, nearly cosmopolitan).

1. LUDWIGIA Linnaeus

Herbs erect, simple, branched with alternate, nearly or quite entire leaves. Flowers small, yellow, axillary, sessile or nearly so; pedicels 2-bracteolate. Calyx tube linear, lobes 3-5, persistent. Petals 3-5. Stamens inserted with and as many as petals. Ovary inferior, 4- to 5-celled; ovules numerous. Capsules oblong or linear, opening by terminal pores or breaking up irregularly.

Species about 75, mostly in North America; 23 widely distributed in the tropics of the Old World; 6 in the Philippines.

1. Seeds embedded in endocarp, uniseriate, at least below
 2. Seeds all uniseriate
 3. Capsules 4-angled, 1-1.5 cm long; flowers 4-merous 1. *L. prostrata*
 3. Capsules 8-ribbed, 2-3.5 cm long; flowers 5-merous 2. *L. adscendens*
 2. Seeds in approximately upper one-fourth of capsule, pluriseriate 3. *L. hyssopifolia*
1. Seeds free, not embedded in endocarp, pluriseriate
 4. Capsule with 4 rounded angles; 0.3-2.0 cm long, 2-3 mm thick 4. *L. perennis*
 4. Capsule with 8 ribs, terete, 1.7-4.5 cm long, 2-8 mm thick
 5. Leaves lanceolate or linear, pubescence appressed to densely villous or wanting 5. *L. octovalvis* ssp. *octovalvis*
 5. Leaves lanceolate to subobovate; pubescence spreading, of long erect hairs 6. *L. octovalvis* ssp. *sessiliflora*

1. ***Ludwigia prostrata*** Roxb., Hort. Beng. 11: 1814 (*nomen*), Fl. Ind. 1: 441, 1820; Raven, Reinwardtia 6: 374, f. 7, 28, 1963.

Annual herbs erect or ascending, branched, glabrous. Stems 20-60 cm high, angled. Leaves oblong-lanceolate to lanceolate, narrowed at both ends, acuminate, larger ones 6-8 cm long, few or many smaller ones intermixed. Flowers small, 4-merous, axillary, solitary, sessile; calyx lobes and petals each 2 mm long. Capsules linear, 4-angled, slender, 1-1.5 cm long, 1-1.5 mm thick; seeds in one row in each cell, distinctly showing through cell walls.

India, southern China to Sri Lanka, Borneo, Java and Timor. Throughout the Philippines; in moist places, rice fields, flood plains of rivers, from sea level to 800 m altitude; common weed.

Com. name – *Alubihud* (P. Bis.).

Exsicc. – *Pancho* CA 20028 (CAHP).

2. ***Ludwigia adscendens*** (L.) Hara, J. Jap. Bot. 28: 290, 1953; Raven, Reinwardtia 6: 387, 1963. – *Jussiaea adscendens* L., Mant. 1: 69, 1767. – *J. repens* L., Sp. Pl. 1: 388, 1753, *non* *L. repens* Forster, 1771.

Herbs. Stems floating or ascending, round, rooting at nodes, with spongy white pneumatophores arising in clusters at nodes of floating stems and from roots; plants normally glabrous but branches growing in dry grounds, densely villous and seldom flowering. Leaves distinctly petioled, broadly oblong-elliptic, 2-7 x 0.75-4 cm, narrowly cuneate at base, acute or obtuse at apex. Flowers

borne singly at upper leaf axils, 5-merous; calyx pubescent or sometimes glabrous, deltoid-acuminate; petals creamy white, yellow at base, 10-16 x 6-10 mm; stamens 10, epipetalous ones slightly shorter. Fruits 2-3.5 cm, pubescent, thick-walled, pedicels 2.5-5.5 cm long; seeds uniseriate in each locule, pale brown, 1-1.5 mm long.

South India to Sri Lanka and eastwards to Malesia to Australia. Throughout the Philippines; in pools, ditches, inundated rice fields, often floating in lakes by means of white, spongy aerenchymatous breathing roots formed in whorls at nodes; a common weed.

Com. name – *Sigang-dagat* (Tag.).

Exsicc. – *Hernaez CA 29129, 29130, 29131* (CAHP).

3. *Ludwigia hyssopifolia* (G. Don) Exell, Garcia de Orta 5: 471, 474, 1957.
– *Jussiaea hyssopifolia* G. Don, Gen. Syst. 2: 693, 1832. – *J. linifolia*
Vahl, Ecolog. Am. 2: 32, 1790 *non* *L. linifolia* Poir., 1813. **Figure 159**

Annual herbs, 20-60 cm tall, often persisting and becoming woody at base; young growth and inflorescences minutely puberulent. Stems green or purplish, often 3- or 4-angled. Leaves lanceolate 1-9 x 0.2-3 cm, narrowly cuneate at base, apex acuminate; petioles 2.5-18 mm long. Flowers axillary, solitary, sessile. Petals 4, yellow, fading to orange-yellow, elliptic, 3-5 x 2-3 mm. Stamens 8, epipetalous ones shorter; filaments of episealous stamens 1-2 mm long, those of epipetalous ones 0.5-1 mm. Capsules finely puberulent, 1.5-3 cm long, 1-1.2 mm thick, subterete, enlarged in upper one-sixth to one-third, subsessile; seeds ovoid, 0.4-0.5 mm, pale brown.

Throughout Southeast Asia, in wetlands at low elevations ascending to 500 m, along canals and ponds.

Com. names – *Alubihud* (P. Bis.); *Sigang-dagat* (Tag.).

Exsicc. – *Steenis 1759**; *Brink 217*; *Frau Reusch 800*; *Kanehira & Hatusima 14146*; *Elmer 14320* (BO).

4. *Ludwigia perennis* L., Sp. Pl. 119, 1753; Raven, Reinwardtia 6: 367, 1963.
– *L. parviflora* Roxb., Hort. Beng. 11: 1814 (*nomen*), Fl. Ind. 1: 440, 1820.

Figure 160

Annual herbs erect, branched, glabrous, 10-30 cm high or more. Stems often purplish, terete. Leaves lanceolate, acute, 2-6 mm long, base narrowed. Flowers axillary, solitary, 4-merous, shortly pedicelled. Calyx lobes oblong, acuminate, green, reflexed, about 2 mm long. Petals yellow, oblong-elliptic, 3 mm long, spreading. Capsules oblong, subcylindric, with 4 rounded angles, green or purplish, 0.3-1.9 cm long, 2-3 mm thick; seeds in several rows in each cell, not distinguishable through cell walls.

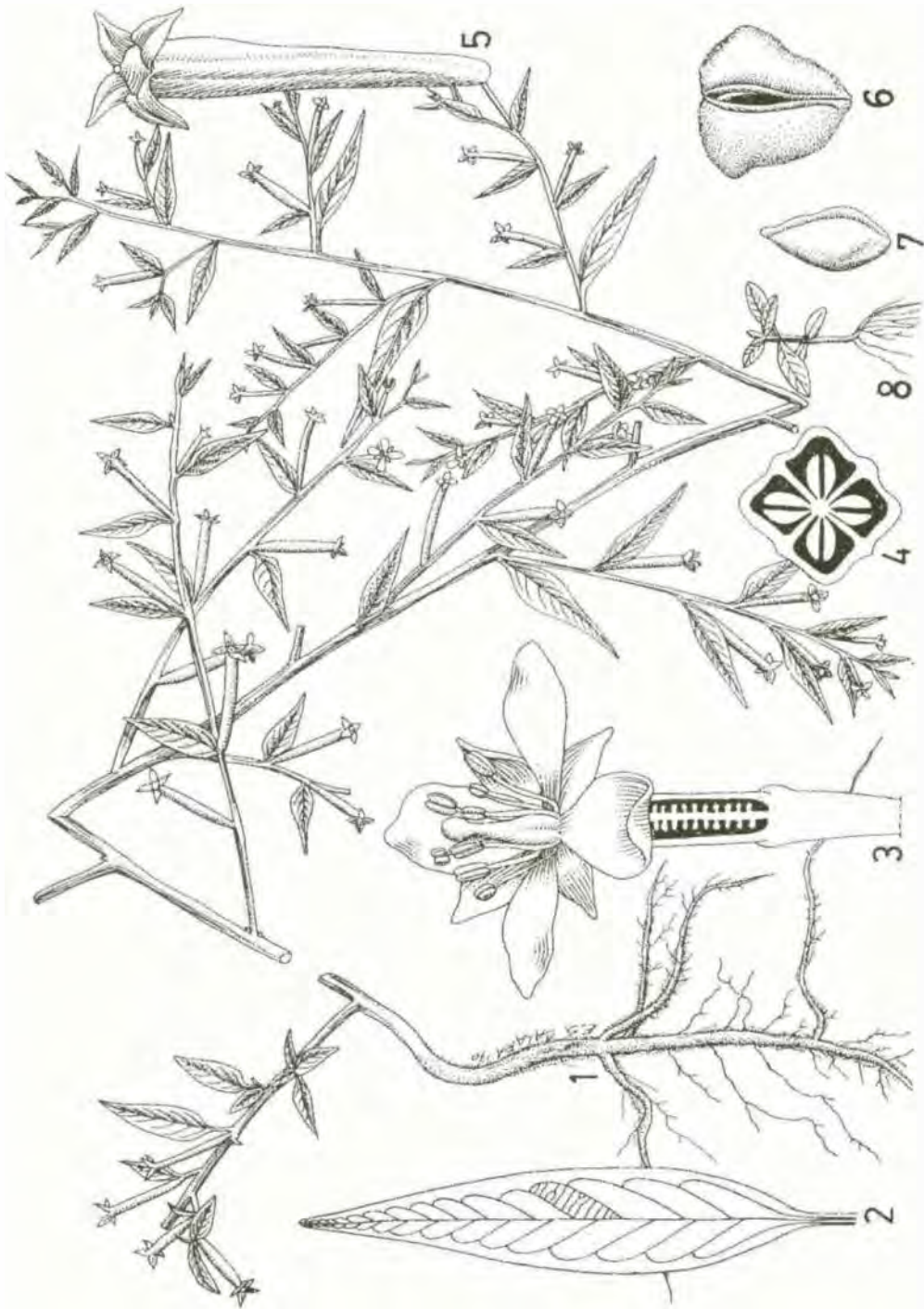


Figure 159. *Ludwigia hyssopifolia*: 1. habit; 2. leaf, enlarged; 3. flower, with ovary excised; 4. ovary, cross section; 5. fruit; 6. seed, embedded in endocarp; 7. seed; 8. seedling.



Figure 160. *Ludwigia perennis*: 1. habit; 2. seedling; 3. flower; 4. capsule; 5. leaf, enlarged; 6. seeds.

Africa to tropical and subtropical Asia, south to Sri Lanka through Malesia, tropical Australia to New Caledonia. Throughout the Philippines, in wetlands and in rice fields, from sea level to 1200 m altitude; a common weed.

Com. name – *Pasau-hapai* (Tag.).

Exsicc. – *Pancho CA 12155**, 12157, 12156, 12158, 12159, 12160, 12161, 12163, 13320 (CAHP).

5. *Ludwigia octovalvis* (Jacq.) Raven, Kew Bull. 15: 476, 1962. – *Jussiaea octovalvis* (Jacq.) Swartz, Obs. Bot. 142, 1791.

ssp. *octovalvis*

Figure 161

Herbs stout, coarse, well-branched, sometimes woody or even shrubby, 0.5-3 m tall, glabrous or appressed-pubescent to densely villous. Leaves lanceolate or linear to narrowly ovate, 3-14 x 0.4-4 cm. Flowers axillary, sessile or nearly so. Sepals 4. Petals 4, yellow, broadly ovate or cuneate, emarginate, 3-17 x 2-7 mm. Stamens 8, epipetalous ones shorter. Capsules thin-walled, 1.7-4.5 cm x 2-8 mm, terete, with 8 ribs, readily and irregularly loculicidal. Seeds pluriseriate in each locule of capsule, free, rounded, 0.6-0.75 x 0.5-0.7 mm, including inflated raphe.

Old World tropics. Throughout Southeast Asia, in moist places, often in areas near cultivation.

Com. name – Water primrose (Engl.).

Exsicc. – *Sindoro 100* (CAHP); *Backer 30179*; *Elmer 14379*; *Lorzing 8088*; *Rant 165* (BO).

6. *Ludwigia octovalvis* (Jacq.) Raven ssp. *sessiliflora* (Mich.) Raven, Reinwardtia 6: 362, 1963. – *Jussiaea suffruticosa* L., Sp. Pl. 1: 388, 1753.

This subspecies differs from ssp. *octovalvis* in the spreading pubescence, at least in the upper parts. Leaves lanceolate to subobovate, 2-10 x 0.8-4 cm.

Throughout Southeast Asia, in damp and swampy places by rivers, streams, lakes and in marshes.

Com. name – *Alubihod* (Tag.).

Exsicc. – *Pancho CA 2195* (CAHP); *Polak 2085*; *Anang 482*; *Henderson 22871*; *Ward 37567*; *Gatchalian 15525* (BO).



Figure 161. *Ludwigia octovalvis* ssp. *octovalvis*: 1. habit; 2. seedling; 3. flower; 4. flower, top view; 5. capsule; 6. leaf, enlarged; 7. seeds.

122. HALORAGACEAE

Herbs or shrubs unarmed, sometimes aquatic, often growing in moist localities. Leaves distichous, spirally arranged, opposite or verticillate, mostly sessile, simple, entire, dentate-serrate or pinnatilobed-pinnatifid; stipules strongly reduced or none. Flowers bisexual or unisexual, solitary or in corymbs or panicles, often very small; calyx tube adnate to ovary, lobes obscure or 2-4, slightly imbricate or valvate; stamens 2-8; anthers basifixed, longitudinally split; ovaries inferior, 1- to 4-locular; styles 2-4; ovules pendulous, as many as styles. Fruits small nuts or drupes, often winged, indehiscent; seeds with endosperm.

Genera 7, species 100; in tropics and temperate regions; 3 genera and 6 species in the Philippines.

1. MYRIOPHYLLUM Linnaeus

Herbs soft, glabrous, often aquatic. Leaves opposite, alternate or verticillate, linear to ovate, entire or toothed, sometimes pinnately lobed, immersed ones often pinnately dissected into filiform segments. Flowers unisexual, small, solitary in axils or in terminal spikes, sessile, staminate uppermost, pistillate below; calyx tube of staminate flowers very short, lobes 4 or rarely 2; petals 2-4; stamens 2-8, filiform; calyx tube of pistillate flowers 4-grooved, lobes obscure or 4, linear, minute; petals minute or absent; ovaries 4-, rarely 2-locular; styles 4, short, pinnate, usually reflexed; ovules solitary in each locule. Drupes 4-grooved or separating into 4 nut-like portions, pericarp coriaceous or slightly fleshy, often tuberculate on back.

Species 40, in the tropics; 1 in the Philippines.

1. *Myriophyllum spicatum* L., Sp. Pl. 2: 992, 1753; Merr., En. Philip. 3: 221, 1923; Pancho & Soerjani, Aq. Weeds 43, f. 26, 7-9, 1978.

Herbs aquatic, monoecious, perennial. Stems sparsely branched, elongated, often 1.5 m long. Leaves verticillate in 4's, sessile, 2-3.5 cm long, pinnately cleft or dissected, segments filiform, entire, aerial leaves green. Inflorescences aerial, spicate, 3-8 cm long, with 4 flowers at each node, bracts narrowly oblong, spreading, 1-1.5 mm long, entire; staminate flowers with 4 petals, 2.5 mm long; stamens 8; anthers 1.5 mm long; calyx tube in pistillate nearly campanulate, 4-grooved, 1 mm long. Fruits globose-ovoid, 2.5 mm long, separating into 4 nut-like fruits, smooth on back.

Widely distributed in warmer and temperate regions of the Old World. Throughout the Philippines, in shallow pools and ditches from sea level to 670 m altitude; a common aquatic weed.

Com. name – Eurasian watermilfoil (Engl.).

Exsicc. – Pancho CA 20565 (CAHP).

123. ALANGIACEAE

Trees or shrubs. Leaves distichous, simple, petiolate, entire or coarsely toothed to lobulate, base often unequal, estipulate. Flowers dichlamydeous, bisexual in axillary cymes or fascicles, jointed to pedicels; calyx tube adherent to ovary, limb entire or toothed; petals 4-10, valvate, ultimately reflexed; stamens as many as petals or twice as numerous, with short, often hairy filaments and long, linear anthers; ovaries inferior, 1- to 2-celled, cells 1-ovuled; style 1; stigmas capitate or clavate, entire or lobed. Fruits baccate, 1-seeded, crowned by slightly enlarged calyx.

Only genus with 22 species in the tropics of the Old World; 6 in the Philippines.

1. **ALANGIUM** Lamarck, *nom. cons.*

Characteristics. (Refer to family description).

- | | |
|---|--------------------------|
| 1. Deciduous tree; fruits ovately-elliptic, 2 cm long | 1. <i>A. longiflorum</i> |
| 1. Evergreen tree; fruits globose or ellipsoid-ovoid, 1-3.5 cm long | |
| 2. Fruits globose, 1 cm long; ovaries 2-celled | 2. <i>A. chinense</i> |
| 2. Fruits ellipsoid-ovoid, 1.75-3.5 cm long; ovaries 1-celled | |
| | 3. <i>A. javanicum</i> |

1. *Alangium longiflorum* Merr., Philip. J. Sc. 7 (Bot.): 319, 1912; Bloembergen, Bull. Jard. Bot. Buitenz. 16: 159, 1939; Blumea 1: 253, f. 1, i, 1935.

Trees dioecious, up to 10 m high. Leaves oblong to obovately oblong, 10-15 x 4-7 cm, entire, acute to acuminate, base obtusely rounded; petioles 5-8 mm long, pubescent. Flowers few-fascicled, white; pedicels short and turbinate; calyx tomentose. Fruits ovately elliptic, 2 cm long, calyx rim hairy.

Borneo. Throughout the Philippines, along stream banks and humid depressions in low forests; in Mt. Makiling, Luzon, along Molawin Creek.

Com. name – *Malatapai* (Bik., Tag.).

Exsicc. – *Miras CA 1974* (CAHP); *Alberto 1155403* (US).

2. *Alangium chinense* (Lour.) Rehd. in Sargent, Pl. Wils 2: 552, 1916; Bloembergen, Blumea 1: 255, f. 2, a-c, 1935. – *Stylidium chinense* Lour., Fl. Cochinch. 220, 1790.

Figure 162

Trees small. Leaves ovate to ovately elliptic, subcordate, begonia-like, entire or young ones lobulate larger lamina 10 x 15 cm; petioles 2-3 cm long.



Figure 162. *Alangium chinense*: 1. flowering branch; 2. flower; 3. flower, vertical section; 4. ovary, cross section; 5. stamens; 6. fruit; 7. seed; 8. fruit cluster.

Cymes slenderly pedunculate, nearly half the length of foliage; flowers white, fragrant; petals 6-8, strap-like, usually 7-merous, becoming reflexed; calyx turbinate; styles thin; stigmas capitate, 4-lobed; ovaries 2-celled. Fruits globose, 1 cm long.

Throughout Africa, southeastern Asia, India to China and Malesia. Throughout the Philippines, primarily along stream banks at low altitudes; in Mt. Makiling, Luzon, along Molawin Creek.

Com. name – *Bagaloan* (Tag.).

Exsicc. – *Pancho CA 9844** (CAHP); *Fortunato 711306*; *Elmer 1237175* (US).

3. *Alangium javanicum* (Bl.) Wang. in Engl., Pfl. R. IV. 220b, 14, 1910; Bloembergen, Blumea 1: 201, 1935. – *Styrax javanicum* Bl., Bijdr. 13: 671, 1826. – *Alangium meyeri* Merr., Publ. Gov. Lab., Philip. 35: 54, 1906.

var. *jaheri* Bloem., Bull. Jard. Bot. Buitenz. 16: 218, 1939.

Trees. Leaves oblong, 15 x 6 cm, short-acute, base broadly rounded; petioles 1 cm long. Cymes sessile or shortly peduncled, 1- to 34-flowered; flowers 4-7 (often 6-)-merous; petals greenish yellow, 7-20 cm long; styles thick, clavate at pyramidal top with 4 decurrent stigmas; ovaries 1-celled. Fruits ellipsoid-ovoid, 1.75-3.5 cm long, glabrous or thinly hairy, narrow apical calyx rim pubescent.

Throughout Malesia. In the Philippines, in forests at low and medium altitudes; in Mt. Makiling, Luzon, mostly at low altitudes.

Com. name – *Putian* (P. Bis., Tag.).

Exsicc. – *Gates CA 1975* (CAHP); *Elmer 854530, 1237337*; *Foxworthy's collector 1091638, 1091586*; *Villamil 901693* (US).

124. CORNACEAE

Trees or shrubs. Leaves opposite or spirally arranged, simple, petiolate, entire or serrate, estipulate. Flowers bisexual or unisexual, regular, terminal or axillary, paniculate, cymose or capitate, occasionally subtended by colored bracts; calyx adnate to ovary, segments small, valvate; petals 4 or 5, sometimes four times more, entirely wanting, inserted around an epigynous disc; stamens usually as many as petals, alternate and inserted with them; ovaries inferior, 1- to 4-celled with 1, rarely 2 pendulous ovules in each cell; styles simple, usually short; stigmas truncate, capitate or pyramidal, sometimes lobed. Fruits drupes or berries with 1- to 4-celled putamen or with 2 distinct stones, sometimes

glomerated into a solid head; embryo in copious fleshy albumen; cotyledons generally thin, foliaceous.

Genera 16, species 100; widely distributed in the tropical and temperate regions of the world; 1 genus and 5 species in the Philippines.

1. MASTIXIA Blume

Trees mostly. Young twigs pubescent. Leaves opposite or spirally arranged. Flowers bisexual, often bibracteate, small, in terminal, many-flowered cymose panicles, sessile or short-pedicelled, jointed under flowers; calyx tube campanulate, limb toothed, hairy; petals 4 or 5, ovate, valvate, pubescent; stamens as many with cordately oblong anthers; ovaries 1-celled, disc fleshy; styles cylindrical; ovules pendulous from top of cell. Drupes ovately ellipsoid, crowned by calyx teeth or scars; putamen grooved down on face; seeds ellipsoid.

Species 13, in Sri Lanka, Western Ghats, Northeastern India, Bhutan, Southern Yunnan, Burma, Thailand, Indochina, Hainan, all over Malesia; 2 species, 1 subspecies and 1 variety in the Philippines.

1. *Mastixia pentandra* Bl., Bijdr. 654, 1926; *Matt. Fl. Mal. I*, 8: 95, 1977. ssp. *philippinensis* (Wang.) Matt., *Blumea* 23: 85, 1976; *Fl. Mal. I*, 8: 96, 1977. – *Mastixia philippinensis* Wang. in *Fedde Repert.* 10: 273, 1910; Merr., *En. Philip.* 3: 241, 1923. **Figure 163**

Trees small to medium-sized. Leaves alternate, oblong, 8 x 3 cm, pronounced midrib with 6 pairs of nerves, abruptly acute to acuminate, base acute to subobtusate; petioles 1-2 cm long. Inflorescences appressed-pubescent. 5 cm long, subpaniculate, ultimate branches bract-subtended; flowers 4- or 5-merous in small, terminal, subsessile clusters, calyx tube short, rim short-toothed; petals oblong, 1 mm longer than calyx; stamens short with broad anthers; styles 1 mm long, 4-angled, terminated by minute stigmas. Drupes ellipsoid, 2.5-3 cm long, smooth, glabrous, short, conically pointed with calyx vestiges, green, then pale white, finally purplish blue to nearly black, often with similarly colored globose cells.

Endemic. Philippines: northern to southern Luzon, Catanduanes and Leyte; in primary forests, ascending to 1000 m altitude; in Mt. Makiling, Luzon, in the vicinity of Mudspring.

Com. name – *Apanit* (Tag.).

Exsicc. – *Stern* CA 12119*; *Villamil* CA 2070 (CAHP); *Curran* 710026; *Elmer* 1237767, 1237340, 1237472; *Racelis* 900778 (US).



Figure 163. *Mastixia pentandra* ssp. *philippinensis*: 1. flowering twig; 2. fruiting twig; 3. flowers; 4. stamen, 2 views; 5. flower, vertical section; 6. fruit, 2 views; 7. seed, 2 views.

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