

DENR Recommends

Volume 15b

INDIGENOUS FOREST TREE SPECIES IN LAGUNA PROVINCE

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August 2007

Foreword

The DENR Recommends No. 15b presents the continuation of the partial output of the ERDB continuing project on “**Seed technology of indigenous forest tree species**”. This focuses on another 13 indigenous forest tree species in the province of Laguna. Of these, 11 were collected from the NSJ Farm, Barangay Cueva in the town of Sta. Maria and two from Mt. Makiling.

Like the No. 15a series, it also includes the botanical description, phenological data, distribution, uses, wood properties, and ecology which are some of the essentials of mass propagation of these species for reforestation and genetic conservation. It highlights research-based information on seed technology aspects particularly on seed germination, seed longevity, and storage.

This botanical research, being trailblazed by three conscientious and aggressive female researchers of ERDB, envisions to augment the current specimen collection and expand the research scope on more indigenous species from other provinces where these species are endemic or naturally growing.



MARCIAL C. AMARO Jr., CESO V
Director

Introduction

The rapid and massive deforestation in the country is disturbing. On the average, our rate of deforestation is 203,905 ha annually, while our rate of reforestation is only 9,398 ha. This means that for every tree planted, 21 are cut down (Manila Bulletin Online, 29 May 2006).

To address this alarming scenario, the government has pursued a nationwide reforestation program aimed at immediately reforesting depleted and denuded vegetative cover and ultimately, restoring ecological balance.

To actualize such reforestation effort, the planting of fast-growing trees has been the prevailing practice, and it is usually limited to a few number of species, mostly exotic species. Concomitant to the problem of low survival rate are other such problems of site incompatibility and susceptibility to pests and diseases which are related to fast-growing species.

As such, ERDB has attempted to explore the possibilities of resorting to alternative species that will fulfill the reforestation objectives of the country, answer the needs of the wood-based industries, and help along genetic conservation. ERDB researchers have initiated to give more attention to indigenous forest tree species that are endemic but promising reforestation species.

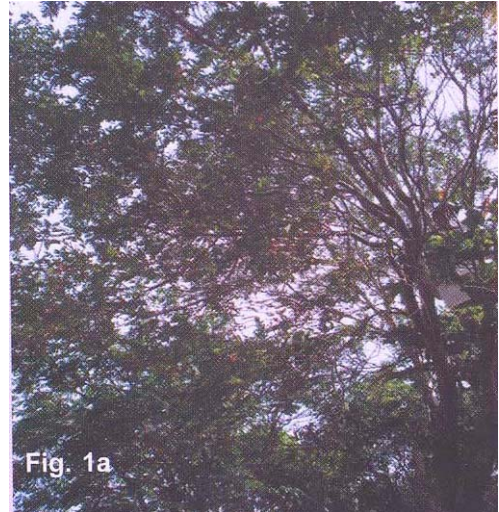
This publication, DENR Recommends No. 15b (and also No. 15a) is meant to answer the information needs of those who are interested in establishing forest plantations and who, in one way or another, or at one time or another, would wish to help hasten the rate of reforesting denuded areas which will eventually rehabilitate the country's forest resources while there is still time.

KANINGNING

Guioa bicolor Merr.

Description

This is a medium-sized tree, 10 m high with a diameter of 4-5 cm. Its bole is straight to crooked and occasionally with buttresses (Fig. 1a). The bark surface is smooth to finely fissured, flaky, whitish to dark gray with darker or lighter patches to red brown. The leaves are alternate, paripinnate. The flowers are in axillary, few-flowered thyrse, seemingly bisexual but probably functionally unisexual. The fruit is a 3-lobed capsule, ovovoid, 3-celled with flattened lobes, green, and turns to orange-red when ripe. The seed is blackish-brown, 8 mm x 5 mm, completely enveloped by an orange arillode (Fig. 1b) dangling from the open fruit/capsule.



Phenology

Flowering	November-December
Fruiting	February-March
Seed collection	March-April
Place of collection	Barangay Cueva, Sta. Maria, Laguna

Seed extraction/processing

Dehiscence the fruit and extract the seeds manually. Remove the fleshy orange aril and wash the seeds in running water to completely remove the pericarp.

Seed count 13,750/kg

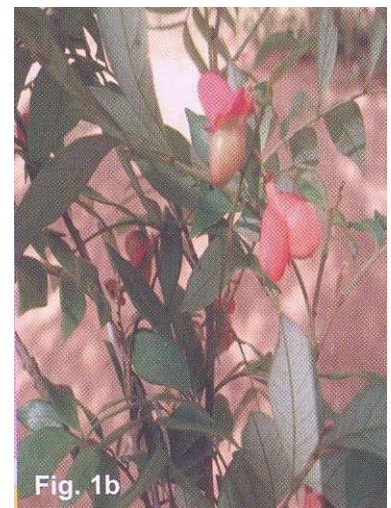
Seed type Recalcitrant

Seed germination

Dark brown to black seeds germinated two days after sowing while light brown seeds germinated after seven days. The seedlings are of the hypogeal type of germination; cotyledons are borne at soil level, not emergent; the hypocotyls is short. The first pair of leaves are opposite, paripinnate with serrate leaflets. The subsequent leaves arranged spirally; rachis is slightly winged.

Storage

Seeds of this species are highly recalcitrant; storing them is not possible. Immediate sowing of the seeds is needed to obtain high percent germination.



Distribution

Guioa comprises 65 species which occur in peninsular Burma (Myanmar), Cambodia, southern Vietnam, Thailand, throughout the Malesian archipelago towards northeastern Australia, and into the Pacific, east Samoa. Of these, 12 occur in the Philippines.

Uses

The wood of *Guioa* is used for house construction, agricultural implements (wagon shafts, plows), tool handles (especially ax handles), and for firewood.

The arilode of the seed of several species is edible but sour.

Boiled roots of some species have been used medicinally against blennorrhoea (a suppurating inflammation of mucous membranes), fever, stomachache and also to exterminate intestinal worms. The seed oil has been used in the treatment of certain skin diseases.

Properties

Guioa yields a medium-weight hardwood with a density of 530-740 kg/m³ at 15% MC. The heartwood is pale brown with a pink or reddish tinge. The grain is usually straight; the texture is fine and even.

The wood which is soft to hard and tough, and fairly strong is probably not very durable when exposed, but fairly durable under cover. It is resistant to termites and its susceptibility to *Lyctus* is indeterminable.

Ecology

Guioa species are fairly common elements of secondary forests but also occur in primary forests on ultrabasic soils, up to 1,000(-1,800) m altitude.

BITONGOL

Flacourtia rukam Zoll. & Mor.

Description

This is an evergreen tree reaching a height of about 20 m and a diameter of 30 cm. Its branches are often crooked and gnarled (Fig. 2a). The trunk and branches are spiny. The bark is brown and smooth. The leaves are simple, 5-15 cm long, elliptic. The flowers are very small, greenish-yellow, in clusters. The fruit is 1-2 cm wide, purplish-green to dark red with whitish pulp, crowned by 4-7 small peg-like styles set in a circle. The seed is irregular in shape, brown (Fig. 2b).

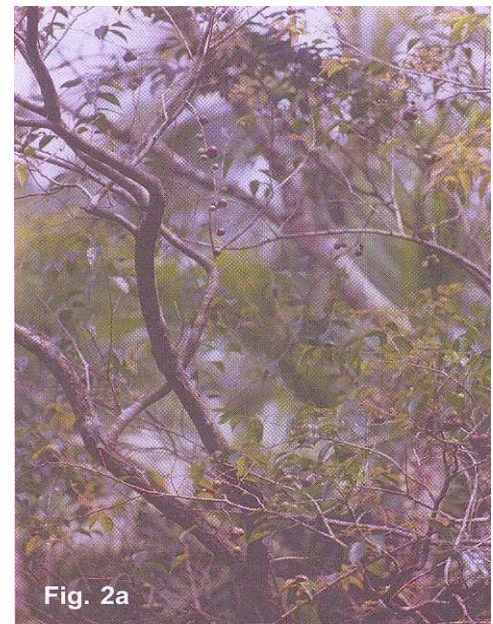


Fig. 2a

Phenology

Flowering	October-November
Fruiting	April-June
Seed collection	October-November
Place of collection	Barangay Cueva, Sta. Maria, Laguna

Seed extraction/processing

Extract the fruit (which is edible) by eating the fleshy portion. Or soak the fruit in tap water to soften the pulp, then extract the seeds manually.

Seed count 18,000/kg

Seed type Orthodox

Seed germination

Seeds started to germinate 15 days after sowing in plastic trays with moistened paper towel but 39 days after when sown in a potting medium. Seeds are of the epigeal type of germination, that is, the cotyledons are raised above the ground. The first pair of cotyledon are smooth, entire, oblanceolate with distinct midrib and two veinlets running from the base to the apex. The first leaf is elliptic and serrated. Eighty-five percent (85%) germination was obtained one and a half months after sowing in a potting medium but only 25% was attained with the use of moistened paper towel.



Fig. 2b

Storage

Information on proper storage of seeds has not been made available yet. Seed storage will have to be addressed and studied in the near future.

Distribution

Bitongol occurs in Luzon (Benguet, Pangasinan, Zambales, Laguna, Tayabas, Batangas, Rizal, Sorsogon, Mindoro, Pollilio), Negros, Cebu, Basilan, and other parts of Mindanao. It can be found also in Malay Peninsula.

Uses

The wood is used for light construction; the fruit is edible.

Properties

There are no available information regarding properties of this species.

Ecology

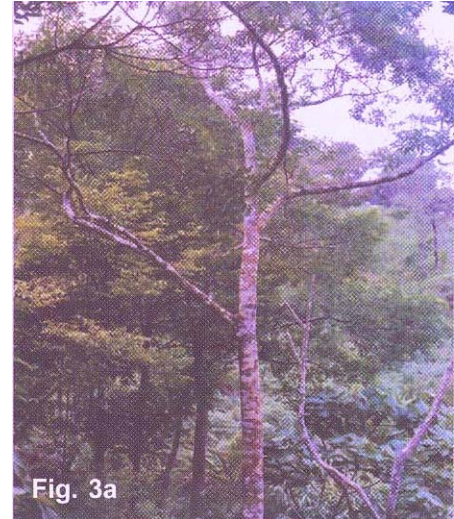
Bitongol is widely distributed but scattered in forests at low and medium altitudes.

SALIMAI- LAKIHAN

Helicia robusta (Roxb.)

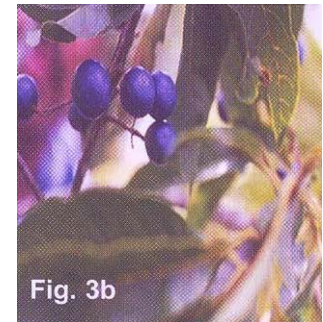
Description

This is a medium-sized tree up to 30 m tall with a diameter of 30 cm, branchless up to 20 m (Fig. 3a). Its bark surface is finely fissured, pale brown to dark brown. Its leaves are arranged spirally, simple, dentate, 3-4 verticillate. The flowers are in an axillary, often paired. The fruit is a nut, globose, 1-1.3 cm, dark green but turns blue when ripe (Fig. 3b). Each nut contains 2-4 seeds. The seed is often subglobose; its testa is thin. It has five distinct lines (striate) from the hilar region to the bottom of the nut; its hilum is prominent; small lines interlaced with each other forming a coriaceous-like structure on the endocarp. Brown and bean-shaped, it measures 6-8 mm x 4-5 mm (Fig. 3c). Its embryo is central.



Phenology

Flowering	May-July
Fruiting	July-September
Seed collection	October-November
Place of collection	Barangay Cueva, Sta. Maria, Laguna



Seed extraction/processing

Extract the seeds manually by removing the pulp of the fruit. Then wash the seeds in running water to remove the fruit remnants

Seed count 8,600/kg

Seed type Orthodox



Seed germination

The seeds sown in coconut coir dust and dried humus did not germinate even after four months of test extension. Seeds treated with various chemicals and exposed to light did not germinate even after extending the test period to almost 12 months.

Storage

Seeds stored at 7°C for 5 months will no longer be viable after three months.

Distribution

Helicia comprises 90 species occurring in Sri Lanka, southern India, Burma (Myanmar), Indochina, Japan, Taiwan, Thailand. It is centered in Malesia where 5 species occur. New Guinea has almost 50 species.

Uses

The nicely figured and hard wood of *Helicia* is used for superior joinery, high class furniture, cabinet work and interior finish, flooring, house building and as a mine timber. Occasionally, the species are planted as ornamentals. The young shoots of certain species are eaten raw as a vegetable.

Properties

Helicia yields a medium-weight hardwood with a density of 505-790 kg/m³ at 15% MC. The heartwood is brown with a pink tinge, sharply differentiated from the yellow-pink sapwood. Its grain is straight and texture, moderately coarse and uneven.

The wood seasons slowly to moderately fast with little end splitting and slight surface checking on the heart side. It is moderately hard to hard, is of moderate strength, is easy to saw and with care can be planed and worked to a smooth surface. It is moderately durable and resistant to pressure impregnation. The sapwood is susceptible to *Lyctus*.

Ecology

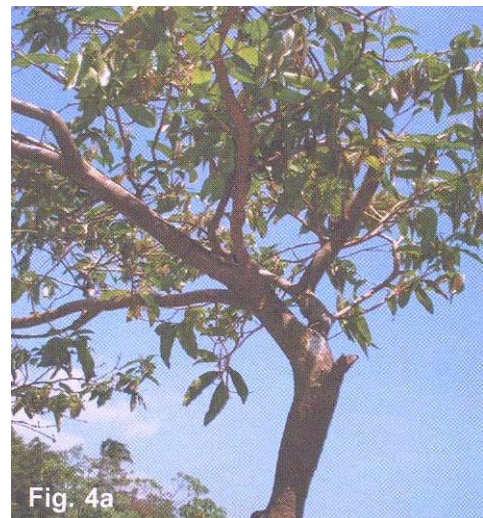
Helicia spp. Are found scattered in lowland to montane rain forest, up to 2,000 (-3,350) m altitude. Some prefer habitats along streams but other species are found on hilltops or ridges.

SALAKTOK

Gomphia serrate (Gaertn.)

Description

This is a small or medium-sized tree up to 25 m tall with a diameter up to 40 cm. Its bole is slightly fluted at the base. Its bark surface is smooth or flaking into thin pieces, dark gray-brown (Fig. 4a). The leaves are arranged spirally, simple, finely toothed with 2-3 intramarginal veins. The flowers are in an axillary or terminal panicle, 5-merous. Its sepals are enlarged and persistent in fruit; petals are yellow or cream. The fruit, with 1-2 kidney-shaped drupelets, is yellowish-green turning dark purple or blue-black when ripe (Fig. 4b).



Phenology

Flowering	July-August
Fruiting	January-February
Seed collection	August-September; March-April
Place of collection	Sta. Maria, Laguna



Seed extraction/processing

Soak the drupes in tap water to soften. Then remove the pericarp manually. Wash the extracted seeds thoroughly under running water to remove remnants of the pericarp.

Seed count 8,333/kg

Seed type Recalcitrant

Seed germination

The seeds started to germinate 15 days after sowing and germination was completed after 20 days with only 10% germination. These are of the epigeal type of germination; that is, the cotyledons are raised above the ground.

Storage

The seeds of this species are highly recalcitrant so storing them is not possible.

Distribution

Gomphia comprise 30-60 species which, with one exception, are confined to tropical Africa and Madagascar. The only Asiatic species is *G. serrata* (Gaertn.) which occurs from Sri Lanka and India to Indochina, southern China (Hainan), Thailand, Peninsular Malaysia, Singapore, Sumatra, Borneo, Sulawesi and the Philippines (Zambales, Mindoro, Camarines, Panay, and Laguna).

Uses

The wood of *G. serrata* is used in house building (rafter, poles, planks) and has been used for boats, pumps, and blocks.

In Peninsular Malaysia, leaves are chewed by the natives. In India, a decoction of the bitter roots and leaves is applied medicinally as stomachic and antiemetic tonic. In Cambodia, pulverized young branches are used against toothache.

Properties

G. serrata yields a medium-weight hardwood with a density of 830-870 kg/m³ at 15% MC. The heartwood is dull red-brown or purple-gray-brown, not clearly differentiated from the sapwood. The grain is straight to shallowly interlocked; the texture is fine and uneven. The wood is prone to splitting during drying. It is hard, strong, and moderately durable.

Ecology

The species is found in primary and secondary, evergreen to semideciduous, lowland to submontane rain forests, up to 1,500 m altitude, on well-drained infertile soil. It is confined to areas with an everwet to moderately dry monsoon climate, where it is found in a wide range of forest types, including mixed dipterocarp forest, limestone forest and peat-swamp forest.

DITA

Alstonia scholaris (L.) R. Br. Var.
scholaris

Description

Dita is a smooth tree reaching a height of about 40 m and a diameter of over 1 m (Fig. 5a). Its branches are spreading and trunk, flanged or fluted. The bark is grayish with numerous lenticels; the inner bark exudes a milky sap when cut. The leaves are simple, 4-7 in a whorl, oblong-obovate 12-23 cm long x 3.5-8 cm wide. These are rounded at the tip and pointed at the base, dark green above and slight glaucous underneath. The flowers are fragrant, light green to yellowish-white; these are crowded, numerous, somewhat hairy. The fruit, single-chambered, is made up of slender follicles, pendulous, cylindrical, 20-40 cm long x 4-5 mm wide. Seeds are about 3-4 mm long x 1.5-2 mm wide, reddish-brown, with ciliate margins and hair-tufts at seed ends (Fig. 5b)

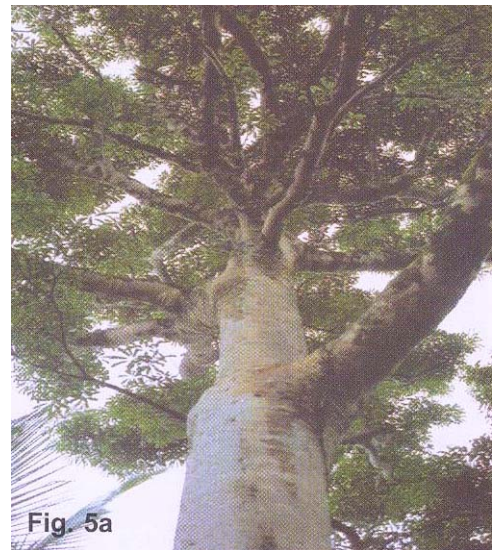


Fig. 5a

Phenology

Flowering	October-November
Fruiting	December-February
Seed collection	May-June
Place of collection	Mt. Makiling, Laguna

Seed extraction/processing

Sun-dry or air-dry the follicle to split. Then extract the seeds manually.

Seed count 500,000 – 600,000/kg

Seed type Orthodox

Seed germination



Fig. 5b

The seeds of this species started to germinate 6 days after sowing and complete germination was noted a month after. These are of the hypogeal type of germination; that is, the cotyledons remain below ground within the testa.

Storage

Dried seeds can be placed in plastic bags and stored at 7°C for 6-12 months with 85% germination. Seeds stored at room temperature easily lose viability after 6 months.

Distribution

The species is found in Laguna, Cavite, and southern Tagalog provinces; Cagayan Province, Ilocos provinces, and Palawan; Visayas and Mindanao and in almost all islands. It is also reported to be growing in tropical Asia and Africa as well as in Malaya and tropical Australia.

Uses

The wood of dita is used for matches, wooden shoes, household implements, ceiling partitions, boxes and crates, pallets, interior finishing, moldings, wooden roof shingles, and twinery.

Decoction of bark is used in place of quinine to cure malaria fever, chronic diarrhea, and dysentery. The leaves are used to cure ulcers with foul discharges.

Properties

The sapwood and the heartwood of this species are not differentiated. The heartwood is cream white to light yellowish-brown; has a bitter taste. The grain is straight, sometimes interlocked; the texture is moderately fine to moderately coarse. The wood is very easy to work by hand and tools; it seasons with little degrade. It needs rapid drying to avoid bluing or sap staining; not so durable, easily perishable when exposed to unfavorable conditions or in contact with the ground. The wood is very susceptible to dry-wood termites and powder post beetle. It is highly susceptible to ambrosia beetle attack after felling.

Ecology

Dita occurs in primarily and secondary forests at low and medium altitudes.

BANGKAL

Nauclea orientalis (L.)

Description

Bangkal is a small to fairly large tree up to 35 m tall; its bole is usually straight, up to 80-100 cm in diameter (Fig. 6a). Its bark surface is smooth to irregularly fissured and cracking sometimes scaly grayish-brown to reddish-brown. The leaves are opposite, simple, entire, leathery with short petioles. The flowers are in an axillary and terminal, stalked head with simple peduncles, 4-5 merous, yellow. The fruit is connate into an indehiscent globose syncarp (Fig. 6b). The seed is ovoid to ellipsoid, sometimes slightly bilaterally compressed, not winged.



Fig. 6a

Phenology

Flowering	August-October
Fruiting	October-December
Seed collection	December-January
Place of collection	Barangay Cueva, Sta. Maria, Laguna

Seed extraction/processing

Soak the fruit in tap water to soften the pericarp. Macerate to separate the seeds. Wash the seeds in running water to completely remove the fruit remnants using a fine mesh strainer.

Seed count 3M/kg

Seed type Recalcitrant

Seed germination

Seeds germinated 15 days after sowing. They are of the epigeal type of germination.

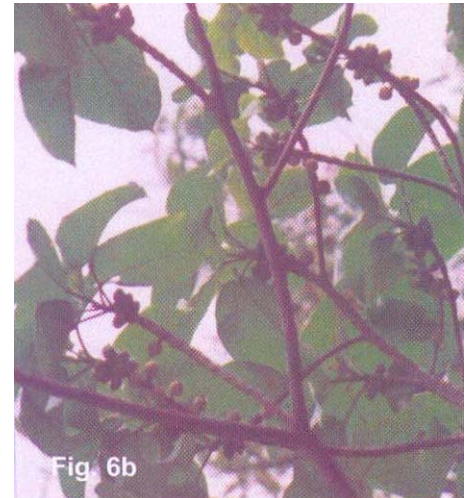


Fig 6b

Storage

The viability of bangkal seeds is quite short. Thus, storage is not possible.

Distribution

Nauclea comprises 10 species; 4 of these occur in Africa and Madagascar and 6 in Asia with 1 species extending to northern Australia. All 6 Asian species are found in Malesia; 3 of them have a large area of distribution. Of the other 3, one is endemic to Borneo, one to the Philippines, and one to New Guinea.

Uses

The wood of *Nauclea* is used for light framing, interior joinery, weatherboard, flooring, furniture, cabinet work, moldings, veneer and plywood, sculptures, implements, shuttering, toys, packing cases, and match splints. It is also used for house construction and the wood is considered suitable for making a good pulp for paper production.

Properties

Nauclea yields a lightweight to medium-weight hardwood with a density of 335-750 kg/m³ at 15% MC. The heartwood is rather bright orange to orange-yellow to dark orange or dark yellow. The grain is slightly interlocked; its texture is moderately fine to slightly coarse and even.

Shrinkage is low and care is needed to prevent warping during seasoning in back-sawn material. The wood is moderately hard and moderately weak to moderately strong. It is easy to work and finish and turns excellently. It is rated from durable to nondurable when exposed to the weather or in contact with the ground. The wood is fairly resistant to insect attack, but it is also reported to be susceptible to termites. The sapwood is susceptible to *Lyctus* and blue stain.

Ecology

Nauclea occurs in lowland and hill forests sometime up to 1,100 m altitude, often along streams, and also in swampy locations. In the Philippines it is found mainly in secondary forests.

BAKAN

Litsea philippinensis Merr.

Description

This is a tree 5-15 m tall with a diameter of 5-6 cm, branchless up to 2 m. Its bark is dark green to dark brown. The leaves, subcoriaceous, are ovate to oblong-ovate, brown and shiny when dry, 8-14 cm long (Fig. 7a). The inflorescence is axillary, the flowers are small, greenish-white, or yellowish, in dense subcapitate, bracteate umbels which are arranged in 2-8 cm long usually pubescent racemes. The fruit is subellipsoid, 8-10 mm long, fleshy, dark purple, but turns black when ripe (Fig. 7b). The seed is black, subellipsoid, 1.2-1.7 cm long.



Phenology

Flowering	January-February
Fruiting	March-September
Seed collection	October -November
Place of collection	Barangay Cueva, Sta. Maria, Laguna

Seed extraction/processing

Soak the fruit in a basin of water overnight to soften the pericarp. Then extract the seeds manually by removing the pulp of the fruit. Air-dry before sowing.

Seed count 430 seeds/kg

Seed type Recalcitrant

Seed germination

Seeds sown in the potting medium (1:1:1) which consists of ordinary garden soil (OGS), dried humus, and coconut coir dust germinated after three months in the germination chamber with light. These are of the hypogeal type of germination. That is, the cotyledons remain below ground within the testa.

The germinants were very slow-growing. The first pair of leaves appeared only when the hypocotyls was about 9 cm long. And this came about 4 months after sowing.

Storage

Bakan is a recalcitrant species. As such, the seeds easily lose their viability and storage is impossible.

Distribution

Bakan is widely distributed in the country. It is endemic to the Philippines.

Uses

The wood of bakan can be used for light construction and as material for novelties.

Properties

The outer bark of bakan is 1-2 mm, brown. The inner bark, 18 mm, yellow with brown dots, turns light brown after exposure. It has an aromatic resinous smell; the cambium becomes an orange-brown line after exposure.

Ecology

Bakan occurs in thickets and forest hills at low to high altitude.

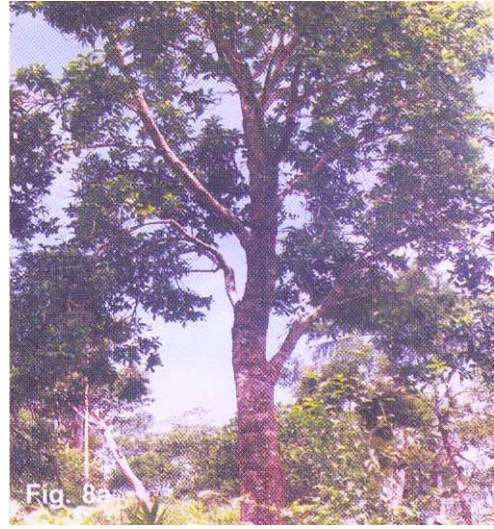


MALASALIMAI

Helicia rigidiflora Sleum

Description

This is a small tree 10 m tall with a diameter of 20 m. It has a branchless bole up to 5 m (Fig. 8a) with slight buttresses. The bark surface is smooth to scaly or finely fissured, gray or pale brown to dark brown. Leaves, arranged spirally, 2.5-8.0 cm x 0.8 – 5.5 cm, simple, sessile, dentate, exstipulate. Flowers are in an axillary, many-flowered, white to pinkish with many stamens to which dark yellow fallen grains are attached (Fig. 8b). The fruit is a nut, 5-6 cm x 2 cm, with 5 protruding edges which split open when ripe. The seeds, 8-9, are winged, light brown, 3-4 cm x 1 cm (Fig. 8c). They are often subglobose; the testa is thin.



Phenology

Flowering	April-August
Fruiting	May-August
Seed collection	August -November
Place of collection	Sta. Maria, Laguna



Seed extraction/processing

Collect the ripe fruits before they split open. Extract the seeds manually. Dewing the seeds before sowing.

Seed count	1,800 - 2000/kg
Seed type	With 63.55% initial MC, probably recalcitrant



Seed germination

Helicia can be propagated by seeds but experiments on germination and seed storage of this species have not been conducted yet due to a limited number of seeds extracted and processed. Studies along this aspect need to be done in the near future.

Storage

With the absence of research-based data on seed germination of *Helicia*, it follows that information on seed storage is likewise not available this time. A study along this area of concern has to be attended to in the near future.

Distribution

The species is endemic to the provinces of Mindoro, Misamis, Bukidnon, and Laguna.

Uses

The nicely figured and hard wood of *Helicia* is used for superior joinery, high class furniture, cabinet work and interior finish, flooring and also (but rarely) for ax handles, house building and as a mine timber.

One *Helicia* species has occasionally been planted for ornamental purposes. Young shoots of *H. robusta* and *H. serrata* are eaten raw as a vegetable.

Properties

Helicia yields a medium-weight hardwood with a density of 505-790 kg/m³ at 15% MC. The heartwood is brown with a pink tinge, sharply differentiated from the yellow-pink, 5-8-cm-wide sapwood. The grain is straight and its texture is moderately coarse and uneven.

The wood seasons slowly to moderately fast with little and splitting and slight surface checking on the heartside. The wood is moderately hard to hard and of moderate strength. It is easy to saw and with care can be planed and worked to a smooth surface. The wood is moderately durable. It is resistant to pressure impregnation. The sapwood is susceptible to *Lyctus*.

Ecology

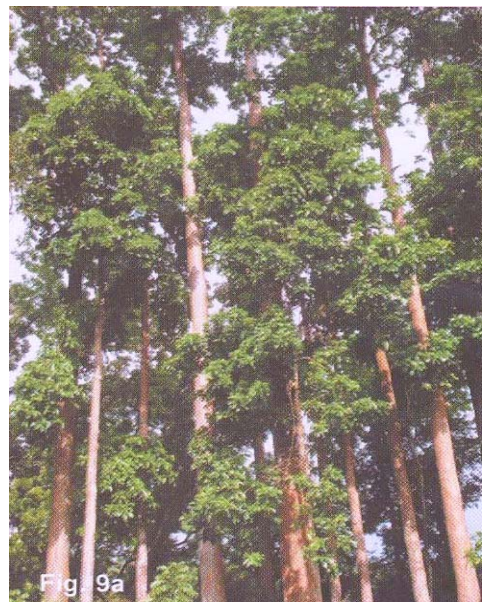
Helicia species are found scattered in lowland to montane rain forests, up to 2,000 (-3,350) m altitude. Some thrive along streams but other species occur on hilltops or ridges.

TOOG

Petersianthus quadrialatus (Merr.) Merr.

Description

This is a deciduous, medium-sized to large tree up to 40 m tall. Its bole is straight, cylindrical, branchless for up to 20-30 m, up to 100-250 cm in diameter. Its bark surface is flaky to deeply fissured dark brown to grayish-red (Fig. 9a). The inner bark is tough and fibrous, pinkish. The leaves are arranged spirally, simple, obscurely toothed, abruptly acuminate; its stipules are early caduceous. The flowers are in an axillary and terminal panicles forming a corymb; the petals 4, free, white and the stamens are numerous. The fruit is a 1-4-seeded capsule, indehiscent, almost



circular in outline, with 4 large, papery wings (Fig. 9b). The seedbearing portion is very narrow. The seed is ovoid, 5-7 mm x 4-5 mm, with a thin seed coat.

Phenology

Flowering	August-September
Fruiting	October-December
Seed collection	December-February
Place of collection	Mt. Makiling, Laguna



Seed extraction/processing

Extract the seeds manually.

Seed count 15,000-20,000/kg

Seed type Recalcitrant

Seed germination

Newly collected seeds started to germinate 6 days after sowing. The seeds are of the epigeal type of germination; the cotyledons are emergent and the hypocotyl is elongated.

Storage

Since the seeds are the recalcitrant type, they cannot be stored for a long period of time.

Distribution

Petersianthus comprises only two species. One occurs in tropical West Africa. The other species, *P. quadrialatus* (Merr.) Merr, is endemic to the Philippines.

Uses

The wood of the species is mainly used for the production of face veneer and fancy plywood, and the production of pulp and paper. It is also suitable for general construction, paneling, bridge building, pallets, and charcoal production. It is used as a mine timber and potentially useful for poles and piles, and vehicle bodies. The seeds are reported edible which taste like groundnut.

Properties

Toog yields a medium-weight hardwood with a density of 615-720 kg/m³ at 15% MC. The heartwood is pale red turning reddish-brown with pale streaks upon exposure, sharply demarcated from the pale and fairly wide sapwood. The grain is interlocked; its texture is moderately fine to moderately coarse. Shrinkage is rather high and the wood is rather difficult to season, as it is likely to warp and split. It is hard, moderately strong and tough, moderately hard to work, but can be finished satisfactorily. The wood is

durable for interior use and slightly durable when exposed to the weather or in contact with the ground. The heartwood is susceptible to dry-wood termites and the sapwood is susceptible to *Lyctus*.

Ecology

The species is fairly common and grows scattered though locally common in primary rain forests at low to medium altitudes, on well-drained soils near riverbanks or on hillsides.

KAITANA

Zanthoxylum limonella (Dennst.)

Description

This is a small to medium-sized tree up to 35 m tall with a bole up to 60 cm in diameter, occasionally larger, without buttresses (Fig.10). Its bark surface is often studded with spines or prickles, gray or brownish. The leaves are alternate, paripinnate; its stipules are absent. The flowers are in an axillary or terminal panicle, raceme or cyme or rarely solitary, small. The fruit is composed of 1-5 free or basally fused follicles. Its exocarp is glandular, red to black. The seed is ovoid to globose, one per follicle, often hanging from a funiculus. The testa is black or reddish, glossy; the endosperm is present.



Phenology

As likewise observed in certain countries, *Zanthoxylum* species found in Mabitac, Laguna did not bear any flower and fruit.

Flowering	December (Java); March-April (P. Malaysia)
Fruiting	January-February (Java)
Seed collection	February-March (Java)

Seed extraction/processing

Air-dry or oven-dry the follicles to open. Then extract the seeds manually.

Seed count 21,600/kg (Panama)

Seed type Recalcitrant

Seed germination

The seeds are of the epigeal type of germination; they germinated 35 to 90 days after planting with 47% germination. Seeds collected in Panama, when washed with soap solution, had 90-100% germination.

Storage

The seeds are the recalcitrant type; storing them lessens their viability. Immediate sowing is recommended.

Distribution

The species can be found from India and Sri Lanka to Burma (Myanmar), Indochina, Thailand, Peninsular Malaysia, Java, the Philippines, Sulawesi, the Lesser Sunda Islands, and southern Papua New Guinea.

Uses

The wood of *Zanthoxylum* is used for house building (planking, rafters, scantlings), furniture and various small articles like jewelry boxes, kris handles and sheaths, ax handles, walking-sticks, inlay work, gun stocks, carvings, and novelties.

Its pounded bark mixed with oil has been used externally against stomachache and a decoction of it is taken internally to cure pains in the chest. The soft, fibrous material from the roots of some species has been used to caulk canoes.

Properties

Zanthoxylum yields lightweight to medium-weight hardwood with a density of (290 -) 335-790 kg/m³ at 15% MC. The heartwood is bright yellow to pale brown; the sapwood is pale brown. The grain is straight; the texture is fine to moderately fine and even. The wood of several species is lustrous.

Shrinkage is high but the wood seasons well without degrade; wood of one species is hard and tough; that of another is soft. It is easy to work by hand and machine and finishes to a shiny surface. The heartwood is resistant to dry-wood termites and moderately resistant to fungi.

Ecology

Zanthoxylum is generally found in rather dry, often monsoonal forests and thickets up to 500 m altitude.

KALANTAS

Toona calantas Merr. & Rolfe

Description

Kalantas is a tree 35 m tall with a diameter of 152 cm. The trunk is terete and straight (Fig. 11a). The leaves are compound, alternate, oddly pinnate. The inflorescence is paniculate profuse, lax, equaling or shorter than the leaves, the lower half pedunculate. The fruit is an ellipsoid capsule; dehiscent from the apex toward the base, dark brown, slightly thicker above the middle, 3.2-3.5 cm x 1.2-1.4 cm, with 5 central columns where brown seeds are packed distinctly but unequally winged at each end. The seed with wings measures 1.2-1.5 cm x 0.4-0.5 cm; that without wings, 5-6 mm x 4-5 mm (Fig 11b).



Phenology

Flowering	June-August
Fruiting	September-November
Seed collection	February-march
Place of collection	Mt. Makiling, Laguna

Seed extraction/processing

Capsules easily open and seeds eventually dehisce. Or extract the seeds manually. Remove the wings before sowing.



Seed count 149,600-150,000/kg

Seed type Intermediate

Seed germination

Seeds sown in trays with OGS and dried humus germinated after 7 days while seeds sown in 3 layers of filter paper (blotter test) germinated after 3 days. Complete germination was observed in the blotter and in the potting medium after 6 and 10 days of sowing respectively.

Storage

The seeds of this species are the intermediate type. These should be sown after drying them for two days to obtain high percent germination.

Distribution

Kalantas is widely distributed throughout the Philippines especially in the Balabac group of islands.

Uses

The kalantas wood is used in the manufacture of cigar boxes, furniture, and plywood.

Properties

Kalantas has distinct ring-porous rings about 2-8 mm wide. Vessels are mostly isolated but sometimes ring-porous. Large vessels are aligned concentrically; vessel elements are distinct averaging 2/mm. The species contains occasional black gummy deposits and iridescent xyloses in some vessels.

The fibers of kalantas are moderately loose. The vasicentric parenchyma is inconspicuous while the terminal parenchyma is distinct. It consists of 1-4 bands at the end of a ring which are moderately narrow to very broad and few to moderately few.

The outer bark, 1.3 mm, is brown; the inner bark is 10 mm, reddish with cedary odor. The cambium, 2-3 mm, is white exuding a clear sticky sap with aromatic smell. The sapwood, white or faintly red, is soft.

Ecology

Kalantas is generally scattered in the forest hills and in primary forests at low and medium altitudes. It prefers deep, well-drained soils.

HAIKAN

Camellia lanceolata (Blume) Seem.

Description

Haikan is a small tree reaching a height of about 5 m and a diameter of 15 cm; it is nearly a shrub (Fig. 12a). The bark is smooth and grayish; the inner bark has light color. The leaves are simple, alternate, glabrous, about 5-13 cm x 2-5 cm, elliptic-lanceolate, broadly obtuse at the base. The lower surface is at first clothed with very thin hairs, subentire or crenately toothed. The flowers are in an axillary, solitary, in pairs or usually clustered. The petals are dingy white; the calyx is leathery, unequal, intricate; the ovary is densely yellowish, hairy. The fruit is a pendulous capsule, 2-4 cm long, ovoidly globose, 1-3 celled. Each cell contains 2-3 seeds.



Phenology

Fruiting	July-September
Seed collection	September-October
Place of collection	Mt. Makiling, Laguna

Seed extraction/processing

Open the capsule/fruit with a knife. Or use a hard object to break the capsule. Then remove the seeds manually.

Seed count 1,000/kg

Seed type Recalcitrant

Seed germination

The seeds, with their thick seed coat cut, were soaked in tap water for 5 hours. Then the seeds were sown in the potting medium (1:1:1) of OGS, dried compost, and coconut coir dust. Seventy (70%) percent germination was obtained 3 weeks after sowing.

Storage

The number of *Haikan* seeds collected did not suffice to warrant a reliable storage study. As such, research-based information along seed storage is not available, thus far.

Distribution

The species is widely distributed throughout the Philippines. It also occurs in Thailand, Sumatra, Java, borneo, and Celebes.

Uses

The leaves of *Haikan* can be used as a substitute for tea. The wood is used as light construction material. It is also used for charcoal and fuel.

Properties

Information that pertains to the wood properties of *Haikan* has not been made available, thus far.

Ecology

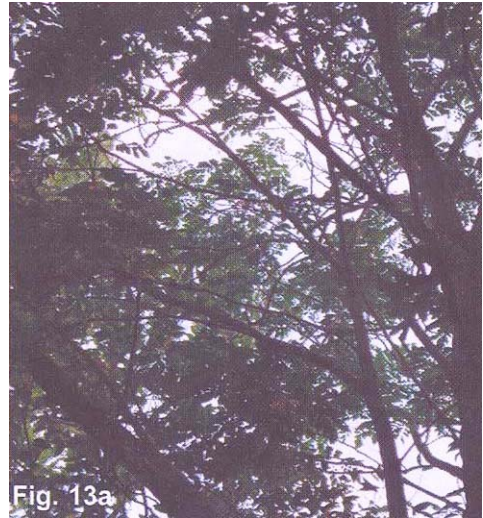
Haikan occurs in alpine or mossy forests from 700 – 2,000 m altitude.

KAMANIGUM

Archidendron clypearia (Jack)
Nielsen var. *casai* (Blanco) Nielsen

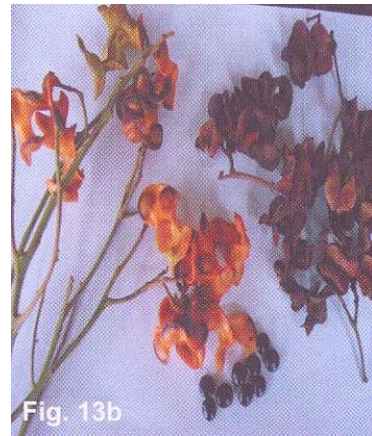
Description

This is an evergreen tree, 5-8 m tall with a diameter of 5-6 cm. Its bole is straight to crooked (Fig. 13a), branchless up to 3 m. The bark surface is smooth, lenticillate, brown to pale gray. The inner bark is greenish-yellow to purplish-red. The leaves are arranged spirally, bipinnate, rachis and pinnae with extrafloral nectarines; leaflets are opposite. The flowers are bisexual or sometimes unisexual, 5-merous; both calyx and corolla are connate. The fruit is a coriaceous to woody, green-orange to reddish-purple when ripe. It is spirally twisted, terete, dehiscent along one or both sutures. The seed is black, shiny, ellipsoid, flattened without pleurogram (Fig. 13b).



Phenology

Flowering	December-january
Fruiting	January-March
Seed collection	April-May
Place of collection	Barangay Cueva, Sta. Maria, Laguna



Seed extraction/processing

Air-dry the pods to open and then extract the seeds manually.

Seed count 1,509/kg

Seed type Intermediate

Seed germination

Seeds pretreated (nicking and soaking in tap water for 5 hours) germinated three days after sowing. Used were three layers of paper towel in plastic trays moistened with 100 ml tap water. The seeds are of the hypogeal type of germination. Complete germination of 100% was attained six days after sowing.

Storage

Viability of most *Archidendron* species is only up to six months when seeds are stored at ambient temperature. Beyond seven months seeds are no longer viable.

Distribution

Archidendron comprises 94 species and occurs from Sri Lanka and India to Indochina, southern China, Taiwan, Myanmar, Thailand. Three species are found in the Philippines.

Uses

The wood of *Archidendron* is used for light construction, interior joinery, furniture and cabinet work, canoes, paddles, fencing, household utensils, knife handles, weapon sheaths, boxes, and coffins. It can also be used as fuel.

A poultice of the leaves of some species is a traditional medicine to treat chickenpox, smallpox, sore legs, swellings and coughs.

Properties

Archidendron yields a lightweight to medium-weight hardwood with a density of 350-860 kg/m³ at 15% MC. The heartwood is whitish with a pink tinge, yellowish or pale red-brown. Sapwood is white, grayish-white, pale yellow or pale brown. The grain is straight, slightly interlocked or wavy; texture is moderately coarse but even. The wood is moderately hard but easy to saw and work to a smooth finish. It is only moderately durable when exposed to weather or in contact with the ground. The sapwood is susceptible to *Lyctus* and to stain.

Ecology

Timber-yielding *Archidendron* species occur in primary and secondary, lowland to lower montane, evergreen forests, up to 1,650 m altitude. They thrive in swamps and riverine forests, but also on well-drained locations, and on a wide variety of soils including clay, laterite, sand, and limestone.

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