

TREES OF FIJI

A GUIDE TO 100 RAINFOREST TREES

On behalf of



Federal Ministry for the
Environment, Nature Conservation
and Nuclear Safety

of the Federal Republic of Germany



Secretariat of the Pacific Community (SPC)

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TREES OF FIJI

A GUIDE TO 100 RAINFOREST TREES

Third, revised edition

By

Gunnar Keppel and Shahina A. Ghazanfar

Secretariat of the Pacific Community (SPC)

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Suva, Fiji, 2011

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Dillenia biflora (Kuluva)

About the Cover

Purple, orange, reddish or even bright pink coloured young leaves are commonly seen on tropical trees. Such coloration prevents heat damage and sunburns of the still tender leaf tissue. But within a few days, the leaves harden and turn green.

Lower two leaves and left insert: *Dillenia biflora* (Kuluva),
see page 123, (LB)

Upper leaf *Syzygium decussatum* (Yasimoli), see page 227, (LB)

Inner Title page

Agathis macrophylla (Dakua), see page 55, (RB)

CONTENTS

Preface to the Second Edition	4
Acknowledgements	5
Note on Fijian Names	6
Forewords	7
Fiji's Forests and their Trees	8
Some General Remarks on Botany and Tree Identification	9
Tree List with scientific names	11
Tree List with Fijian names	14
Key to Families	17
Photo Credits	22

Family and Species Descriptions

Anacardiaceae	24	Lecythidaceae	178
Annonaceae	34	Loganiaceae	184
Apocynaceae	40	Meliaceae	188
Araliaceae	48	Mimosaceae	200
Araucariaceae	52	Moraceae	208
Bignoniaceae	56	Myristicaceae	214
Boraginaceae	60	Myrtaceae	220
Bursерaceae	64	Pittosporaceae	230
Caesalpiniaceae	70	Podocarpaceae	234
Casuarinaceae	82	Proteaceae	244
Chrysobalanaceae	88	Rhamnaceae	248
Clusiaceae	94	Rhizophoraceae	254
Combretaceae	106	Rubiaceae	262
Cunoniaceae	112	Santalaceae	268
Degeneriaceae	116	Sapindaceae	272
Dilleniaceae	120	Sapotaceae	280
Ebenaceae	124	Simaroubaceae	292
Elaeocarpaceae	128	Sterculiaceae	296
Euphorbiaceae	132	Thymelaeaceae	306
Fabaceae	152	Tiliaceae	310
Gnetaceae	160	Urticaceae	314
Hernandiaceae	164	Verbenaceae	318
Lauraceae	170		

Selected Bibliography	324
Glossary to Botanical Terms	326
Index	332

Preface to the Second Edition

Published in 1996, *A Guide to Some Indigenous Fijian Trees* was the first field guide to Fiji's forest trees. It presented colour photographs and described characteristics such as bark and slash appearance, characteristics which are useful for identification in the field but not found in A.C. Smith's *Flora Vitiensis Nova*.

In 2006 the guide underwent full revision, resulting in the publication of *Trees of Fiji – a guide to 100 rainforest trees*. This revised edition contained new photos and expanded coverage of families and indigenous and naturalised species, and included dichotomous keys to facilitate identification. For the keys, vegetative characters (leaf, stem and bark) were used wherever possible because flowers can be difficult to obtain. Even during the flowering season, flowers or fruits may be high up on the trees and therefore not readily accessible.

The book was further revised in 2010. Sourcing appropriate high-resolution photographs to capture representative tree features and seasonal characteristics is one of the challenges in putting together a book that relies on photographic references. In this third edition we have tried to improve on the quality of the photographs. The third edition also corrects a few spelling errors and inaccuracies in descriptions that appeared in the second edition. We are grateful to the regional experts who took the time to correct these.

As with the second edition, tree species are grouped according to the family they belong to and the families are arranged in alphabetical order and colour coded. Lists of scientific and Fijian names are provided to facilitate identification. A glossary that explains some of the technical terms used and an index, which allows searching the book by vernacular and scientific name, complete this book.

Please be reminded that this book does not purport to be a tree flora of Fiji, nor has it been possible to cover all the trees that are found in Fiji's forests. Nevertheless, we are sure that foresters and non-foresters alike will find this book useful and we hope you will enjoy using this book to learn more about Fiji's beautiful forests and its valuable trees.

Despite careful editing, this third edition may still contain some errors. We therefore welcome your comments on how to improve it further, especially the generic keys and diagnostic characteristics of our many tree species.

Acknowledgements

Many skilled individuals and organisations contributed to this new and improved edition. A big *vinaka vaka levu* to all of you, especially to Marika Tuiwawa, Lex Thomson, and David Maberly.

A special thank you goes to Dr Rainer J. Blank, who continued tirelessly to further improve the book, and to Christine Fung and Nacanieli Speight for getting this third edition together.

The printing of this third edition is financially supported by the Secretariat of the Pacific Community (SPC)/German International Development Cooperation (GIZ) 'Climate Protection through Forest Conservation in the Pacific Island Countries' project. The project is funded through the International Climate Initiative of the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany.

Note on Fijian Names

Since there has been no comprehensive survey, many of the Fijian plant names given are tentative, and readers are requested to contact the authors with corrections and additions. In some cases, the 'Fijian' name commonly used by government officials and people in the timber trade is either incorrect or not widely used; this is listed here as the 'trade name'.

Differences in pronunciation are not noted. For example, the name "dakua" is used throughout Fiji for *Agathis macrophylla*, but it is pronounced in different ways, such as "da'ua" in Taveuni, or "taxua" in Kubulau, Bua. Those interested in the precise pronunciation should consult Clunie 1999:136-8.

Locations are approximate only, so that, for example, 'Ba' does not mean that the name is used throughout Ba province, nor throughout the district of Ba, but somewhere in the vanua of Ba and maybe in some adjoining areas. Some location names may be unfamiliar: Yasayasabeqa comprises Beqa, Deuba, Yanuca and Ono (Kadavu); *Vatulawa* comprises Koro, Natewa peninsula, Taveuni and Yacata; and Gonedau includes the small islands of Yaqaga, Tavea and Galoa off the north coast of Bua.

Rotuman names are taken from Inia et al 1998 and most Waya names from Pawley & Sayaba 2003. All other names are culled from the field experience of Gunnar Keppel and Paul Geraghty.

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Clunie, Fergus. 1999. *Birds of the Fiji Bush*. Second edition. Suva: Fiji Museum.

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Pawley, Andrew & Timoci Sayaba. 2003. *Words of Waya: A dictionary of the Wayan dialect of the Western Fijian language*. Draft computer printout. Canberra: Department of Linguistics, Research School of Pacific and Asian Studies, Australian National University.

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Suva, 2006

Foreword

It was during the early 1990's when the idea was born to have a guide to the most common and important of the many tree species found in Fiji's forests. It was the time, when the Fiji-German Forestry Project and the Research Division of the Department of Forestry implemented the Natural Forest Management Pilot Project (NFMPP) in Nakavu village in the South-East of Viti Levu.

Correct and consistent identification of the many tree species found in Fiji's forests is essential for a modern forest management regime, which is geared to balance and sustain productivity, biodiversity of our forests and the complex forest ecosystems to continue thriving and providing a multitude of environmental services.

In-depth knowledge of the different trees is the basis for any conclusive pre-harvest inventory (PHI) and to draw-up realistic forest management plans (FMP) for individual forest management areas. Correct and detailed tree information is required for sound application of the National Code of Harvesting Practices (NCOHP) and the application of species specific diameter felling limits. Know-How on the different tree species is also needed for outlining long term forest research and development programs, e.g. through the establishment of representative Permanent Sample Plots (PSP) or to improve the performance of the country's forest resources and influence both policy directions and management decisions on areas to be approved for sustainable, reduced-impact logging and areas to be protected, e.g. through National Forest Inventories (NFI).

Such requirements and one of the aims of Pacific-German Development Cooperation to mobilize indigenous knowledge and to enhance skills and know-how of stakeholders in the development process led to the publication of "A GUIDE TO SOME INDIGENOUS FIJIAN TREES" in 1996.

The need for an updated second edition of the tree-guide was felt, when the Federal Republic of Germany entered into partnership with the Secretariat of the Pacific Community (SPC). By granting assistance to the Pacific-German Regional Forestry Project (PGRFP) and extending the Pacific-German technical cooperation to additional seven other Pacific Island Countries, support and promotion of Sustainable community Forest Management (SFM) regimes continued. PGRFP now assists and promotes full participation of customary users and owners in all management aspects of their land and forest resources in eight countries.

With the mounting need for the forest sector also in Fiji to appropriately respond to the international, regional and domestic trends towards more sustainability in resources management and take up and follow sustainable forest management regimes, availability of qualified and skilled human resources may become a limiting factor for the development of the forestry sector.

Covering more of the important tree species, reflecting new taxonomic and botanical findings and developments and with many improved photographic images (although, as anybody who has tried to take pictures of individual trees within a somewhat dark "jungle" will tell you, this has remained quite a challenge ...), I am confident, that this guide does not only help forestry officers in their field work, but will be a rich source of information to the staff of forest agencies, environmental NGOs, forest scientists, and members of the general public interested in Fiji's beautiful forests and the valuable trees they contain.

I now hope that this endeavor will contribute to the overall goal of managing and preserving Fiji's forests for us, and the ones that will follow us.

Suva, July 2006

Christoph Muziol

Chief Adviser / Team Leader

SPC/GTZ Pacific-German Regional Forestry Project (PGRFP)

Fiji's Forests and their Trees

Since Charles Darwin published his "On the Origin of Species" in 1859, the Pacific Island ecosystems attract a wide range of scientists, environmentalists, interested visitors, businesses and trades.

With their complex composition and interesting and often unique characteristics, Fiji's insular rainforest ecosystems are in need of gaining even better national and international recognition, and the support of both the customary resource owners (e.g. landowning communities) and resource users like for example water and energy providers, businesses and trades of timber and non-timber forest products or the tourist sector.

In 1991 and 1992, the German-funded Fiji National Forest Inventory recorded a total of 183 timber tree species. Of these about 30 species are widely known and recognized in Fiji's timber trade, and are included also in the new edition of this book.

The National Inventory recorded a total of about 826,000 hectares of forested land, classified into three major categories, namely dense (310,000 ha), medium dense (423,500 ha) and scattered forest (92,500 ha). Mangrove forest was figured at 15,500 ha. To relieve the pressure of generating income and employment from the natural forests, the country also invested in forest plantations of exotic species like mahogany (42,000 ha) and pine (close to 50,000 ha).

In 2004, the Ministry of Fisheries and Forests' Annual Report accounted for about 102,000m³ of logs harvested from natural forests and 333,000m³ from forest plantations (pine 316,000m³, mahogany 17,000m³). As more planted forest areas mature in the coming years, timber harvests from forest plantations will increase substantially. The annual sustained production forecast for the mahogany industry alone was set to about 100,000m³ in the next five years. Likewise forest resource-based domestic downstream processing and value-adding industries are expected to provide more income and employment opportunities in Fiji.

Also supported by the Federal Republic of Germany, through the SPC/GTZ Pacific-German Regional Forestry Project, the Fiji Government has begun work for an updated National Forest Inventory in late 2005. Latest inventory data, a comparison of past harvesting figures with present day statistics and thorough trend analyses will soon provide the information basis for the forestry sector to support the sustainable management of Fiji's forest resources.

Our forefathers had a rich but largely unrecorded knowledge of our environment and natural forests. Various traditional uses, be they for domestic needs, foodstuff, medicinal or cultural purposes were handed down for generations.

Past generations of landowners, foresters and loggers used to boast about their knowledge and skills to identify any tree, shrub or creeper in our forests. But more and more people live and work in an urbanized environment. The once diverse knowledge of our natural forests and trees and the skills to use and maintain this wealth are steadily eroding. The loss of such know-how may finally restrict the ability of many resource owners, foresters and other forestry stakeholders to make informed decisions and to sustain our forest resources. This concern needs to be addressed urgently as sound knowledge of our tree flora is a prerequisite for all stakeholders of the industry to follow sound harvesting practices and to manage our forest resources along sustainable regimes.

Aiming to become your user-friendly forest guide in Fiji and to provide you with relevant information on our most important rainforest trees, this field guide will definitely stem the tide of fading knowledge about Fiji's invaluable forest resources.

Hon. Iaitia Tuisese
Minister of Fisheries and Forests
Suva, July 2006

Some General Remarks on Botany and Tree Identification

(Taken from “A Guide to Some Indigenous Fijian Trees”)

Trees are perennial and erect woody plants that may grow from about 2 meters to over 30 meters high. The main stem is sometimes without branches as in palm trees, but most trees produce many leaf-bearing branches that form the crown of the tree. Most trees have a long taproot that grows more or less vertically down below the surface of the soil, and anchors the tree firmly into the ground. All around this is a system of side secondary and roots dividing out into very fine branches that increase the surface area for absorption of nutrients from near the surface of the soil. Some are deeper rooted and are able to absorb from further down. This way many trees can grow close together as in a forest. Each lower layer of trees, is able to catch the light that filters through the top layer. Light is very important for plants as it provides the energy for them to make simple sugars, the basic building block for the body of the plants.

Trees belong to three main groups of plants. Some trees bear cones instead of flowers and fruits. Perhaps the most familiar cone is that of the pines trees, which is introduced to Fiji. Cones are made up of woody scales. Male cones are usually small and transient. Female cones are usually larger and stay much longer on the tree. The female cones get fertilised by pollen from the male cones and produce seeds. The seeds in cones are fertilised by pollen from the male cones and produce seeds. The seeds in cones are exposed and not enclosed in a fruit as in other trees, such as pawpaw. Cone bearing trees are known as gymnosperms. They are believed to be more primitive than other trees. This is based on the belief that flowers and fruits have a greater advantage over cones in terms of ensuring fertilisation and protection of the growing seeds. In terms of success in the struggle for existence, those that produce the most offspring and ensure the survival of the majority will win. Gymnosperm trees that are native to Fiji include Yaka, Dakua and Sukau. All these do not have flowers and bear only cones.

The other two groups of trees both bear flowers and fruits. They are known as Angiosperms as distinct from Gymnosperms. These two groups of angiosperms are distinguished by their germinating seed produced two seed leaves known as cotyledons. These trees are known as dicotyledons. This term simply means two seed leaves. Most trees found in Fiji are dicotyledons. These are usually large woody trees that produce a core of hard heartwood around which is a thinner layer of growing tissue and vessels that conduct water and nutrients up and down thinner layer of growing tissue and vessels that conduct water and nutrients up and down the trunk to all parts of the tree. Dicotyledon trees usually have tap roots. With few exception, these trees normally produce many leafy branches. Examples are Kaudamu, Bauvudi, Mahogany and the flame tree.

In the second group of angiosperm trees the seed produces only one seed leaf. These trees are known as monocotyledons. This means – one seed leaf. In monocotyledon trees the woody tissue is not all solid but scattered in numerous small bundles all though the main trunk. Each bundle has the growing layer and the conducting vessels. Monocotyledon trees normally do not have branches. They also do not have tap roots but a system fibrous roots. Examples are palm trees such as the coconut and royal palm, and pandanus trees.

In Fiji, one may also find tree ferns. These do not belong to any of the above three groups. In terms of evolution, tree ferns are even more primitive than gymnosperms. Like other ferns, tree ferns bear only spores. These are found on small spore sacs on the under-surfaces of their leaves. This book only discusses gymnosperms and dicotyledonous angiosperm trees.

Trees are usually identified scientifically in terms of their genus and species. The genus name is like a surname. The species name is like a person's individual name. Members of a genus may be differentiated from each other by their specific name. For example, many Yasiyasi trees are members of the genus *Syzygium*. There are however several different Yasiyasi. Species *Syzygium wolfii* is a different species from *S. corynocarpum*. Several genera (plural for

genus) that are closely similar make up a family. The genus *Syzygium* is closely related to the genus *Cleistocalyx* which together belong to the family Myrtaceae. Indeed all *Cleistocalyx* trees share the common name Yasiyasi.

In order to identify a tree, one must look at several different features. It is not enough to look only at one. The more important features for differentiating trees, as in all plants are the reproductive parts. These are the cones in gymnosperms, and the flowers and fruits in angiosperms. The structures of the flowers and fruits and the way they are arranged are constant for different families, genera and species. The form of leaves, the way their veins run and the way they are arranged are also used to differentiate families, or genera and species. For field identification, where the leaves and flowers are often too high to examine closely, other features, such as bark, wood trunk form, and the way branches are arranged also help to identify trees.

Scientific classification may not be too different from the way ordinary people classify trees. This is true when the feature of trees are obviously similar. For example, the Fijians recognise all the *Barringtonia* trees as belonging to the same genus. They classify them all as different kinds of Vutu. Their leaves flowers and fruits indicate that they are obviously related. Sometimes however, the similarities are not so obviously related. Then common names do not indicate the similarities or differences recognised scientifically. Common names vary from area to area and even between different persons in some areas. Scientific names are constant so that a species may be recognised anywhere it occurs by anyone who knows how to use scientific keys.

Suliana Siwatibau

Tree List with Scientific Names

<u>Scientific Name</u>	<u>Fijian / Trade Name</u>	<u>Family Name</u>
<i>Acacia richii</i>	Qumu	Mimosaceae
<i>Agathis macrophylla</i>	Dakua Makadre	Araucariaceae
<i>Aglaiia elegans</i>	Lagakali ni veikau / Kautoa	Meliaceae
<i>Aleurites moluccana</i>	Lauci	Euphorbiaceae
<i>Alphitonia zizyphoides</i>	Doi	Rhamnaceae
<i>Alstonia costata</i>	Sorua / Saurua	Apocynaceae
<i>Amaroria soulameoides</i>	Vasa ni veikau	Simaroubaceae
<i>Atuna racemosa</i>	Mākita	Chrysobalanaceae
<i>Barringtonia asiatica</i>	Vutu rakraka	Lecythidaceae
<i>Barringtonia edulis</i>	Vutu	Lecythidaceae
<i>Bischofia javanica</i>	Koka	Euphorbiaceae
<i>Bruguiera gymnorrhiza</i>	Dogo	Rhizophoraceae
<i>Buchanania vitiense</i>	Uko / Damanu ni Yaqqaq	Anacardiaceae
<i>Burckella parviflora</i>	Baumika	Sapotaceae
<i>Calophyllum inophyllum</i>	Dilo	Clusiaceae
<i>Calophyllum leptocladum</i>	Damanu draulalai	Clusiaceae
<i>Calophyllum vitiense</i>	Damanu	Clusiaceae
<i>Canarium harveyi</i>	Kaunicina / Kaunigai	Burseraceae
<i>Cananga odorata</i>	Makosoi	Annonaceae
<i>Casuarina equisetifolia</i>	Nokonoko	Casuarinaceae
<i>Cerbera manghas</i>	Vasa	Apocynaceae
<i>Commersonia bartramia</i>	Sama	Sterculiaceae
<i>Cordia subcordata</i>	Nawanawa	Boraginaceae
<i>Crossostylis seemannii</i>	Tiri vanua	Rhizophoraceae
<i>Cynometra insularis</i>	Cibicibi	Caesalpiniaceae
<i>Dacrycarpus imbricatus</i>	Kautabua / Amunu	Podocarpaceae
<i>Dacrydium nidulum</i>	Yaka	Podocarpaceae
<i>Decaspermum vitiense</i>	Nuqanuqa	Myrtaceae
<i>Degeneria vitiensis</i>	Masiratu	Degeneriaceae
<i>Dendrocnide harveyi</i>	Salato	Urticaceae
<i>Dillenia biflora</i>	Kuluva	Dilleniaceae
<i>Diospyros major</i>	Maba / Kauloa	Ebenaceae
<i>Dysoxylum lenticellare</i>	Bausomi / Malamala	Meliaceae
<i>Dysoxylum richii</i>	Sasawira	Meliaceae
<i>Elaeocarpus lepidus</i>	Kabi	Elaeocarpaceae
<i>Elattostachys falcata</i>	Marasa - I	Sapindaceae
<i>Emmenosperma micropetalum</i>	Tomanu	Rhamnaceae

<u>Scientific Name</u>	<u>Fijian / Trade Name</u>	<u>Family Name</u>
<i>Endiandra elaeocarpa</i>	Qeleqai / Damabi	Lauraceae
<i>Endiandra gillespiei</i>	Tabadamu	Lauraceae
<i>Endospermum macrophyllum</i>	Kauvula	Euphorbiaceae
<i>Erythrina variegata</i>	Drala	Fabaceae
<i>Ficus obliqua</i>	Baka	Moraceae
<i>Ficus smithii</i>	Nunu	Moraceae
<i>Fragraea gracilipes</i>	Buabua	Loganiaceae
<i>Garcinia myrtifolia</i>	Laubu	Clusiaceae
<i>Garcinia pseudoguttifera</i>	Buluwai / Bulu M.	Clusiaceae
<i>Geissois superba</i>	Vure	Cunoniaceae
<i>Glochidion seemannii</i>	Molau	Euphorbiaceae
<i>Glochidion vitiense</i>	Molau Tagane	Euphorbiaceae
<i>Gmelina vitiensis</i>	Rosawa	Verbenaceae
<i>Gnetum gnemon</i>	Sukau	Gnetaceae
<i>Gonystylus punctatus</i>	Mavota	Thymelaeaceae
<i>Gymnostoma vitiense</i>	Yaumunu / Velau	Casurinaceae
<i>Gyrocarpus americanus</i>	Wiriwiri	Hernandiaceae
<i>Haplolobus floribundus</i>	Kaunicina / Kaunigai	Burseraceae
<i>Heritiera ornithocephala</i>	Rogi / Rosarosa	Sterculiaceae
<i>Hernandia olivacea</i>	Makoloa / Dalovoci	Hernandiaceae
<i>Homalanthus nutans</i>	Tadau / Tadano	Euphorbiaceae
<i>Inocarpus fagifer</i>	Ivi	Fabaceae
<i>Intsia bijuga</i>	Vesi	Caesalpiniceae
<i>Kingiodendron platycarpum</i>	Moivi	Caesalpiniceae
<i>Koelreuteria elegans</i>	Manawi	Sapindaceae
<i>Litsea mellifera</i>	Lidi	Lauraceae
<i>Lumnitzera littorea</i>	Sagale	Combretaceae
<i>Macaranga harveyana</i>	Mavu	Euphorbiaceae
<i>Mallotus tiliifolius</i>	Yaqwata / Qetata	Euphorbiaceae
<i>Maniltoa grandiflora</i>	Cibicibi / Moivi levu	Caesalpiniceae
<i>Mastixiodendron robustum</i>	Duvula	Rubiaceae
<i>Metrosideros collina</i>	Vuqa	Myrtaceae
<i>Millettia pinnata</i>	Vesiwai	Fabaceae
<i>Myristica castaneifolia</i>	Kaudamu	Myristicaceae
<i>Neonauclea forsterii</i>	Vacea	Rubiaceae
<i>Pagiantha thurstonii</i>	Tadalo	Apocynaceae
<i>Palaquium hornei</i>	Sacau	Sapotaceae
<i>Palaquium porphyreum</i>	Bauvudi	Sapotaceae
<i>Palaquium vitilevuensis</i>	Bau	Sapotaceae

<u>Scientific Name</u>	<u>Fijian / Trade Name</u>	<u>Family Name</u>
<i>Parinari insularum</i>	Sa	Chrysobalanaceae
<i>Pittosporum pickeringii</i>	Tuvakalo / Duva ni veikau	Pittosporaceae
<i>Pleiogynium timoriense</i>	Manawi / Manui	Anacardiaceae
<i>Plerandra pickeringii</i>	Sole	Araliaceae
<i>Podocarpus neriiifolius</i>	Kuasi	Podocarpaceae
<i>Pometia pinnata</i>	Dawa	Sapindaceae
<i>Pouteria vitiensis</i>	Sarosaro	Sapotaceae
<i>Premna protrusa</i>	Yaro	Verbenaceae
<i>Pterocymbium oceanicum</i>	Ma	Sterculiaceae
<i>Retrophyllum vitiense</i>	Dakua salusalu	Podocarpaceae
<i>Rhizophora mangle</i>	Tiriwai	Rhizophoraceae
<i>Samanea saman</i>	Vaivai ni vavalagi	Mimosaceae
<i>Santalum yasi</i>	Yasi	Santalaceae
<i>Semecarpus vitiensis</i>	Kaukaro	Anacardiaceae
<i>Serianthes melanesica</i>	Vaivai ni viti	Mimosaceae
<i>Spathodea campanulata</i>	Pasiu	Bignoniaceae
<i>Spondias dulcis</i>	Wi	Anacardiaceae
<i>Sterculia vitiensis</i>	Waciwaci	Sterculiaceae
<i>Storckiella vitiensis</i>	Marasa II	Caesalpiniaceae
<i>Swietenia macrophylla</i>	Mahogany	Meliaceae
<i>Syzygium decussatum</i>	Yasimoli	Myrtaceae
<i>Syzygium fijiense</i>	Yadisravi	Myrtaceae
<i>Terminalia capitanea</i>	Tivi loa	Combretaceae
<i>Trichospermum calyculatum</i>	Makoloa	Tiliaceae
<i>Turrillia vitiensis</i>	Kauceuti	Proteaceae
<i>Vavaea amicorum</i>	Sevua / Cevua	Meliaceae
<i>Xylopia pacifica</i>	Dulewa	Annonaceae

Tree List with Fijian Names

<u>Fijian Name</u>	<u>Scientific Name</u>	<u>Family</u>
Amunu	<i>Dacrycarpus imbricatus</i>	Podocarpaceae
Baka	<i>Ficus obliqua</i>	Moraceae
Bau	<i>Palaquium vitilevuense</i>	Sapotaceae
Baumika	<i>Burckella parviflora</i>	Sapotaceae
Bauvudi	<i>Palaquium porphyreum</i>	Sapotaceae
Buabua	<i>Fagraea gracilipes</i>	Loganiaceae
Bulu wai, Bulu M.	<i>Garcinia pseudoguttifera</i>	Clusiaceae
Cevua	<i>Vavaea amicornum</i>	Meliaceae
Cibicibi	<i>Cynometra insularis</i>	Caesalpiniaceae
Dakua makadre	<i>Agathis macrophylla</i>	Araucariaceae
Dakua salusalu	<i>Retrophyllum vitiensis</i>	Podocarpaceae
Dalovoci	<i>Hernandia olivacea</i>	Hernandiaceae
Damabi	<i>Endiandra elaeocarpa</i>	Lauraceae
Damanu	<i>Calophyllum vitiense</i>	Clusiaceae
Damanu draulalai	<i>Calophyllum leptocladum</i>	Clusiaceae
Dawa	<i>Pometia pinnata</i>	Sapindaceae
Dilo	<i>Calophyllum inophyllum</i>	Clusiaceae
Dogo	<i>Bruguiera gymnorrhiza</i>	Rhizophoraceae
Doi	<i>Alphitonia zizyphoides</i>	Rhamnaceae
Drala	<i>Erythrina variegata</i>	Fabaceae
Dulewa	<i>Xylopia pacifica</i>	Annonaceae
Duva ni veikau	<i>Pittosporum pickeringii</i>	Pittosporaceae
Duvula	<i>Mastixiodendron robustum</i>	Rubiaceae
Ivi	<i>Inocarpus fagifer</i>	Fabaceae
Kabi	<i>Elaeocarpus lepidus</i>	Elaeocarpaceae
Kauceuti	<i>Turrillia vitiensis</i>	Proteaceae
Kaudamu	<i>Myristica castaneifolia</i>	Myristicaceae
Kauloa	<i>Diospyros major</i>	Ebenaceae
Kaukaro	<i>Semecarpus vitiensis</i>	Anacardiaceae
Kaunigai	<i>Haplolobus floribundus</i>	Burseraceae
Kaunicina	<i>Canarium harveyi</i>	Burseraceae
Kautoa	<i>Aglaia elegans</i>	Meliaceae
Kauvula	<i>Endospermum macrophyllum</i>	Euphorbiaceae
Koka	<i>Bischofia javanica</i>	Euphorbiaceae
Kuasi	<i>Podocarpus neriifolius</i>	Podocarpaceae
Kuluva	<i>Dillenia biflora</i>	Dilleniaceae
Laubu	<i>Garcinia myrtifolia</i>	Clusiaceae

<u>Fijian Name</u>	<u>Scientific Name</u>	<u>Family</u>
Lauci	<i>Aleurites moluccana</i>	Euphorbiaceae
Lidi	<i>Litsea mellifera</i>	Lauraceae
Ma	<i>Pterocymbium oceanicum</i>	Sterculiaceae
Mahogany	<i>Swietenia macrophylla</i>	Meliaceae
Makita	<i>Atuna racemosa</i>	Chrysobalanaceae
Makoloa	<i>Trichospermum calyculatum</i>	Tiliaceae
Makosoi	<i>Cananga odorata</i>	Annonaceae
Malamala	<i>Dysoxylum lenticellare</i>	Meliaceae
Manawi	<i>Koelreuteria elegans</i>	Sapindaceae
Manui	<i>Pleiogynium timoriense</i>	Anacardiaceae
Marasa I	<i>Elatostachys falcata</i>	Sapindaceae
Marasa II	<i>Storckiella vitiensis</i>	Caesalpiniaceae
Masiratu	<i>Degeneria vitiensis</i>	Degeneriaceae
Mavota	<i>Gonystylus punctatus</i>	Thymelaeaceae
Mavu	<i>Macaranga harveyana</i>	Euphorbiaceae
Moivi	<i>Kingiodendron platycarpum</i>	Caesalpiniaceae
Moivi levu	<i>Maniltoa grandiflora</i>	Caesalpiniaceae
Molau	<i>Glochidion seemannii</i>	Euphorbiaceae
Molau Tagane	<i>Glochidion vitiense</i>	Euphorbiaceae
Nawanawa	<i>Cordia subcordata</i>	Boraginaceae
Nokonoko	<i>Casuarina equisetifolia</i>	Casuarinaceae
Nunu	<i>Ficus smithii</i>	Moraceae
Nuqanuqa	<i>Decaspermum vitiense</i>	Myrtaceae
Pasiu	<i>Spathodea campanulata</i>	Bignoniaceae
Qetata	<i>Mallotus tiliifolius</i>	Euphorbiaceae
Qumu	<i>Acacia richii</i>	Mimosaceae
Rosarosa	<i>Heritiera ornithocephala</i>	Sterculiaceae
Rosawa	<i>Gmelina vitiensis</i>	Verbenaceae
Sa	<i>Parinari insularum</i>	Chrysobalanaceae
Sacau	<i>Palaquium hornei</i>	Sapotaceae
Sagale	<i>Lumnitzera littorea</i>	Combretaceae
Salato	<i>Dendrocnide harveyi</i>	Urticaceae
Sama	<i>Commersonia bartramia</i>	Sterculiaceae
Sarosaro	<i>Pouteria vitiensis</i>	Sapotaceae
Sasawira	<i>Dysoxylum richii</i>	Meliaceae
Sole	<i>Plerandra pickeringii</i>	Araliaceae
Sorua / Saurua	<i>Alstonia costata</i>	Apocynaceae
Sukau	<i>Gnetum gnemon</i>	Gnetaceae
Tabadamu	<i>Endiandra gillespiei</i>	Lauraceae

<u>Fijian Name</u>	<u>Scientific Name</u>	<u>Family</u>
Tadalo	<i>Pagiantha thurstonii</i>	Apocynaceae
Tadano	<i>Homalanthus nutans</i>	Euphorbiaceae
Tiriwai	<i>Rhizophora mangle</i>	Rhizophoraceae
Tiri vanua	<i>Crossostylis seemannii</i>	Rhizophoraceae
Tivi loa	<i>Terminalia capitanea</i>	Combretaceae
Tomanu	<i>Emmenosperma micropetalum</i>	Rhamnaceae
Uko	<i>Buchanania vitiense</i>	Anacardiaceae
Vacea	<i>Neonauclea forsteri</i>	Rubiaceae
Vavai ni vavalagi	<i>Samanea saman</i>	Mimosaceae
Vavai ni viti	<i>Serianthes melanesica</i>	Mimosaceae
Vasa	<i>Cerbera manghas</i>	Apocynaceae
Vasa ni veikau	<i>Amaroria soulameoides</i>	Simaroubaceae
Velau	<i>Gymnostoma vitiense</i>	Casuarinaceae
Vesi	<i>Intsia bijuga</i>	Caesalpiniaceae
Vesiwai	<i>Millettia pinnata</i>	Fabaceae
Vuga	<i>Metrosideros collina</i>	Myrtaceae
Vure	<i>Geissois superba</i>	Cunoniaceae
Vutu rakraka	<i>Barringtonia asiatica</i>	Lecythidaceae
Vutu	<i>Barringtonia edulis</i>	Lecythidaceae
Waciwaci	<i>Sterculia vitiensis</i>	Sterculiaceae
Wi	<i>Spondias dulcis</i>	Anacardiaceae
Wiriwiri	<i>Gyrocarpus americanus</i>	Hernandiaceae
Yaka	<i>Dacrydium nidulum</i>	Podocarpaceae
Yadisravi	<i>Syzygium fijiense</i>	Myrtaceae
Yasi	<i>Santalum yasi</i>	Santalaceae
Yasimoli	<i>Syzygium decussatum</i>	Myrtaceae
Yaro	<i>Premna protrusa</i>	Verbenaceae

Key to Families

The dichotomous key below allows you to identify the family a tree belongs to by taking you through successive pairs of choices. For example the key begins by giving you the choices of the leaves being scale- or needle-like (1a) or the leaves being broad (1b). If the leaves of the plant are scale- or needle-like (as in **yaka**, *Dacrydium nidulum*), you would continue with the choices below 1a, i.e. 2a or 2b. But if the leaf of your plant is broader, you would move on to the next set of choices below 1b, i.e. leaves compound (3a) or leaves simple (3b).

Because this book deals with many species, the key is subdivided into several inter-linked keys. To determine the genus of a tree, you will need to look up the keys presented under the various families (see page 1 for page numbers of the different families).

The Forest and tree Program (FAT) of the Secretariat of the Pacific Community's (SPC) Land Resources Division (LRD) in partnership with PACINET (SPC, USP, SPRH, SPREP) will explore avenues for converting the dichotomous keys contained within this guide into multi-media LUCID identification keys (see <http://www.lucidcentral.com/>). Anyone interested in assisting with this option should contact the FAD Regional Forest Genetic Recourses Officer (cenonP@spc.int) or the PACINET Coordinator via the program website (<http://www.pbif.org/PACINET/default.html>).

General Key

- 1a. Leaves scale- or needle-like
 - 2a. Leaves whorled and joined into toothed sheaths Casuarinaceae
 - 2b. Leaves scale- or needle-like, not whorled Podocarpaceae
- 1b. Leaves broad ("leaf-like")
 - 3a. Leaves compound **Key A**
 - 3b. Leaves simple, or appearing simple
 - 4a. Leaf veins parallel to each other
 - 5a. Leaves opposite Araucariaceae
 - 5b. Leaves alternate
 - 6a. About 5 parallel veins present *Exocarpus* (Santalaceae)
 - 6b. More than 5 parallel veins present.
 - 'Leaves' are actually modified petioles *Acacia* (Mimosaceae)
 - 4b. Leaves have a central vein from which smaller veins originate (pinnate venation)
 - 7a. Leaves opposite or whorled (2 or more leaves originate at every node) **Key B**
 - 7b. Leaves alternate (1 leaf per node)
 - 8a. Leaves originate from branches in one plane (distichous leaves) **Key C**
 - 8b. Leaves spirally arranged **Key D**

Key A (Leaves compound)

- 1a. Leaves opposite
 - 2a. Stipules obvious and leaf-like Cunoniaceae
 - 2b. Stipules minute or absent Verbenaceae
- 1b. Leaves alternate or spirally arranged
 - 4a. Base of petiole (and usually of petiolule) swollen (pulvinus present)
 - 5a. Leaves bipinnate Mimosaceae
 - 5a. Leaves simple pinnate
 - 6a. Leaflets arranged as opposite pairs (even number of leaflets) or alternate Caesalpiniaceae
 - 6b. Leaflets opposite and with a terminal leaflet (uneven number of leaflets) Fabaceae
 - 4b. Base of petiole swollen or not
 - 7a. Leaflets originating at a single point (leaves palmately compound)
 - 8a. Base of petiole sheathing stem Araliaceae
 - 8b. Base of petiole not sheathing *Sterculia* (Sterculiaceae)
 - 7b. Leaflets originating at several points from a central axis (leaves pinnately compound)
 - 9a. Leaves composed of 3 leaves (trifoliate); leaflet margins serrate *Bischofia* (Euphorbiaceae)
 - 9b. Leaves not trifoliate
 - 10a. Leaf rachis extended beyond distal leaflets Sapindaceae
 - 10b. Leaf rachis not extended beyond distal leaflets
 - 11a. Leaflets asymmetric at base
 - 12a. Secondary veins curve close to leaf margin; latex often turning brown or black Anacardiaceae
 - 12b. Veins curve earlier; latex absent Meliaceae
 - 11b. Leaflets more or less symmetric at base
 - 13a. Cut bark smells of unripe mangoes Burseraceae
 - 13b. Cut bark does not smell of unripe mangoes
 - 14a. Petiole with stripes of lighter colour Araliaceae
 - 14b. Petiole without lighter coloured stripes
 - 15a. Young leaves hairy Meliaceae
 - 15b. Young leaves not hairy Proteaceae

Key B (Leaves simple and opposite or whorled)

- 1a. Base of petiole expanded to cover developing leaves
 - 2a. Leaves and/ or bark with white or coloured sap
 - 3a. White sap exuded abundantly when a leaf is broken Apocynaceae
 - 3b. No coloured sap exuded on breaking leaf Clusiaceae
 - 2b. Coloured sap lacking Loganiaceae
- 1b. Base of petioles not expanded
 - 4a. Stipules or stipule-like appendages obvious
 - 5a. Stilt-roots/ pneumatophores present, stipules sheathing Rhizophoraceae
 - 5b. Stilt-roots lacking
 - 6a. Opposing leaves of unequal size; Leaves often almost white underneath; leaf epidermis often marked with prominent cystoliths Urticaceae
 - 6b. Opposing leaves of approximately equal size; leaves undersurface not as above; cystoliths absent
 - 7a. Stipules joined to form a persistent rim around stem Loganiaceae
 - 7b. Stipules not forming a persistent rim around the stem
 - 8a. Leaf margins usually dentate Cunoniaceae
 - 8b. Leaf margins usually entire Rubiaceae
- 4b. Stipules minute or absent
 - 9a. Nodes conspicuously swollen Gnetaceae
 - 9b. Nodes not or only slightly swollen
 - 10a. 1 or 2 marginal collecting veins (parallel to the leaf margin) present Myrtaceae
 - 10b. Marginal collecting veins lacking
 - 11a. Petiole short (to 1cm long)
 - 12a. Leaves light green, petiole thin, wood scented Santalaceae
 - 12b. Leaves dark green, petiole stouter, wood not scented
 - 13a. Narrow band of leaf tissue fringes the tip of the petiole (leaves decurrent) *Austrobuxus* (Euphorbiaceae)
 - 13b. Leaf blades not decurrent on petiole Thymelaeaceae
- 11b. Petiole longer (more than 1.5cm long)
 - 14a. Petiole thick and sometimes wrinkled Lauraceae
 - 14b. Petiole thin and never wrinkled Verbenaceae

Key C (Distichous leaves – simple, alternate and in one plane)

- 1a. Stipules conspicuous
 - 2a. White sap exuded by leaves when broken; stipules fused into a stipular sheath / hood Moraceae
 - 2b. White sap absent; stipules not fused
 - 3a. Petiole swollen and wrinkled Chrysobalanaceae
 - 3b. Petiole neither swollen nor wrinkled Urticaceae
- 1b. Stipules minute or absent
 - 4a. Stem exuding red sap when cut; petioles S-shaped Myristicaceae
 - 4b. Stem without coloured sap; petioles not S-shaped
 - 5a. Leaves with black dots on the underside *Gonystylus* (Thymelaeaceae)
 - 5b. Leaves lack black dots on the underside
 - 6a. Tertiary veins run perpendicular to secondary veins producing a ladder-like venation Rhamnaceae
 - 6b. Venation not ladder-like
 - 7a. Fruits subtended by sepals; stem usually black; narrow band of leaf tissue fringes the tip of the petiole (leaves decurrent) Ebenaceae
 - 7b. Fruits not subtended by sepals
 - 8a. The two halves of emerging leaves folded against each other along the main vein (conduplicate); fruits produced on an umbel Annonaceae
 - 8b. Emerging leaves not conduplicate
 - 9a. Base of leaf strongly asymmetric Alangiaceae
 - 9b. Base of leaves more or less symmetric
 - 10a. Petiole thick and short (less than 5mm), leaf forms a small flap on either side where the petiole is attached (leaf cordate) *Inocarpus* (Fabaceae)
 - 10b. Not the above combination of characters Euphorbiaceae

Key D (Leaves alternate, spirally arranged)

- 1a. Leaves appearing 3-veined (3 veins arise at the leaf base and run almost the entire length of the leaf)
 - 2a. Stipular hood present Urticaceae
 - 2b. Stipular hood absent
 - 3a. Leaves hairy Tiliaceae
 - 3b. Leaves glabrous
 - 4a. Leaves rounded at base or forming a small flap on either side where the petiole is attached (cordate); leaf tissue never fringes the tip of the petiole (not decurrent) Tiliaceae
 - 4b. Leaves may appear cordate or rounded but decurrent on petiole
 - 5a. Leaves glossy, leather-like, almost oval Hernandiaceae
 - 5b. Leaves thin, paper-like, somewhat triangular Boraginaceae
- 1b. Secondary veins arise perpendicular to the main vein (pinnate venation)
 - 6a. Leaves sessile or almost so
 - 7a. Leaves with white hair on undersurface Boraginaceae
 - 7b. Leaves without hair
 - 8a. Smaller branches curve upward from bigger branches as seen in the genus *Terminalia* (*tivi*) (*Terminalia*-branching present) Combretaceae
 - 8b. Smaller branches are more or less straight (no *Terminalia*-branching) Lecythidaceae
 - 6b. Leaves with distinct petiole
 - 9a. Leaves densely silvery hairy on the underside *Hibbertia* (Dilleniaceae)
 - 9b. Leaves glabrous or with few hairs
 - 10a. Leaves narrowly lanceolate
 - 11a. Secondary veins obvious *Dodonea* (Sapindaceae)
 - 11b. Secondary veins inconspicuous *Podocarpus* (Podocarpaceae)
 - 10b. Leaves broader
 - 12a. Petioles winged (fringed by leaf tissue throughout) *Dillenia* (Dilleniaceae)
 - 12b. Petioles not winged
 - 13a. Base of leaves sheathing stem Araliaceae
 - 13b. Base of leaves not sheathing stem
 - 14a. Leaves arranged in successive clusters on same branch Pittosporaceae
 - 14b. Leaves may be clustered at tips of branches but not with several clusters on same branch
 - 15a. Petioles thickened at both ends
 - 16a. Petiole very long, yellow; leaf margins

smooth; veins forming a very fine mesh	Simaroubaceae
16b. Petioles usually shorter; leaf margins toothed in some species; veins forming broader mesh	Elaeocarpaceae
15b. Petioles not swollen where they attach to leaf	
17a. Leaves brown or silver beneath	
18a. Leaves with dense cover of dark brown hairs beneath	Proteaceae
18b. Leaves glabrous beneath	Sterculiaceae
17b. Leaves green on both surfaces	
19a. Smaller branches curve upward from bigger branches (<i>Terminalia</i> -branching); leaves crowded at tips of branches	
20a. White sap exuded when cut (in some species only after 1 to 2 minutes)	Sapotaceae
20b. White sap absent	
21a. Leaves very densely arranged on tip of branches; fruit a drupe	Combretaceae
21b. Leaves clustered at tip of branches but less dense; fruit a berry	Meliaceae
19b. <i>Terminalia</i> -branching absent	
22a. Petiole (long); leaf midrib yellow	Degeneriaceae
22b. Above set of characters absent	
23a. Veins curving close to leaf margin; sap turning black or brown after exposure	Anacardiaceae
23b. Above set of characters absent	Lauraceae

Photo Credits

The initials in brackets in the captions refer to the following sources:

BT = Baravi Thaman	LB = Laura J. Blank
GK = Gunnar Keppel	MS = Martin Speier
GP = Gregory M. Plunkett	RB = Rainer J. Blank
HB = Hildegund Blank	SPRH = South Pacific Regional Herbarium
JM = Jalesi Mateboto	RD = Randy Thaman

Pictures without initials in the captions are taken from the first edition with sources no more known.



FAMILY & SPECIES DESCRIPTIONS

ANACARDIACEAE (Mango family)

Worldwide: 73 genera; c. 850 species, mainly tropical, few temperate.

Fiji: 11 genera, 6 indigenous.

Economic Importance: Tannins, fruits (cashew, pistachio, mango) and ornamentals. Mango (*Mangifera indica*) is widely cultivated in Fiji.

Family Characteristics

Trees, shrubs or lianas; bark resinous and many exude latex (often poisonous) that turns brown or black upon exposure. Slash pinkish to reddish brown. Stipules lacking. Leaves alternate (spirally arranged), imparipinnately compound or simple. Venation pinnate with secondary veins often curving close to margin. Leaflets usually asymmetric at base. Petiolar scars usually conspicuous and shield-like. Flowers numerous, often white, mostly about 5mm across in upright, branched, terminal and cymose inflorescences. Fruit a drupe.

Indigenous Genera and Species

Buchanania (**damanu ni yaqaqa uko, maqo in veikau**) 2 endemic spp., 1 described

Dracontomelon (**tarawau**) 1 sp.

Pleiogynium (**manui, totowiwi**) 2 spp., 1 endemic, 1 described

Rhus (**manawi**) 1 sp.

Semecarpus (**kaukaro**) 1 sp., described

Spondias (**wi**) 1 sp., aboriginal introduction, described

Key to Indigenous Genera

- | | |
|---|----------------------|
| 1a. Leaves simple; stamens twice as many as the petals, all fertile | |
| 2a. Leaves green beneath; venation closed | <i>Buchanania</i> |
| 2b. Leaves grey-green beneath; venation open | <i>Semecarpus</i> |
| 1b. Leaves compound; stamens 5-10, but usually only one fertile | |
| 3a. Leaflets with conspicuous intramarginal veins | <i>Spondias</i> |
| 3b. Leaflets lacking intramarginal veins | |
| 4a. Secondary veins of leaflets curve strongly about halfway between the midrib and leaf margin | <i>Dracontomelon</i> |
| 4b. Secondary veins of leaflets curve close to the leaf margin | |
| 5a. Rachis sometimes narrowly winged; stamens 5; fruit a subglobose, 1-seeded, fleshy drupe | <i>Rhus</i> |
| 5b. Rachis not winged; stamens usually 10; fruit subglobose, containing scone-shaped, 5- or more-seeded capsule | <i>Pleiogynium</i> |



Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5

Buchanania vitiense Engl.

Fijian name: Uko

Trade name: Damanu ni Yaqqa

Height: 8-18m, with a spreading crown.

Bark: Grey-brown with circular ridges with a dark pink tinge.

Slash: Blood-red, with the inner layers successively pink to white; wood light, no latex.

Leaves: Simple, obovate, leathery, 15-30 x 6-15cm (about twice as long as broad), margin entire, apex pointed. Petiole stout and 1cm or less long.

Flowers: Creamy-white, c. 7mm across, borne in terminal clusters amongst the leaves.

Fruits: Ovoid, deep purple.

Flowering & Fruiting: August to December; December to March.

Habitat: Beach thickets and lowland coastal forest.

Altitude: Sea level to 80m.

Distribution: Endemic to Fiji and so far known from Viti Levu, Wakaya, coastal areas and on smaller islands off Vanua Levu and from islands in the Lau group.

Uses: A useful timber tree.

Comments: The second endemic species, *Buchanania attenuata* A.C. Sm. (**maqo ni veikau**), is distinguished from *B. vitiense* by its leaves that are 3 to 4 times longer than broad, and longer petioles.

Diagnostic features: Grey-brown bark with circular pink tinged patches (similar in colour to *Calophyllum vitiense*, **damanu**). Latex absent. Large obovate leaves similar to *Palaquium vitilevuense* (**bau**). Venation closed

Fig. 1: Habit of *Buchanania attenuata*. (RB)

Fig. 2: Slash of the bark of *Buchanania attenuata*. (GK)

Fig. 3: Inflorescence and leaves of *Buchanania vitiense*.

Fig. 4: Fruits of *Buchanania attenuata*. (RB)

Fig. 5: Leaves of *Buchanania vitiense*. (GK)



Fig. 6



Fig. 7



Fig. 8



Fig. 9

Pleiogynium timoriense (DC.) Leenh.

Fijian names: Manawī, tōlō (waya)

Trade name: Manui

Height: 3-30m, with a spreading rounded crown. Trunk to 1m in diameter.

Bark: Dark grey to blackish outer bark with deep, horizontal fissures.

Slash: Thick red inner bark over light coloured wood. Sap reddish.

Leaves: Alternate, spirally arranged, 10-40cm long, imparipinnately compound. Leaflets strongly asymmetric at the base, 6-13 × 3-6cm in size. Lowest leaflets usually half the size of the biggest. Young parts glabrous. Leaves may be shed during prolonged dry spells, making the tree drought-deciduous.

Flowers: Flowers white to pale yellow, to 4mm across, 5-merous, borne in axillary inflorescences.

Fruits: Rounded, fleshy, to 2.5cm in diameter, ripening red to purple. The seed is contained in a capsule that often looks like a scone with ridges on the upper surface.

Flowering & Fruiting: Throughout the year.

Habitat: Dense moist and dry forest, secondary forest and in coastal vegetation.

Altitude: Near sea level to c. 1,000m.

Distribution: Found in Malesia, Queensland and the Pacific, where it does not occur east of Tonga. Recorded in Fiji on Viti Levu, Vanua Levu, Ovalau, Gau, Waya (Yasawa Group) and several islands in the Lau Group.

Uses: A useful timber tree. Traditionally used in canoe and house building.

Comments: The other species, *P. hapalum* A.C.Sm. is endemic to Fiji and can be differentiated by having hairy young parts, petioles, surfaces of leaflets and inflorescences.

Diagnostic features: Dark grey to blackish bark with deep, horizontal fissures. Dark green, imparipinnate leaves that may be shed during prolonged dry spells. Characteristic scone-shaped, seed-containing capsule that can often be found below the tree.

Figure 6: Habit of *Pleiogynium timoriense*. (GK)

Figure 7: Bark of *Pleiogynium timoriense*. (GK)

Figure 8: Fruits and compound leaves of *Pleiogynium timoriense*. (GK)

Figure 9: Scone-shaped capsule of *Pleiogynium timoriense*. (BT)



Fig. 10



Fig. 11

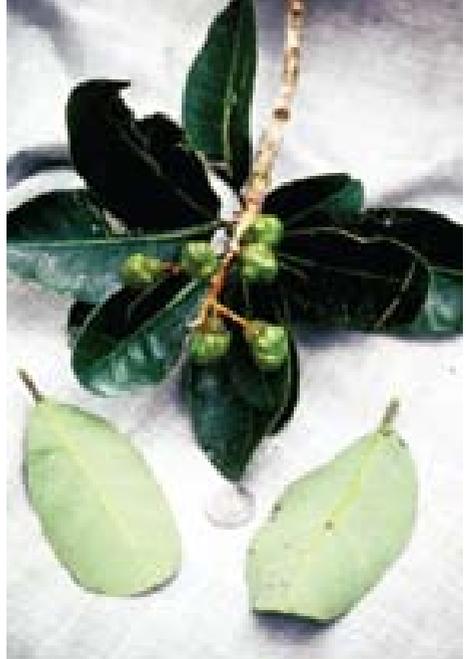


Fig. 12

Semecarpus vitiensis (A. Gray) Engl.

Fijian names: **Kaukaro**, kaukara (Wainibuka), malawaci (Vanua Levu, Lau)

English name: Poison wood

Height: 5-30m, with a spreading rounded crown.

Bark: Yellow-brown to mud-brown to grey with light brown patches where flakes have been shed. Characteristically fissured with lenticels.

Slash: Blood-red to pink, with brown inner layer; wood white. Exudate poisonous, causing irritation on contact, yellow or brown, darkening black, hardening on exposure.

Leaves: Simple, c. 20 x 7cm, obovate, stiff and leathery, dark green above, grey-green beneath, margin entire, pointed with rounded apex.

Flowers: Bisexual or unisexual, white, c. 8mm across, borne in terminal or subterminal branched inflorescences.

Fruits: Irregularly rounded, c. 3cm in diameter, green, ripening orange to purple-black, soft and fleshy.

Flowering & Fruiting: Throughout the year.

Habitat: Dense forest.

Altitude: Near sea level to 900m.

Distribution: Recorded in Fiji on Viti Levu, Vanua Levu, Kadavu, Ovalau and Kabara. Elsewhere in the Pacific in Tonga and Vanuatu.

Uses: A useful timber tree.

Comments: Great care should be taken when breaking leaves or branches of this tree, because its sap causes painful burns that may persist for several days.

Diagnostic features: Yellow-brown to grey bark with lenticels over red inner bark, exudate turning black like coal-tar and hardening on exposure, irritant on contact with skin. **BE CAREFUL NOT TO COME IN CONTACT WITH THE SAP!** Dark green leaves with a grey-green undersurface. Irregularly rounded fruits.

Fig. 10: Habit of *Semecarpus vitiensis*.

Fig. 11: Slash of bark of *Semecarpus vitiensis*. Note the dark colour of the hardened exudates covering the red inner bark. (GK)

Fig. 12: Leaves and fruits of *Semecarpus vitiensis*. Note the greyish underside of the leaves.



Fig. 13



Fig. 14



Fig. 16



Fig. 15



Fig. 17

Spondias dulcis G.Forest.

Fijian names: Wi

Rotuman name: Vi

English name: Polynesian Plum

Height: 8-20m, with a light, open crown.

Bark: Chalky-grey brown, with conspicuous lenticels; bark peeling off in small flakes.

Slash: Light pink with red-brown and white streaks; inner layer white-yellow, covering yellow-white wood.

Leaves: Pinnately compound with 5-15 leaflets, the entire leaf up to 40cm; leaflets ovate with serrate margins and a distinct vein running parallel to the leaf margin. Leaves deciduous, smelling of unripe mangoes when crushed.

Flowers: Bisexual or unisexual, small white, borne in terminal or subterminal branched inflorescences. Petals and sepals 4 to 5.

Fruits: Globose, 5-7cm in diameter, green, turning yellow to orange when ripe, edible.

Flowering & Fruiting: August to December; more or less throughout the year.

Habitat: Dry secondary forest; often cultivated.

Altitude: Sea level to 500m.

Distribution: Throughout Fiji, possibly as a naturalised aboriginal introduction from western Melanesia. Commonly cultivated.

Uses: Fruit is edible and the leaves are used as flavouring for meat. The bark is medicinal. The tree produces a soft wood.

Diagnostic features: Chalky-grey brown bark. Light, open crown. Deciduous, large, pinnately compound leaves with leaflets that have an intramarginal vein. Large, rounded edible fruits

Fig. 13: Habit (deciduous stage) of *Spondias dulcis*. (RB)

Fig. 14: Slash of the bark of *Spondias dulcis*. (GK)

Fig. 15: Compound leaves of *Spondias dulcis*. (GK)

Fig. 16: Fruits of *spondias dulcis*. (RB)

Fig. 17: Inflorescence of *Spondias dulcis*. (RB)

ANNONACEAE (Soursop family)

Worldwide: 128 genera; c. 2,050 spp., pantropical, mainly Old World tropics.

Fiji: 6 genera, 4 indigenous

Economic Importance: Fruits (soursop or **seremaia**, custard apple) and aromatic oils (*Cananga odorata*). *Annona glabra* (bullock's heart or **uto ni bulumakau**) is now widely naturalized in Fiji.

Family Characteristics

Trees, shrubs or lianas, often aromatic with greyish bark and (in Fijian species) with round, elevated lenticels. Tips of branches often drooping and slightly zigzagging. Stipules absent. Leaves alternate, simple, entire and often pellucid-dotted and shiny. Venation pinnate. Petiole with a groove towards the base. Young leaves sometimes red and folded along the main vein (conduplicate). Flowers often fragrant, yellow, white or greenish, usually bisexual, hypogynous, usually 3-merous, on short, woody stalks, solitary or in different forms of cymose inflorescences, sometimes borne on branches or the trunk. Fruit an aggregate of berries or dry and mostly indehiscent, green ripening black.

Indigenous Genera and Species

Cananga 1 sp., (**makosoi**) aboriginal introduction, described

Cyathocalyx (**makosoi**) 4 endemic spp.

Meiogyne 1 endemic sp.

Polyalthia (**mocelolo**) 8 endemic spp.

Richella (**makosoi**) 1 endemic sp.

Xylopia (**dulewa**) 3 endemic sp., 1 described

Key to the Indigenous Genera

- | | |
|---|--------------------|
| 1a. Petiole broadening away from stem | <i>Xylopia</i> |
| 1b. Petiole not broadening away from stem | |
| 2a. Petiole about 5mm long (up to 8mm); leaf base asymmetric;
carpels numerous | <i>Polyalthia</i> |
| 2b. Petiole more than 7mm long; leaf base symmetric;
carpels 15 or less | |
| 3a. Petiole usually more than 1.5cm long | <i>Cyathocalyx</i> |
| 3b. Petiole about 1cm long | |
| 4a. Petiole 1mm or more in diameter; seeds
conspicuously winged | <i>Richella</i> |
| 4b. Petiole less than 1mm in diameter; seeds not winged | <i>Cananga</i> |



Fig. 18



Fig. 19



Fig. 20



Fig. 21

Cananga odorata (Lam.) Hook.f. & Thomson.

Fijian names: Makosoi, makusui, masōi. (Labasa)

Rotuman name: Moskoi

English names: Ylang Ylang, perfume tree.

Height: 6-20m; crown open and spreading with branches roughly horizontal to the trunk.

Bark: Grey-brown to light grey, fibrous.

Slash: Light yellow with a brown tinge; inner layer white over white wood. The cut bark emits a ginger-like smell when mature.

Leaves: Simple, oblong, c. 20 x 7cm, arranged alternately in one plane, margin entire, apex acuminate, dull green beneath.

Flowers: Yellow-green, c. 5cm across, fragrant, with 6 linear, often unequal petals; sepals 3, yellow, maturing green-yellow.

Fruits: Obovoid, c. 3cm in diameter, black when mature, hanging in clusters.

Flowering & Fruiting: Throughout the year.

Habitat: Secondary forest, cultivated and naturalized.

Altitude: Sea level to 800m.

Distribution: Throughout Fiji and SE Asia, Malaysia, Northern Australia, Melanesia, Western Micronesia and as far as Tahiti and the Marquesas.

Uses: Flowers used for scenting coconut oil and a valued component of *salusalu* (traditional garlands). The bark is medicinal and the wood is used for timber. Seed oil used as perfume.

Diagnostic features: Horizontal branches. Bark greyish in colour. Fragrant yellow flowers with linear petals. Leaves shiny, alternate and arranged in one plane.

Fig. 18: Habit of *Cananga odorata*. (RB)

Fig. 19: Slash of *Cananga odorata*.

Fig. 20: Distichously arranged leaves and flower of *Cananga odorata*. (GK)

Fig. 21: Cluster of fruits of *Cananga odorata*. (RB)



Fig. 22



Fig. 23



Fig. 24



Fig. 25

Xylopia pacifica A.C. Sm.

Fijian name: Dulewa.

Tradename: Dulewa

Height: 3-24m; crown open and spreading; branches roughly horizontal to the trunk; trunk slender or to 40cm in diameter; sometimes shrub-like.

Bark: Grey-brown to light grey. sometime with small, round black lenticels

Slash: Brown over white wood, emitting a ginger-like smell when cut.

Leaves: Simple, oblong, c. 12 x 5cm, arranged alternately in one plane, margin entire, apex acuminate, dull green beneath. Petioles less than 1cm long and broaden away from stem.

Flowers: Pale yellow, c. 1cm across, fragrant.

Fruits: Obovoid, to 3cm in diameter when mature, hanging in clusters.

Flowering & Fruiting: Throughout the year.

Habitat: Different types of rainforest.

Altitude: Sea level to 900m.

Distribution: Endemic to Fiji and found on several of the larger islands.

Uses: Timber.

Comments: The other 2 endemic species of *Xylopia* are comparatively rare and have longer petioles.

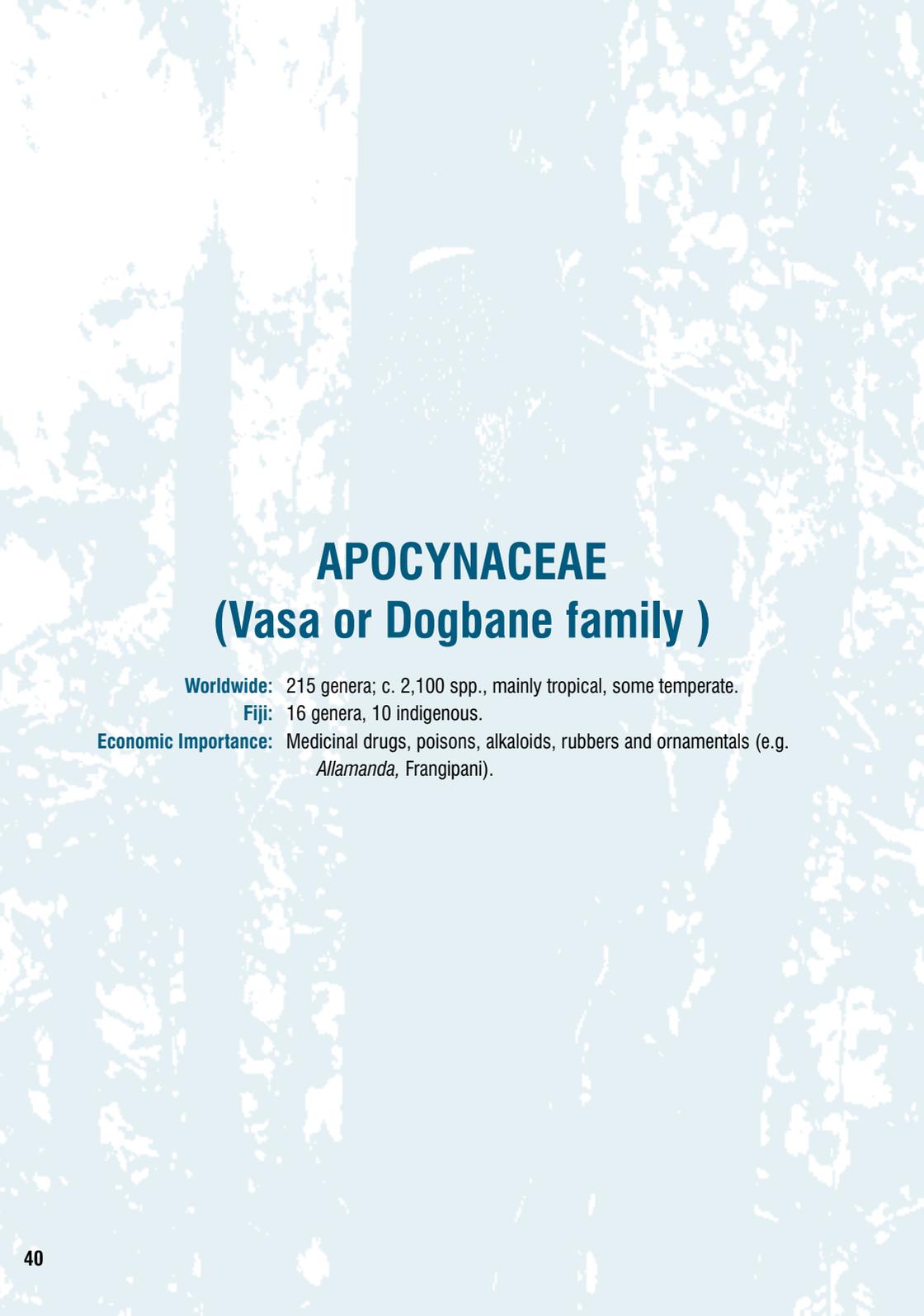
Diagnostic features: Grey brown bark that emits a ginger-like smell when cut; sometimes covered with black lenticels. Petioles broadening away from the stem.

Fig. 22: Habit of *Xylopia pacifica*. (GK)

Fig. 23: Slash of the bark of *Xylopia pacifica*. (SPRH)

Fig. 24: Distichously arranged alternate leaves of *Xylopia pacifica*. (GK)

Fig. 25: Petiole of *Xylopia pacifica*. Note how it broadens away from the branch. (GK)



APOCYNACEAE (Vasa or Dogbane family)

Worldwide: 215 genera; c. 2,100 spp., mainly tropical, some temperate.

Fiji: 16 genera, 10 indigenous.

Economic Importance: Medicinal drugs, poisons, alkaloids, rubbers and ornamentals (e.g. *Allamanda*, Frangipani).

Family Characteristics

Trees, shrubs, lianas, herbs and succulents. Latex milky, sometimes poisonous. Lenticels elevated and retaining circular form upon secondary growth. Stipules often interpetiolar. Leaves simple, opposite-decussate, in whorls or spiral, entire and usually adhering by white threads when broken. Venation pinnate. Base of Petiole often with a groove and broadly attached to protect apical bud. Flowers often showy, bisexual and usually 5-merous, white or yellowish (Fijian species). Inflorescence a cyme or raceme. Petals partially fused. Fruits diverse (usually paired and drupe or pod like in the Fijian species).

Indigenous Genera and Species

Alstonia (**sorua**) 3 spp., 2 endemic, 1 described

Alyxia (**vono**) 3 spp., 1 end. (lianas)

Carruthersia 2 end. spp. (lianas)

Cerbera (**vasa, rewa**) 1 sp., described

Tabernaemontana (synonym: **kolovesi, vuetinaitasiri**) synonym: *Ervatamia* 1sp.

Melodinus 2 spp. (lianas)

Neisosperma (**vao**) 1 sp.

Ochrosia 1 sp.

Pagiantha (**vuetinaitasiri, tadalo**) 1 endemic sp., described

Parsonsia 2 spp., 1 end. (lianas)

Key to Indigenous Tree Genera

- | | |
|---|------------------------|
| 1a. Leaves spirally arranged and crowded towards the apex | <i>Cerbera</i> |
| 1b. Leaves opposite or whorled | |
| 2a. Leaves whorled (more than 2 leaves originating at a node) | |
| 3a. Leaves mostly more than 5cm wide, thin leathery, shiny on the upper surface; fruit ovoid | <i>Neisosperma</i> |
| 3b. Leaves mostly less than 5cm wide, usually papery and not shiny; fruit dorsiventrally compressed | <i>Ochrosia</i> |
| 2b. Leaves opposite | |
| 4a. Petiolar scars broad and shield-like | |
| 5a. Opposing leaves of equal size; fruit pod-like | <i>Alstonia</i> |
| 5b. Opposing leaves of unequal size; fruit drupe-like | <i>Pagiantha</i> |
| 4b. Petiolar scars narrow and rounded | <i>Tabernaemontana</i> |



Fig. 26



Fig. 27



Fig. 28



Fig. 29



Fig. 30



Fig.31

Alstonia costata (G. Forst.) R. Br.

Synonym: *Alstonia pacifica* (Seem.) A.C. Sm.

Fijian names: *Saurua*, bulei, (Yasayasasaira, Yasayasabeqa, Rakiraki, Macuata), drega (Bua, Wailevu), dregabulei (Ovalau), sorua (Namosi), (all the names may be used for any of the *Alstonia* species in Fiji).

Trade name: Sorua

Height: 2-20m, slender, with *Terminalia*-like branching.

Bark: Light-grey to grey-brown, smooth.

Slash: Inner bark yellow-brown over white wood and exuding white sap that hardens on exposure.

Leaves: Simple, opposite and decussate, 7-22 x 3-11cm, obovate to ovate, margin entire, apex acute; stipules absent. Base of opposing petioles is expanded and clasping the stem, protecting the developing leaves and eventually forming a ligule.

Flowers: Bisexual, white, small (about 1cm across), in spreading inflorescences towards the tips of branches. Petals and sepals 5.

Fruits: Linear capsules, 13-38cm long, splitting at maturity. Seeds winged.

Flowering & Fruiting: Throughout the year.

Habitat: Secondary and lowland forest, coastal thickets.

Altitude: Sea level to 1000m.

Distribution: Recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau, Koro and Moala. Elsewhere in the Pacific recorded from the Solomon Islands, Vanuatu and Samoa.

Uses: Latex is used as chewing gum. The species is a potential source of natural rubber.

Comments: There are three species of *Alstonia* in Fiji. The other common species, *Alstonia vitiensis* Seem., can be distinguished from *A. costata* by its larger leaves (up to 60 x 30 cm). There are two forms of *A. vitiensis* that are differentiated based on leaf hairs: (i) forma *vitiensis*, where the undersurface of leaf is covered with fine soft hairs and (ii) forma *glabra* A.C. Sm., where the undersurface of leaf is glabrous (without hairs). The other species, *A. montana* Turrill, differs by having smaller leaves (5-15cm x 2-5cm) and comparatively slender petioles that are not clasping. A recent review considered *A. montana* Turrill to be part of *A. costata* but the former species differs substantially in flower and leaf characters.

Diagnostic features: White sap that hardens on exposure. Long, bean-like capsules, splitting when dry. The bases of the terminal pair of opposing leaves protect the developing bud.

Fig. 26: Habit of *Alstonia* spp. (RB)

Fig. 27: Slash of bark of *Alstonia costata*.

Fig. 28: Large, opposite leaves of *Alstonia costata*. Note the 10-cent coin placed as a scale. (GK)

Fig. 29: Close-up of a branch of *Alstonia costata*, showing the ligules and the shield-like petiolar scars. (GK)

Fig. 30: Flowers of *Alstonia* spp. (RB)

Fig. 31: Fruits of *Alstonia* spp. (RB)



Fig. 32



Fig. 33



Fig. 34



Fig. 35

Cerbera manghas L.

Fijian name: Vasa, rewa (Waya, Ba, Nadroga, Serua, Yasayasabeqa, Qoma, Rakiraki, Lau), rewarewa (Vuda), vasavula (Rewa, Kuiva, Gau)

Rotuman name: Giagia

Height: Shrub or tree, 1-20m, usually with a clear trunk and a freely-branched crown.

Bark: The bark is grey-black with numerous small outgrowths.

Slash: Outer layer light brown, inner layer yellow over yellow wood with abundant white sap that does not harden soon after exposure.

Leaves: Simple, fleshy-leathery, 8-23 x 2.5-7cm, more or less lanceolate, spirally arranged, apex acute to short-acuminate.

Flowers: Fragrant, white, sometimes with a pinkish centre, c. 3cm across, bisexual, inflorescence broadly branching at the tip of branches.

Fruits: Ellipsoid, up to 9 x 6cm, green, maturing red.

Flowering & Fruiting: Throughout the year.

Habitat: Beach thickets, dense or open forest and in shrub- and grasslands.

Altitude: Sea level to 1,000m.

Distribution: In Fiji recorded from all the major islands (Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau and Gau), the Lau Group and other smaller islands. Elsewhere distributed from Malaysia to the Tuamotus and as far as Pictairn.

Uses: Dried leaves are used to treat skin irritations and as a component of a medicine for eye pains. The poisonous latex is also reported to be part of various remedies.

Diagnoastic features: Freely branching crown. Gray-black bark, exuding white sap when cut. Spirally arranged, long, elongated leaves that are clustered towards the tip of each branch. Fragrant white flowers. Large, egg-shaped fruits. Milky sap.

Fig. 32: Habit of *Cerbera manghas*.

Fig. 33: Slash of bark of *Cerbera manghas*. Notice the white sap. (RB)

Fig. 34: Spiral arrangement of leaves and flowers of *Cerbera manghas*. (GK)

Fig. 35: Fruits and flowers of *Cerbera manghas*.

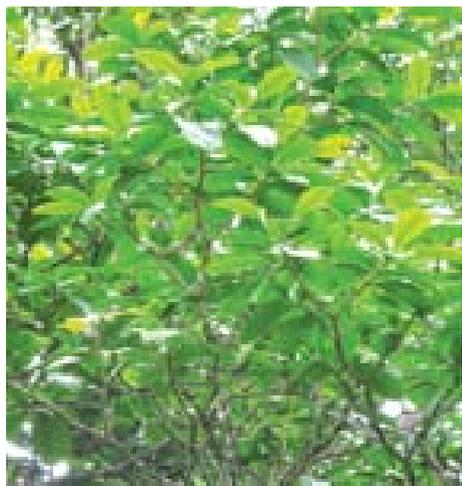


Fig. 36



Fig. 37



Fig. 38



Fig. 39



Fig. 40

Pagiantha thurstonii (Horne ex Baker) A.C. Sm.

Fijian names: Vuetnaitasiri, tabuairakalavo (Beqa), tabuakeirakalavo, (Koro), tabuameikalavo (Kubulau), tabuaneirakalavo (Verata), tarawaukeirakalavo (Bau), vudikeilewalewadrua (Macuata).

Trade name: Tadalo

Height: 4-30m with a compact crown.

Bark: Yellow-brown to grey-brown, rough, covered with small outgrowths and fissured longitudinally.

Slash: Cut bark with brown outer layer and an inner yellow layer; wood white. Cut bark exuding copious white sap that does not harden soon on exposure.

Leaves: Simple, opposite, thick and leathery, variable in size and shape even on the same branch, 7-22 x 3-12cm ovate to elliptic (opposing leaves often of different size), margin entire, apex rounded to acute; stipules absent.

Flowers: White, fragrant, in short terminal inflorescences. Petals and sepals 5.

Fruits: Curved, c. 5 x 3cm, brown and becoming warty at maturity.

Flowering & Fruiting: Throughout the year.

Habitat: Edges of dense forest.

Altitude: 30m to 1,100m.

Distribution: Endemic to Fiji and recorded from Viti Levu, Vanua Levu and Taveuni.

Uses: Timber. Latex sometimes used as chewing gum.

Diagnostic features: Yellowish bark, white sap that does not harden soon on exposure; recurved fruits that are warty when mature. Leaves variable in size and shape even on the same branch and in opposing pairs.

Fig. 36: Habit of *Pagiantha thurstonii*. (RB)

Fig. 37: Slash of the bark of *Pagiantha thurstonii*. (SPRH)

Fig. 38: Leaves of *Pagiantha thurstonii*. (GK)

Fig. 39: Flowers of *Pagiantha thurstonii*. (HB)

Fig. 40: Fruit pods of *Pagiantha thurstonii* (RB)

ARALIACEAE (Sole or Ivy family)

Worldwide: 57 genera; c. 800 spp., tropical (mainly Indomalaysia and Americas), a few temperate.

Fiji: 4 indigenous genera.

Economic Importance: *Panax quinquefolia* yields ginseng, other species produce medicinal products, ornamentals (species of *Polyscia* (**danidani**) and ivy), weeds / invasive species (Australian umbrella tree, *Schefflera actinophylla*).

Family Characteristics

Trees or shrubs or lianas, epiphytes and herbs (not Fiji indigenous species) with alternate (spirally arranged) leaves that are often large and palmately or imparipinnately compound or simple. Stipules absent or present. Petiole sometimes with lighter coloured, vertically elongate spots. Petiolar base broadly attached and usually sheathing the stem. Flowers usually bisexual, small, epigynous, 5-merous and aggregated into clusters in simple or compound racemose inflorescences. Fruit a drupe containing 2-5 seeds or a berry (not Fijian species).

Indigenous Genera and Species

Meryta 1 endemic sp.

Plerandra (**sole**) 7 endemic spp, 1 described

Polyscias (**danidani**) 4 spp., 3 endemic

Schefflera (**sole**) 4 endemic spp.,

Key to Indigenous Genera

1a. Leaves simple	<i>Meryta</i>
1b. Leaves compound	
2a. Leaves pinnately compound	<i>Polyscias</i>
2b. Leaves palmately compound	
3a. Stamens up to twice the number of petals	<i>Schefflera</i>
3b. Stamens many (15-500)	<i>Plerandra</i>



Fig. 41



Fig. 42



Fig. 45



Fig. 43



Fig. 44

Plerandra pickeringii A. Gray

Fijian names: Sole, vola.

Height: 3-15m, usually with no more than 3 branches.

Bark: Thin, grey.

Slash: Light brown, covering white wood, with sparse, colourless sap.

Leaves: Digitately compound, clustered at the end of branches. Leaflets oblanceolate, 16-50 x 6-25cm, 6 to 10 in number, apex rounded. Base of the petiole sheathing and forming a ligule.

Flowers: Unisexual, present in separate inflorescences on the same tree, green to white, to 1.5cm across, often conspicuously purple-tinged with numerous stamens.

Fruits: Subglobose, to 1 x 2cm, green turning black at maturity.

Flowering & Fruiting: Throughout the year.

Habitat: A canopy or sub-canopy tree of different types of rain forest and on its edges.

Altitude: Sea-level to 1,050m.

Distribution: Endemic to Fiji and recorded from eight high islands.

Uses: The tree produces a soft wood.

Comments: There are 7 endemic species of *Plerandra* and 4 endemic species of the genus *Schefflera* that are difficult to distinguish in the field and all share the common name **sole**. Keys to the different taxa are provided in Smith (1985). Not to mistaken for *Schefflera actinophylla* (Endlicher) Harms, the Australian umbrella tree, an invasive species in the Suva area (see Fig. 45)

Diagnostic features: Digitately compound leaves crowded towards the tips of branches, with large oblanceolate leaflets. A petiole that broadly sheathes the stem and a ligule.

Fig. 41: Habit of *Plerandra pickeringii*. (GK)

Fig. 42: Slash of bark of *Plerandra pickeringii*. (GK)

Fig. 43: Digitally compound leaves and fruit of *Plerandra* sp. (SPRH)

Fig. 44: Flowers of *Plerandra pickeringii*. (GP)

Fig. 45: Cluster of fruits *Inflorescence of Schefflera actinophylla*. (RB)



ARAUCARIACEAE

(Kauri family)

Worldwide: 3 genera; 34 spp., mainly Southern Hemisphere (absent from Africa).

Fiji: 2 genera, 1 indigenous.

Economic Importance: Timber and sometimes planted as ornamentals.

Family Characteristics

Gymnosperm. Mostly dioecious trees with whorled branches on a straight and often massive trunk. Leaves broad (in indigenous Fijian genus) or needle-like, opposite (sometimes alternate on older portions of a branch) or spirally arranged (not in indigenous Fijian genus) and leathery. Venation parallel. Base of petiole somewhat sheathing. Male cones cylindrical and catkin-like. Seed cones large, globose and disintegrating at maturity.

Indigenous Genera and Species

Agathis macrophylla (**dakua, dakua makadre**) 1 sp., described



Fig. 46

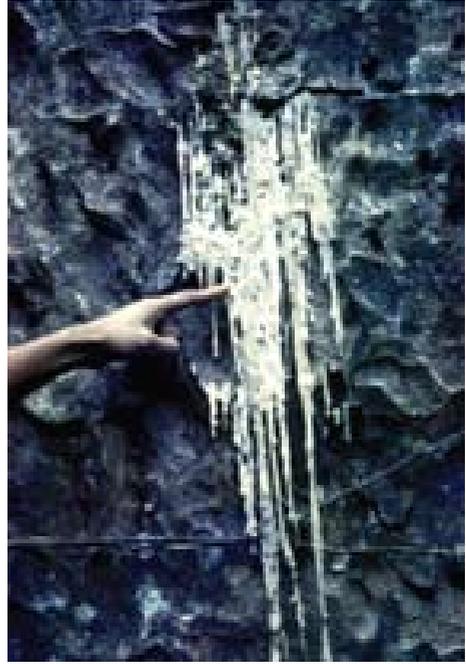


Fig. 47



Fig. 49

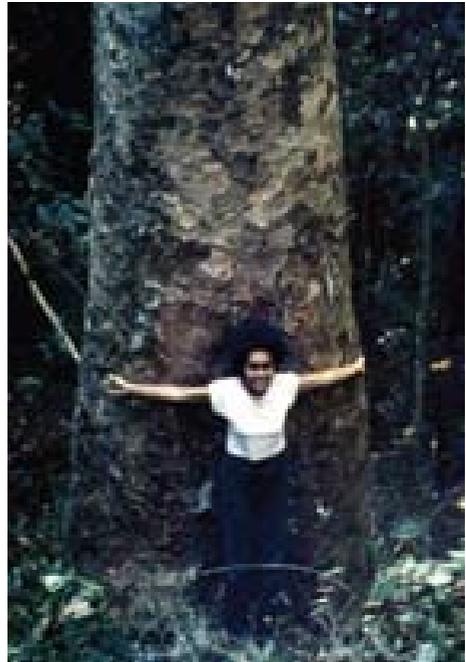


Fig. 48



Fig. 50

Agathis macrophylla (Lindl.) Mast.

Synonym: *A. vitiensis* (Seem.) Benth & Hook.f. ex Drake

Fijian names: **Dakua**, dakuamakadre, makadre (Vuda, Ba)

English name: Pacific Kauri

Height: Tall tree, more than 30m, with few horizontal branches to form a rounded crown. Trunk straight, bole reaching up to 30m, and diameter to 2m. Trunk of an old tree may take 3-5 men with arms outstretched to encircle it.

Bark: Green-brown, smooth when young, becoming grey, thick and peeling in rough patches.

Slash: Outer and inner layers pink, over a white to cream wood. Resin clear, soon hardens to white or light yellow. The resin (**makadre**) is used to differentiate this tree from the other **dakua** tree (*Retrophyllum vitiensis*).

Leaves: Simple, fresh green, up to 13 x 5cm, ovate, margin entire, apex acute. Venation of many fine parallel veins. Leaves exude white latex when cut and 2 broken parts of a leaf adhere by white threads.

Cones: Male and female cones on separate trees. Male cones cylindrical, green, c. 5cm long; female cones subglobose, up to 8 x 10cm, with hard scales. Female cones stay on the tree for a long time, as they take up to 2 years to mature and then dry and break. Seeds winged.

Fruiting: Cones may be present throughout the year.

Habitat: Canopy tree of wet lowland and upland forests, most abundant on ridges and well drained slopes.

Altitude: Sea level to 1,150m.

Distribution: In Fiji recorded from Viti Levu, Vanua Levu, Kadavu, Ovalau. Elsewhere in the Pacific distributed in Vanuatu and the Santa Cruz Group of the Solomon Islands. Cultivated in several countries of the Pacific.

Uses: A valuable and important timber tree. Lumps of resin are used for glazing pottery and lit as torches. Resin was once collected commercially.

Diagnostic features: Thick, greyish bark, with thick rough patches when old, exuding thick resin that hardens on exposure. Green, oppositely arranged leaves with faint parallel venation. Straight bole.

Fig. 46: Habit of *Agathis macrophylla*. (GP)

Fig. 47: Bark of *Agathis macrophylla* with the white, hardened resin ("makadre" in Fijian) that exuded from a cut.

Fig. 48: A person in front of the trunk of *Agathis macrophylla* to indicate the huge dimensions of the tree.

Fig. 49: Woody female cone and opposite leaves of *Agathis macrophylla*. (GK)

Fig. 50: Male cones of *Agathis macrophylla*. (GK)



BIGNONIACEAE

(African Tulip Tree Family)

Worldwide: 112 genera; c. 725 spp., mostly tropical, especially South America

Fiji: 9 genera, none indigenous

Economic Importance: Ornamentals and timbers.

Family Characteristics

Trees and shrubs, few climbers and herbs. Stipules absent. Leaves mostly opposite and pinnate to trifoliate. Flowers are bisexual, often showy, 5-merous and in inflorescences of one or more. Fruit is usually a bivalved capsule. Seeds mostly flat and winged.

Indigenous Genera and Species

None

Introduced Species Described

Spathodea campanulata Beauv. (**Pasii**)



Fig. 51



Fig. 52



Fig. 55



Fig. 53



Fig. 56



Fig. 57



Fig. 54

Spathodea campanulata Beauv.

Fijian names: Pasiu, pisipisi.

English names: African Tulip Tree, Fountain Tree, Flame Tree

Height: 5-20m, with an irregularly round and spreading crown. Buttresses may be present in adult trees.

Bark: Grey and smooth.

Slash: Thin green layer over whitish inner bark, covering soft, white wood.

Leaves: Opposite or subopposite, imparipinnately compound, with 9-19 entire leaflets. Leaves 10-40 × 10-30cm. Leaflets 7-13 × 3-6 cm, dark green, ovate, with entire margin, apex acute, petiole usually exceeding 5cm.

Flowers: Showy, orange-red, sometimes yellow-orange with wavy, yellow edges, 4-10 cm long.

Fruits: Elongate capsules, 15-22 × 3-5 cm, brown, with hundreds of small seeds with plastic-like wings that give them good buoyancy in wind and facilitate their rapid distribution.

Flowering & Fruiting: June - October, but some flowers may be found throughout the year.

Habitat: Planted in gardens. Very common in secondary forests, often being the dominant species. Sometimes individuals are found in primary forest, especially along streams. Has been observed both on the dry and moist side of islands.

Altitude: Sea level to about 400m.

Distribution: Native populations are restricted to tropical Africa. But the tree has been introduced as an ornamental to many tropical countries around the world where it often has naturalized. In Fiji it is currently the most invasive tree species, dominating fallow farmlands and vast areas of secondary bush and forest.

Uses: The wood is rather weak and soft and of little use for construction or carving, but may be used for storage boxes/packing, toothpicks etc. Cuttings root quickly and grow fast, providing useful life-post/fencing. The flower buds are filled with water and are sometimes used by kids as water pistols. Flowers attract fruit bats and various birds.

Diagnostic features: Gray bark over soft wood. Opposite, compound leaves. Showy orange-red flowers. Fruits brown capsules containing numerous small seeds with plastic-like wings.

Fig.51: Habit of *Spathodea campanulata*. (RB)

Fig. 52: Slash of bark of *Spathodea campanulata*. (GK)

Fig. 53: Opposite, compound leaves of *Spathodea campanulata*. (GK)

Fig. 54: Fruit of *Spathodea campanulata*. (GK)

Fig. 55: Winged seed of *Spathodea campanulata*. (GK)

Fig. 56: Bright orange flowers and flower buds of *Spathodea campanulata*. (RB)

Fig. 57: Inflorescence of *Spathodea campanulata*. (RB)



BORAGINACEAE (Nawanawa family)

Worldwide: 154 genera; c. 2,500 spp., cosmopolitan

Fiji: 6 genera, 2 indigenous

Economic Importance: Ornamentals, kitchen-herbs and red dye.

Family Characteristics

Trees, shrubs or climbers. Stipules absent. Leaves alternate (spirally arranged), simple and entire. Flowers usually bisexual, usually 5-merous, in inflorescences of one or more cymes that uncoil progressively as flowers open, rarely solitary. The fruit consists of 4 nutlets or is a 1- to 4-seeded drupe.

Indigenous Genera and Species

Cordia (**nawanawa**) 2 spp., 1 described

Tournefortia (**roro ni bebe**) synonyms: *Argusia* and *Messerschmidia* 1 sp.

Key To Indigenous Genera

- | | |
|---|---------------------|
| 1a. Leaves spirally arranged, glabrous or with sparse hair; petiolate | <i>Cordia</i> |
| 1b. Leaves alternate, grey-green, hairy; sessile (or nearly so) | <i>Tournefortia</i> |

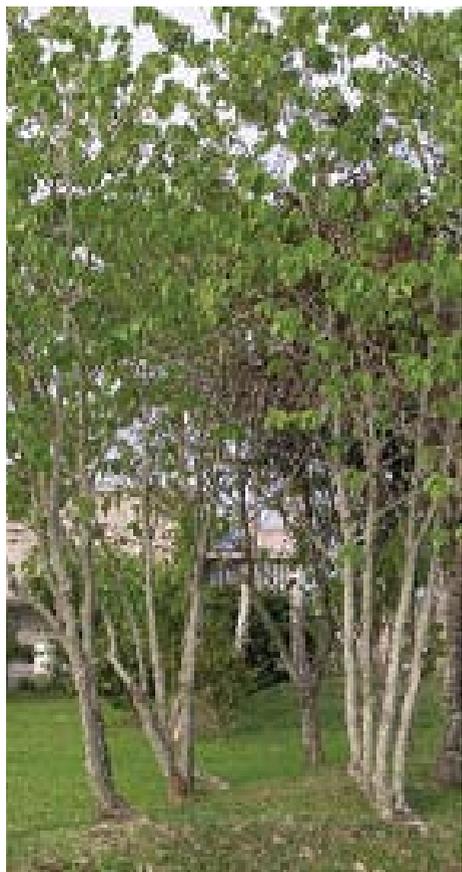


Fig. 58



Fig. 59



Fig. 60



Fig. 61

Cordia subcordata Lam.

Fijian name: Nawanawa.

Rotuman name: Man'ava

Height: 2-15m, branching low, and forming a somewhat rounded crown. Bole often somewhat crooked.

Bark: Brown to dark brown, usually weathered light grey, smooth with transverse and horizontal fissures.

Slash: Inner bark pale brown, exuding a clear sap that turns dark brown on exposure, wood white, heartwood yellowish white to light brown.

Leaves: Simple, light green, spirally arranged, 4-20 x 7-12cm, ovate to elliptic, margin entire, apex acute, petiole usually exceeding 5cm. The two basal secondary veins are often very prominent, making the leaf appear 3-veined.

Flowers: Showy, orange, c. 3cm across, inflorescences opposite the leaves. Petals wrinkled.

Fruits: Globose to subglobose with longitudinal ridges, c. 3cm across, hanging in clusters, green, brown at maturity.

Flowering & Fruiting: More or less throughout the year.

Habitat: Beaches, edges of rocky shore forests, edges of mangrove swamps.

Altitude: Sea level.

Distribution: Coasts of the larger islands and most of the smaller islands. Distributed in tropical East Africa, the Indian Ocean islands, Southeast Asia, through Malaysia, northern Australia, Micronesia and most of the other south Pacific Islands.

Uses: Wood is popular for carving and general construction. The inner bark is soaked in seawater and fibers made from it are used for making baskets and garlands. The seeds are edible. Bark used in traditional herbal medicines.

Diagnostic features: Coastal tree that branches low. Showy orange flowers. Simple, spirally arranged, light green leaves.

Fig. 58: Habit of *Cordia subcordata*, showing three trees growing together. (GK)

Fig. 59: Slash of bark of *Cordia subcordata*. (GK)

Fig. 60: Bright orange flowers, fruits and leaves of *Cordia subcordata*. (GK)

Fig. 61: Fruits of *Cordia subcordata*. (RB)



BURSERACEAE (Kaunigai family)

Worldwide: 18 genera; c. 540 spp., tropical, especially America and Northeast Africa.

Fiji: 2 indigenous genera.

Economic Importance: Aromatic resins (frankincense, *Boswellia carteri*, *B. sacra* and myrrh, species of *Commiphora*), timber, edible seeds, gums and varnishes.

Family Characteristics

Resinous trees (our species), or shrubs, often with raised and circular lenticels. Sap clear or slightly milky. Leaves alternate (spirally arranged), pinnately compound and usually crowded at the apices of branches. Leaflets entire or toothed, opposite (or essentially so) and asymmetrical or more or less rounded at base. In our species, the base of the petioles is swollen or wrinkled and flat on the upper surface, with the sides being raised and wing-like. Petiolar scars shield-like. Stipules absent or present. Flowers 4- or 5-merous, small (less than 1cm across), usually hypogynous and grouped in panicles. In our species, inflorescences sometimes bear brown insect galls that may appear like fruits. Fruit a drupe, green, ripening dark green to black.

Indigenous Genera and Species

Canarium (**kaunicina**) 3 spp., 1 described

Garuga 1 sp.

Haplolobus (**kaunigai**) 1 sp., described

Key To Indigenous Genera

1a. Leaf margins smooth

2a. Stipules present, covering developing leaves; fruit fleshy

Canarium

2b. Stipules lacking; fruit dry

Haplolobus

1b. Leaf margins toothed

Garuga



Fig. 62



Fig. 63



Fig. 66



Fig. 64



Fig. 67



Fig. 65

Canarium harveyi Seem.

Fijian names: Kaunigai, Kaunicina, yagai (Lau).

Trade name: Kaunicina

Height: 15-25m.

Bark: Light, grey, smooth

Slash: Inner bark, red-brown covering white wood. Cut bark smelling of green mangoes, often exuding a colourless sap that becomes white and hard on exposure.

Leaves: Pinnate, with rounded ear-like stipules (1 x 2cm) that fall off as leaves mature; leaves with 3-5 pairs of leaflets, leaflets shiny, 8-20 x 4-10cm, ovate, margin entire, apex acute.

Flowers: Unisexual, tree dioecious (male and female flowers on separate trees), white, in inflorescences at the tips of branches. Individual flowers 4-6 mm long.

Fruits: Ellipsoid, 3-5cm long, blue-green, maturing blue and then black.

Flowering & Fruiting: February to August; throughout the year.

Habitat: Dense forest.

Altitude: Sea level to 600m.

Distribution: Found on many islands in Fiji. Elsewhere it occurs in the Solomon Islands, Vanuatu, Samoa, Tonga and Niue.

Uses: Timber. The fruits were utilised as a food source and the correct name should probably be Kaunigai, 'gai referring to the fruits. Dried and salted, the cernuls are again in popular demand as "forest nuts" (Nangae nuts) e.g. from Vanuatu.

Comments: The two other indigenous species of *Canarium*, *C. vitiense* A. Gray and *C. vanikoroense* Leenh. share the local name **kaunicina** and **kaunigai** and are difficult to tell apart in the field. *C. vitiense* and *C. vanikoroense* differ in having narrow, pointed stipules. In addition, *C. vanikoroense* has an ash-grey bark, while the latex of *C. vitiense* is pale yellow or milky.

Diagnostic features: Smooth, ash-grey bark, smelling of green mangoes when cut. Pinnate leaves with shiny leaflets. Narrowly lanceolate stipules 5 to 10cm long. Colourless sap that turns white upon hardening.

Fig. 62: Habit of *Canarium indicum*.

Fig. 63: Slash of the bark of *Canarium indicum*. (RB)

Fig. 64: Fruit of *Canarium indicum* which is similar to *C. harveyi*. (RB)

Fig. 65: Compound leaf and fruit of *Canarium harveyi*, which are similar to those of *C. vanikoroense*. (SPRH)

Fig. 66: Seedling of *Canarium harveyi*. (LT)

Fig. 67: Fruits of *Canarium indicum*. (RB)



Fig. 68



Fig. 69



Fig. 70

Haplolobus floribundus. subsp. *salomonensis* (C.T.White) Leenh.

Fijian names: Kaunicina, kaunigai.

Trade names: Kaunigai

Height: 5-24m, trunk to 60cm in diameter.

Bark: Brown, covered with small outgrowths, but not rough to touch.

Slash: Inner layer light yellow, covering yellow wood, white on the inside. Latex white, hardening on exposure. Cut bark smelling of unripe mangoes.

Leaves: Pinnate, lacking stipules, with up to 3 pairs of leaflets with an oblique base and a terminal leaflet; leaflets ovate, margin entire, apex acuminate, hairy on the undersurface when young.

Flowers: Unisexual, tree dioecious (male and female flowers on separate trees). Flowers fragrant, white, to 8mm across, in inflorescences amongst the leaves.

Fruits: Ellipsoid, 2-2.5cm, with a thin outer wall, green to dark purple or black.

Flowering & Fruiting: February to May; June to January.

Habitat: Dense and secondary forest.

Altitude: 90m to 850m.

Distribution: In Fiji recorded from Viti Levu and Kadavu. Elsewhere in the Pacific found in the Solomon Islands, Vanuatu and Samoa.

Uses: A well-known timber tree.

Comments: The correct Fijian name for the species should probably be Kaunicina, meaning “wood for light”, as the hardened latex was used as a flammable substance in traditional torches.

Diagnostic features: White latex that hardens on exposure. Pinnate leaves that have leaflets with acuminate tips and lack stipules. Cut bark smelling of unripe mangoes

Fig. 68: Habit of *Haplolobus floribundus*.

Fig. 69: Slash of the bark of *Haplolobus floribundus*. (GK)

Fig. 70: Compound leaves of *Haplolobus floribundus*. (SPRH)

CAESALPINIACEAE

(Vesi family)

Worldwide: 162 genera; c. 2,000 spp., tropical and subtropical.

Fiji: 19 genera, 7 indigenous.

Economic Importance: Ornaments: (flame tree or *sekoula* (*Delonix regia*), butterfly tree (species of *Bauhinia*), golden shower (*Cassia fistula*); timbers, (Kwila, Raintree, *Samanea saman*), dyes, purgatives, medicines and edible fruits: (tamarind, *Tamarindus indica*).

Family Characteristics

Trees, shrubs or herbs or lianas. Lenticels elongate transversely. Stipules paired or absent. Leaves pinnately or bipinnately compound and alternately or spirally arranged. The petioles usually with an abscission joint and a swollen, wrinkled basal thickening (pulvinus) that turns black on drying. Flowers usually bisexual, 5-merous and showy. Fruit a pod.

Indigenous Genera and Species

Caesalpinia (**soni**) 2 spp. (climbers)

Cynometra (**cibicibi**) 2 endemic spp. 1 described

Intsia (**vesi**) 1 sp., described

Kingiodendron (**moivi**) 1 endemic sp., described

Maniltoa (**cibicibi**) 4 spp., 3 endemic spp., 1 described

Senna 2 spp. (herbs and shrubs)

Storckiella (**marasa**) 1 endemic sp., described

Key To Indigenous Tree Genera

- | | |
|--|----------------------|
| 1a. Leaflets opposite | |
| 2a. 1 or 2 glands present near the base of leaf; young leaves green | <i>Intsia</i> |
| 2b. Glands absent; young leaves usually pink | |
| 3a. 1 pair of leaflets per leaf; leaf buds very congested with small scales (<1cm long); stamens usually 10 | <i>Cynometra</i> |
| 3b. Usually 2 or more pairs of leaflets per leaf; leaf buds subconical with conspicuous scales (usually 1-3cm long); stamens usually 20-40 | <i>Maniltoa</i> |
| 1b. Leaflets alternate or subopposite | |
| 4a. Leaflets 2-7, minutely glandular-punctate; base slightly asymmetric | <i>Kingiodendron</i> |
| 4b. Leaflets many, not glandular-punctate; base symmetric | <i>Storckiella</i> |



Fig. 71

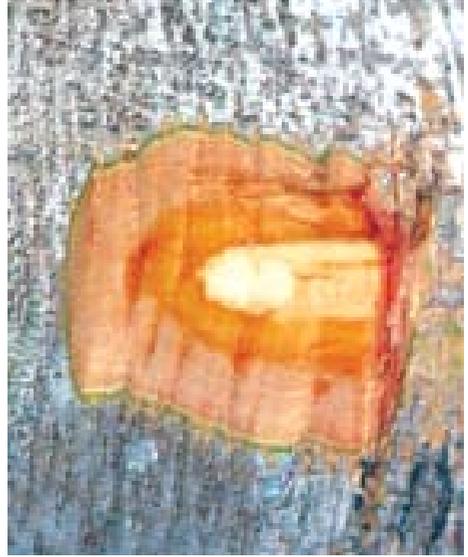


Fig.72



Fig. 73



Fig. 75



Fig.74

Cynometra insularis A.C. Sm.

Fijian names: Cibicibi, namo (Waqa, Vuda, Ba).

Height: 6-25m. Trunk slender and may have buttresses at the base.

Bark: Chalky-grey in coastal locations but red-brown in the rainforest, rough with small white rash-like outgrowths.

Slash: Thin outer layer is light green, over a light pink to reddish layer turning yellow and covering creamy white wood.

Leaves: Pinnate, with 2-4 opposite leaflets; leaflets with petioles 1-2.5cm; leaflets 4-8 x 1.5-3cm, elliptic to oblong, margin entire, apex acute, base asymmetrical.

Flowers: White to creamy, 1-2cm across, in clusters on short inflorescences, fragrant. Inflorescence, buds distinct with overlapping bracts.

Fruits: Pod, ovoid, 6 x 4.5 x 3.5cm, with a tough and wrinkled outer covering. Seed single.

Flowering & Fruiting: April to July; October to January

Habitat: Found in a variety of habitats, including wet dense forests, dry gullies and riversides, hill slopes and open forests.

Altitude: Sea level to 600m.

Distribution: Endemic to Fiji, recorded from many islands.

Uses: Used for its timber, and for making house posts. Parts of the tree are used in traditional herbal medicine.

Comments: The other endemic species, *C. falcata* A. Gray, has almost sessile leaflets that are subfalcate.

Diagnostic features: Grey bark. Compound leaves with two opposite leaflets, asymmetric at base, resembling the wings of a butterfly.

Fig. 71: Habit of *Cynometra insularis*. (GK)

Fig. 72: Slash of *Cynometra insularis*. (RB)

Fig. 73: Falcate Compound leaves and fruits of *Cynometra insularis*. (GK)

Fig. 74: Cluster flower with distinct overlapping bracts of *Cynometra insularis*. (RB)

Fig. 75: Flush of young, reddish leaves of *Cynometra insularis*. (GK)



Fig. 76



Fig. 77



Fig. 79



Fig. 78



Fig. 80

Intsia bijuga (Colebr.) Kuntze

Fijian names: Vesi

Rotuman name: Fesi

Trade names: Vesi, Kwila

Height: 7-30m, with a roughly rounded, spreading crown. Trunk reaching up to 1m in diameter, and small buttresses at the base.

Bark: Pink-brown to ash-grey, peeling off in large irregular patches exposing light brown patches, smooth.

Slash: Outer layer light brown, over a cream middle layer that covers an inner creamy-brown layer.

Leaves: Pinnate, with 2 pairs of opposite leaflets (rarely 1-3pairs), petioles swollen at the base; leaflets c. 12 x 6cm with 1 or 2 glands at the base, ovate, margin entire, apex obtuse. Young leaves pink red and glossy.

Flowers: White or yellow, turning light or purple, 1.5-2cm across, in short inflorescences at the ends of branches, fragrant. One showy petal. Petals fall easily, leaving pale green sepals with red margins.

Fruits: Pod, flattened, up to 20 x 6cm, thicker at the margins, dehiscent with 3-7 seeds. Pods orange mealy inside.

Flowering & Fruiting: October to May; April to October.

Habitat: Beach and coastal forests, edges of mangroves, and dry forests.

Altitude: Sea level to 450m.

Distribution: Recorded from the larger islands of Fiji, occurring both in the wild and in cultivation. Widely distributed in coastal forests from Madagascar and coastal tropical East Africa to southeast Asia and China, through Malaysia and in the Pacific to Tonga and Samoa.

Uses: Widely used as a source of excellent hardwood, often traded under the name “Kwila” for carving e.g. bowls such as those used for kava, other utilitarian objects, decking and outdoor furniture. It was one of the most important trees in boat building in pre-European times. Parts of the tree are also used in traditional herbal medicine.

Comments: The tree features prominently in Fijian mythology and is culturally very important.

Diagnostic features: Tree with a straight bole and a pink-brown to ash-grey bark. Leaves with two pairs of opposite leaflets, asymmetric at base; 1-2 glands present near the leaflet base. Flattened, brown pods.

Fig. 76: Habit of *Intsia bijuga*. (RB)

Fig. 77: Slash of the bark of *Intsia bijuga*. (GK)

Fig. 78: Compound leaves of *Intsia bijuga*, consisting of 2 pairs of leaflets. (GK)

Fig. 79: Flower of *Intsia bijuga*. (RB)

Fig. 80: Seed pods of *Intsia bijuga*. (RB)



Fig. 81



Fig. 82



Fig. 83



Fig. 84

Kingiodendron platycarpum B.L. Burt

Fijian names: Moivi, namo (Waya)

Height: 8-35m with a dense, wide crown. Trunk straight, unbranched to about 15m, reaching up to 1.3m in diameter.

Bark: Khaki-brown.

Slash: Thin and yellow outer layer over thicker reddish brown layer, covering white wood with brown streaks.

Leaves: Pinnate, with a terminal leaflet and 3-7 (occasionally 1 or 2) alternate leaflets; leaflets up to 12 x 4cm, narrow elliptic to oblong, margin entire, apex acute, base asymmetrical.

Flowers: Green to dull cream, small (to 5mm across) and inconspicuous, borne in clusters, close to the stem.

Fruits: Pod, flattened, obovate (somewhat heart-shaped), up to 8 x 6cm, with a small point at the tip. Mature pod hard and woody, swelling out. Seed single.

Flowering & Fruiting: January and March; May to October.

Habitat: Dense forest, in remnants of forests amongst cleared lands, and along ridges.

Altitude: Sea level to 600m.

Distribution: Endemic to Fiji, and recorded from many islands.

Uses: The tree yields a commercially valuable hardwood.

Diagnostic features: Brown bark. Compound leaves with alternate, asymmetrical leaflets. Obovate pods.

Fig. 81: Habit of *Kingiodendron platycarpum*.

Fig. 82: Slash of *Kingiodendron platycarpum*.

Fig. 83: Compound leaf of *Kingiodendron platycarpum*, showing the big, alternately arranged leaflets. (GK)

Fig. 84: Close-up of the base of the leaf of *Kingiodendron platycarpum*. (GK)



Fig. 85



Fig. 86



Fig. 87



Fig. 89

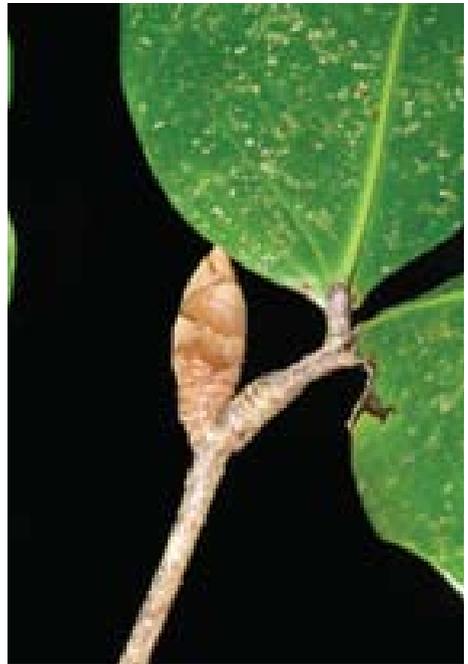


Fig. 88

Maniltoa grandiflora (A. Gray) Scheff.

Fijian names: Cibicibi, namo, (Waya, Namu, Vuda, Ba).

Trade name: Moivi levu

Height: 5-25m, trunk up to 1m in diameter, with buttresses at the base.

Bark: Chalky-grey, rough with small scabies-like outgrowths and transverse ridges. Bark peeling off easily leaving a cream wood.

Slash: Inner layer red-brown, hard. Sap clear, if any.

Leaves: Pinnate, with a terminal leaflet and 2-3 pairs (rarely 1 or 4 pairs) of opposite to subopposite leaflets; leaflets 5-10 x 2-5.5cm, ovate to ovate-oblong, margin entire, apex obtuse, emarginated (notched at the apex) base oblique (asymmetrical), somewhat resembling butterfly wings. Young leaves delicate pink, flaccid. Mature vegetative buds 2.5-7cm long.

Flowers: White to cream, in clusters, fragrant.

Fruits: Pod, woody, flattened, 6 x 3.5 x 1.8cm, purple-brown when mature.

Flowering & Fruiting: May and January; more or less throughout the year.

Habitat: Dense or dry forest, often along rocky coasts and limestone shores, and on the landward edges of mangroves.

Altitude: Sea level to 600m.

Distribution: In Fiji recorded from Viti Levu, Vanua Levu, Taveuni, Ovalau and the Lau Group. Elsewhere in the Pacific found in Tonga.

Uses: A timber tree.

Comments: The species shares both the Fijian name cibicibi and the trade name Moivi levu with *Cynometra insularis* A.C.Sm. The four indigenous species of *Maniltoa* can be distinguished by their indumentum characters. *M. floribunda* A.C. Sm. and *M. vestita* A.C. Sm. have fine hair on young twigs and petioles while *M. minor* A.C. Sm. and *M. grandiflora* are glabrous. *M. grandiflora* is more robust than *M. minor* (mature vegetative buds up to 1.5cm long, leaflets up to 6cm long).

Diagnostic features: Compound leaves with 2 to 3 pairs of opposite, asymmetrical leaflets, resembling the wings of a butterfly. Easily peeling bark leaving a cream wood.

Fig. 85: Habit of *Maniltoa grandiflora*.

Fig. 86: Slash of *Maniltoa grandiflora*.

Fig. 87: Compound leaves of *Maniltoa vestita*, with leaflets arranged in opposing pairs. (GK)

Fig. 88: Vegetative bud covering developing leaves of *Maniltoa grandiflora* and base of a leaf, showing the swollen, wrinkled base of the petiole. (GK)

Fig. 89: Inflorescence of *Maniltoa vestita*. (GK)



Fig. 90



Fig. 91



Fig. 93



Fig. 94



Fig. 92

Storckiella vitiensis Seem.

Fijian names: Marasa-II, vesida, gadi

Height: 6-27m, trunk to 1m in diameter.

Bark: Grey-black, rough, covered with small scabies-like outgrowths.

Slash: Outer layer red, inner layer cream, covering white wood. Root bright yellow when cut.

Leaves: Pinnate, with a terminal leaflet and 5-7 pairs of alternate to subopposite leaflets; leaflets 4-8 x 1.5-3cm, narrow elliptic to oblong, margin wavy, apex acuminate to cuspidate, pale green beneath.

Flowers: Golden-yellow, about 3cm across, in branched inflorescences at the end of branches, fragrant.

Fruits: Pod, flattened, c. 6 x 3cm, with thin lateral wings, dehiscent. Seeds 1-2.

Flowering & Fruiting: December, May, July; November and January.

Habitat: Dense forest.

Altitude: Sea level to 300m.

Distribution: Endemic to Fiji, and recorded from Viti Levu, Vanua Levu and Kadavu.

Uses: A useful timber tree, uncommon. Has great potential for cultivation as an ornamental tree.

Comments: The species shares the name marasa with *Elattostachys falcata*, (A. Gray) Radlk. Which it resembles in the appearance of the leaves and bark from a distance.

Diagnostic features: Showy yellow spray of flowers. Rough black bark. Imparipinnately compound leaflets with 5 to 7 pairs of alternate to almost opposite leaflets.

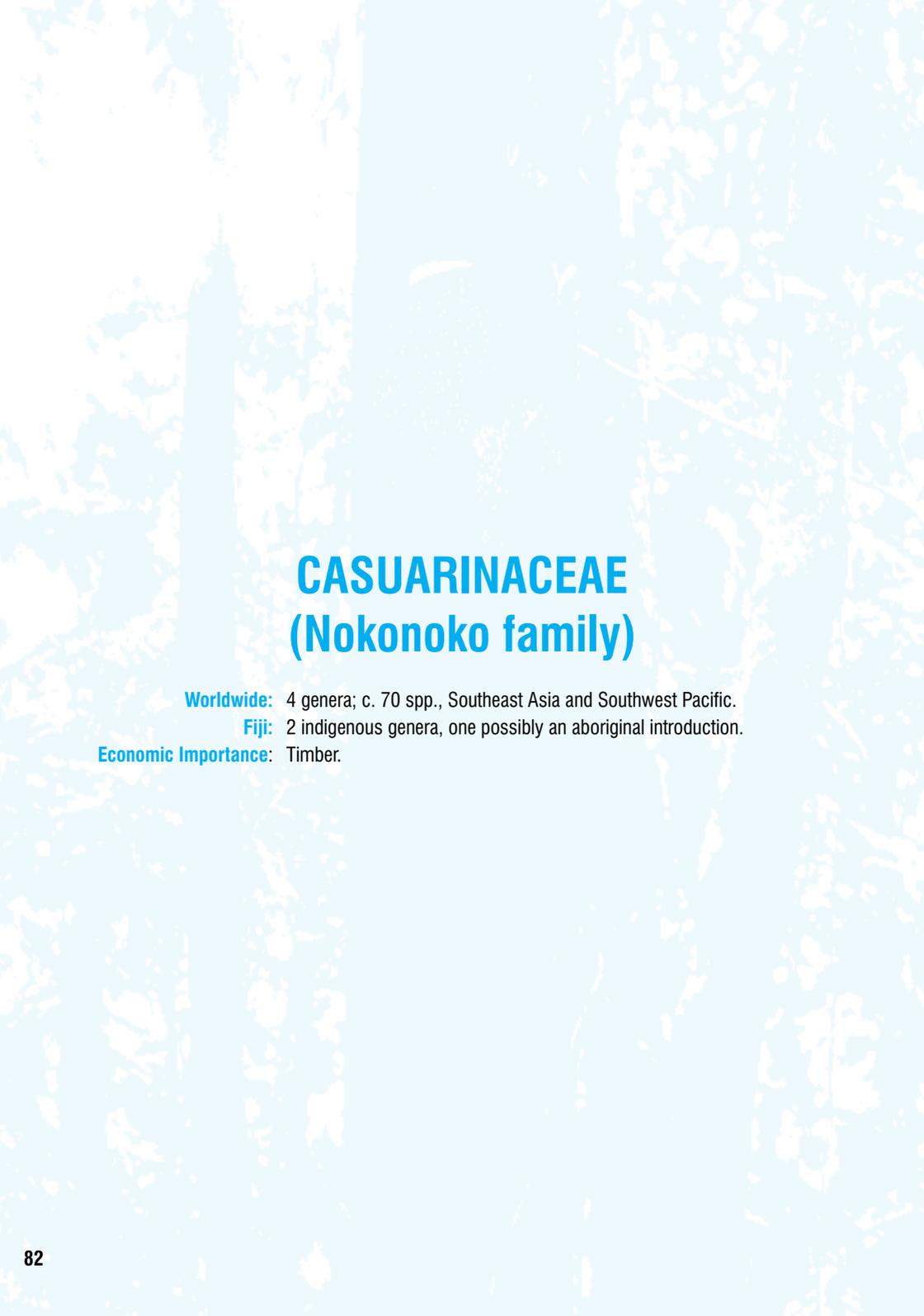
Fig. 90: Habit of *Storckiella vitiensis*. (RB)

Fig. 91: Slash of *Storckiella vitiensis*. (RB)

Fig. 92: Compound leaves of *Storckiella vitiensis*. (GK)

Fig. 93 Inflorescence of *Storckiella vitiensis*. (RB)

Fig. 94 Sainivalati Vido holds inflorescence of *Storckiella vitiensis*. (RB)



CASUARINACEAE (Nokonoko family)

Worldwide: 4 genera; c. 70 spp., Southeast Asia and Southwest Pacific.

Fiji: 2 indigenous genera, one possibly an aboriginal introduction.

Economic Importance: Timber.

Family Characteristics

Monoecious or dioecious trees (Fijian species) or shrubs with green, jointed, branches with short internodes. Stipules lacking. Leaves small, scale-like, whorled and more or less joined into toothed sheaths at each node. Flowers usually unisexual, highly reduced, small and inconspicuous and borne in spikes. Fruits 1-seeded, winged and crowded into dry, splitting, cone-like structures.

Indigenous Genera and Species

Casuarina (**nokonoko**) 1 sp., described

Gymnostoma (**velau yaumunu, cau**) 1 sp., described

Key to Indigenous Genera

- | | |
|--|-------------------|
| 1a. Distal branches drooping (weeping habit) and cylindrical | <i>Casuarina</i> |
| 1b. Distal branches erect and quadrangular | <i>Gymnostoma</i> |

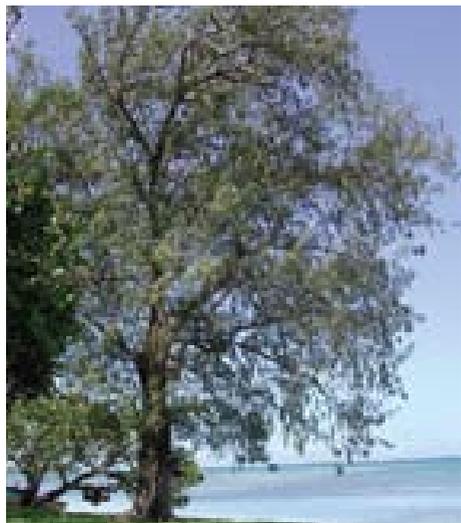


Fig. 95



Fig. 96



Fig. 97

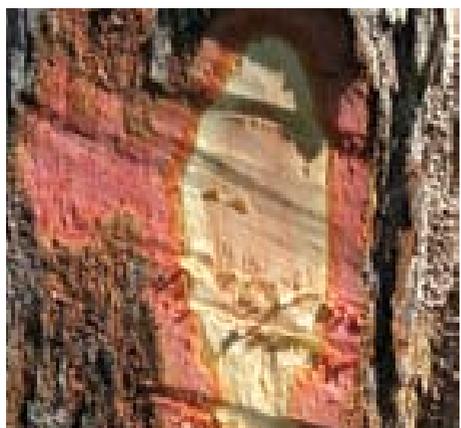


Fig. 99



Fig. 98

Casuarina equisetifolia J.R. Forst. & G. Forst.

Fijian names: Nokonoko, cau (Kadavu, Beqa, Rewa, Vanualevu, Taveuni, Lau), cauyalewa (Dogotuki), qaro (Nadi, Nadroga, Vatulle, Serua, Yanuca), velau (Wayu, Vuda, Ba)

Rotuman name: Toa

English name: Ironwood

Height: 3-25m, with drooping branches. Sometimes with buttresses. Young tree with a cone-shaped crown.

Bark: Dull mud-grey, rough with longitudinal fissures, peeling off in long strips.

Slash: Red, turning pink on the inside over pink wood; sap red.

Leaves: Small and scale-like, arranged in whorls on green branchlets.

Flowers: Male and female flowers in separate inflorescences, minute. Male flowers in spikes and arranged in whorls of 6-16 flowers. Flowers with hard bracts and bracteoles.

Fruits: Aggregated into woody heads, bracteoles persistent and hard. Each fruit flattened, winged, to 2cm in diameter, green turning brown on maturity.

Flowering & Fruiting: More or less throughout the year.

Habitat: Littoral and coastal forests, dry degraded areas, grassland, open forests.

Altitude: Sea level to 475m.

Distribution: Recorded from all major islands of Fiji. Also cultivated. Distributed from Southeast Asia to the South Pacific.

Uses: A useful timber tree. The hard wood was used to make war clubs. Bark is used in traditional herbal medicinal. Sometimes used as a windbreak, reforestation of degraded land, soil stabilisation, coastal protection.

Comments: Often regarded as an aboriginal introduction to the Fiji Islands, but may also be truly indigenous. The tree features in Fijian legends.

Diagnostic features: Drooping branches; branchlets grooved. Small, scale-like leaves, arranged in whorls. Female flowers in hard cone-like structures.

Fig 95: Habit of *Casuarina equisetifolia*. (LT)

Fig. 96: Drooping branchlets of *Casuarina equisetifolia*.

Fig. 97: Bark of *Casuarina equisetifolia*.

Fig. 98: Young fruits of *Casuarina equisetifolia*. Also note the green branchlets, which bear tiny leaves (not visible).

Fig. 99: Slash of the bark of *Casuarina equisetifolia*. (RB)



Fig. 100



Fig. 101



Fig. 104

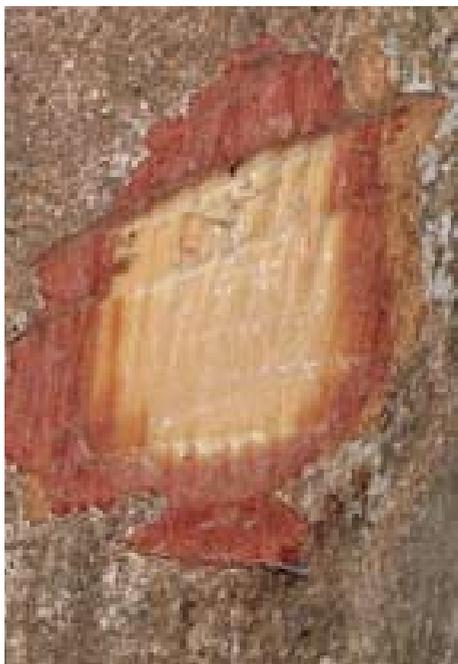


Fig. 102



Fig. 105



Fig. 103

Gymnostoma vitiense L.A.S. Johnson

Fijian names: Yaumunu, caukuro, (Vanualevu), caumumu (Kadavu), cautagane (Dogotuki), gunugunu (Serua, Yanuca), qarovatu (Nadroga), velau (Namosi, Suva, Bau)

Trade names: Velau

Height: 3-27m, with a flat, rounded crown. Trunk up to 2m in diameter.

Bark: Dull mud-grey, rough with longitudinal fissures, peeling off in large scales.

Slash: Red, turning pink on the inside over pink wood. Sap red.

Leaves: Small and scale-like, arranged in whorls on green branchlets.

Flowers: Male and female flowers in separate inflorescences, minute. Male flowers arranged in whorls of 8. Female flowers compressed in cone-like structures, flowers with hard bracts and bracteoles.

Fruits: Aggregated into a woody capsule, bracteoles persistent and hard. Single seeds 5mm, flattened, winged, 2-3cm in diameter, green turning brown on maturity.

Flowering & Fruiting: December to May; throughout the year.

Habitat: A canopy tree of dense or open forest, ridge forests and grassland thickets.

Altitude: Sea level to 90m.

Distribution: Endemic to Fiji, and recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, and Ovalau.

Uses: A useful timber tree. Wood is used for fuel, saplings used as fishing rods. The wood was formerly used to make war clubs. As ornamental when young.

Diagnostic features: Green, erect branches. Small, scale-like leaves arranged in whorls. Female flowers in cone-like structures.

Fig. 100: Habit of *Gymnostoma vitiense*.

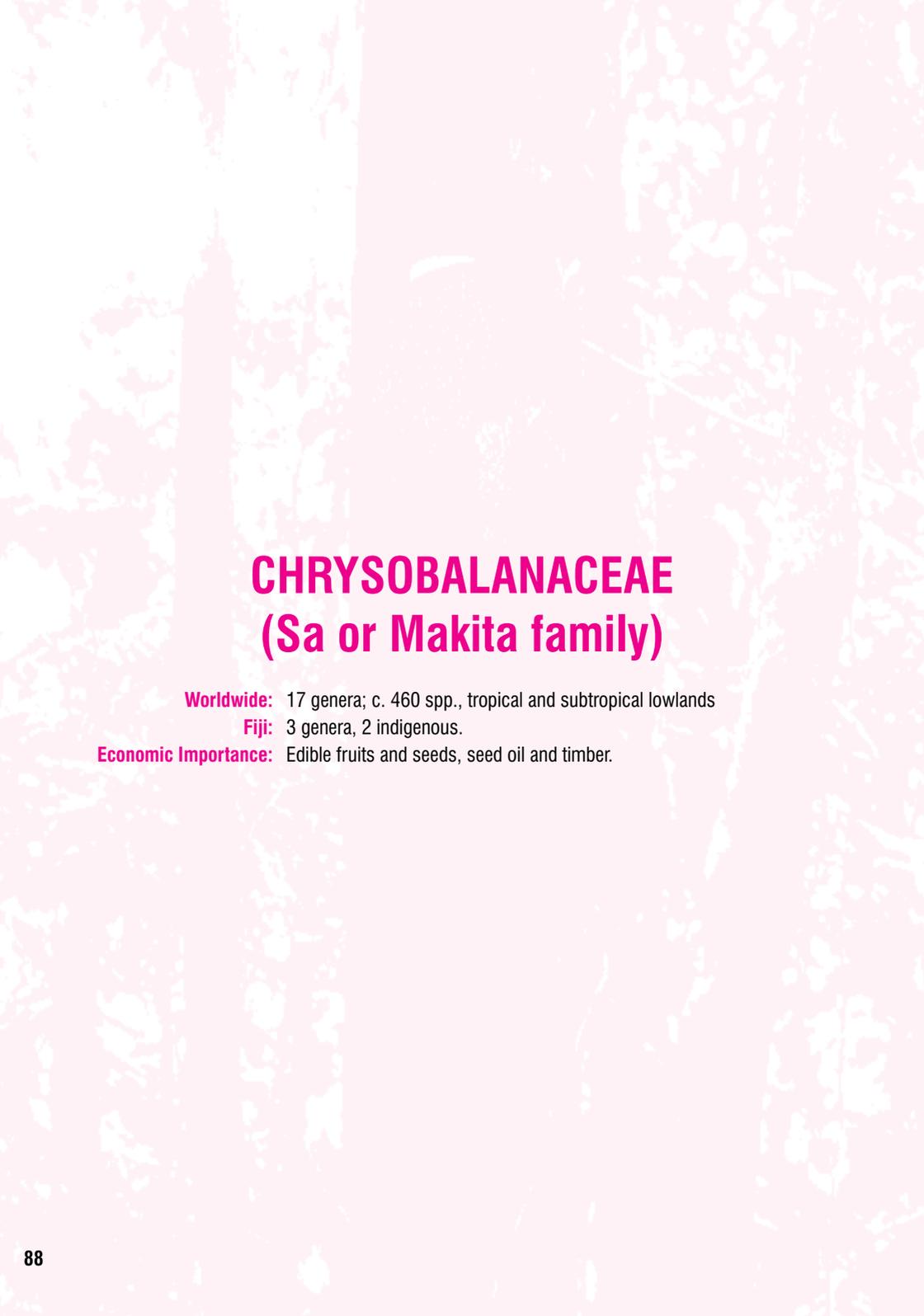
Fig. 101: Bark of *Gymnostoma vitiense*. (SPRH)

Fig 102: Slash of *Gymnostoma vitiense*. (GK)

Fig. 103: Branch with mature fruit capsules of *Gymnostoma vitiense*. (RB)

Fig. 104: Aggregate fruit capsule of *Gymnostoma vitiense*. Note the green branchlets, which bear tiny leaves (not visible). (RB)

Fig. 105: Fruit capsules and single seeds of *Gymnostoma vitiense*. (RB)



CHRYSOBALANACEAE (Sa or Makita family)

Worldwide: 17 genera; c. 460 spp., tropical and subtropical lowlands

Fiji: 3 genera, 2 indigenous.

Economic Importance: Edible fruits and seeds, seed oil and timber.

Family Characteristics

Trees with simple, alternate, pinnate leaves arranged in one plane. Petiole swollen and wrinkled (in Fijian species). Stipules present, often persistent. Lenticels elongate transversely upon secondary growth of the stem. Flowers bisexual, 5-merous, usually irregular (not radially symmetrical), aggregated into cymose to racemose inflorescences. Fruit a 1-seeded drupe.

Indigenous Genera and Species

Atuna (**makita**) 2 spp., 1 endemic, 1 described

Parinari (**sa**) 1 sp., described

Key To Indigenous Genera

- | | | |
|-----|---|-----------------|
| 1a. | Stipules enveloping the leaf in bud, forming a stipular hood;
lenticels few or none; leaves glabrous | <i>Atuna</i> |
| 1b. | Stipules broadly attached, leaving a scar similar to an interpetiolar
ridge-but not forming a stipular hood; lenticels numerous; leaves
hairy beneath | <i>Parinari</i> |



Fig. 106



Fig. 107



Fig. 110



Fig. 108



Fig. 109

Atuna racemosa Raf.

Fijian names: Mākita, mala (Bua, Vanualevuiloma, Labasa)

Rotuman name: Pipi

Height: Small tree, 5-20m, slender, with a close canopy made up of small branches.

Bark: Light brown-grey, thin, with large scales falling off, exposing white rough spots.

Slash: Outer layer red, fading to a lighter shade, exposing white wood.

Leaves: Simple, stiff, 10-35 x 2.5-13cm, ovate, arranged alternately in one plane, margin entire, apex acute to acuminate, remain attached to the stem for a long time.

Flowers: White, tinged purple at the base, small, in axillary inflorescences below the tips of branches.

Fruits: Globose up to 10cm in diameter, red-brown, woody, fleshy inside.

Flowering & Fruiting: Throughout the year.

Habitat: Light forest, as a typical understorey tree, and in grasslands.

Altitude: Sea level to 500m.

Distribution: In Fiji recorded from Viti Levu, Vanua Levu, Kadavu and Ovalau. Elsewhere distributed from Malaysia to the Caroline Islands and further east to Samoa and Tonga.

Uses: Leaves are used for thatching houses as they remain on the stems for a considerable time. Timber used for house posts. The fruit is used as a mordant for dyes, for scenting coconut oil, and for caulking canoes. The bark is medicinal.

Comments: *Atuna elliptica* (Kosterm.) Kosterm., the second native species, can be distinguished by its rounded leaf tips. It appears to be uncommon.

Diagnostic features: Large, glossy, dark green leaves arranged in one plane. Stipular hood covers the tip of the branch. Large, brown grey-spotted, woody fruits. Most common near streams, rivers and lakes.

Fig. 106: Habit of *Atuna racemosa*.

Fig. 107: Slash of *Atuna racemosa*. (GK)

Fig. 108: Distichously arranged leaves and fruit cone cut open of *Atuna racemosa*. (RB)

Fig. 109: Flower of *Atuna racemosa*. (RB)

Fig. 110: Stipular hood at the tip of the branch in *Atuna racemosa*. (GK)



Fig. 111

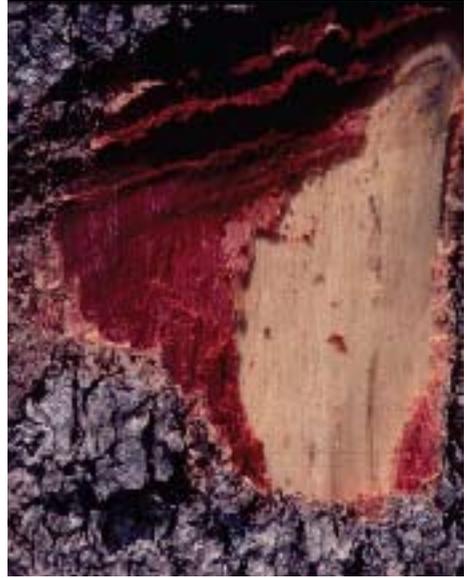


Fig. 112



Fig. 114

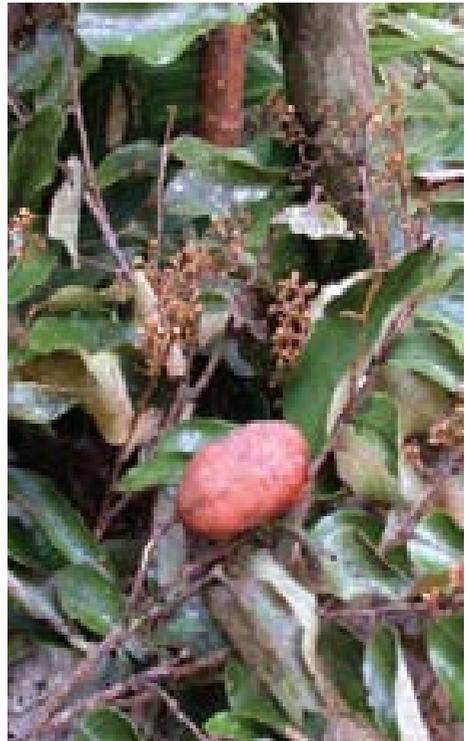


Fig. 113

Parinari insularum A. Gray

Fijian names: Sa, sea, (Wainibuka, Macuata, Taveuni), sea (Serua, Ovalau)

Rotuman name: Sea

Height: Tall tree, 8-30m, with a straight bole and a light rounded crown. Trunk spanning out in narrow flanks at the base. Branches growing out at sharp angles, appearing crooked.

Bark: Brown-grey, thick, rough, fissured, with scales falling off.

Slash: Outer layer dark-red, fading to cream. Sap red.

Leaves: Simple, up to 15 x 6cm, ovate, margin entire, apex acute, thin, stiff and papery, undersurface grey-green, hairy. Stipules small (c. 5mm long).

Flowers: White, small (c. 5mm across), in inflorescences at the tips of branches.

Fruits: Subglobose, c. 4 x 3cm, red-brown, densely spotted grey with lenticels. As fruits ripen the outer flesh softens and emits a strong sweet odour.

Flowering & Fruiting: March to October; throughout the year.

Habitat: Dense or open forest, cleared areas for pastures, ridge forests, and coastal thickets.

Altitude: Sea level to 800m.

Distribution: In Fiji recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu and Ovalau. Elsewhere in the Pacific found in Tonga, Samoa and the Wallis Islands.

Uses: The tree yields a hard timber used for making house posts. Bark is medicinal.

Diagnostic features: Habit of tree with branches appearing crooked. Red sap exuding when bark is cut. Leaves grey-green underneath and arranged in one plane. Small stipules present. Red-brown fruits with grey spots.

Fig. 111: Habit of *Parinari insularum*. (GK)

Fig. 112: Slash of *Parinari insularum*. Note the red inner bark.

Fig. 113: Leaves, inflorescence and fruit of *Parinari insularum*. (SPRH)

Fig 114: Inflorescence and leaves of *Parinari insularum*.



CLUSIACEAE

(Guttiferae) (Damanu family)

Worldwide: 47 genera; c. 1,350 spp., tropical and subtropical.

Fiji: 4 genera; 3 indigenous.

Economic Importance: Timbers, drugs, dyes (bark), gums, pigments, resins, edible fruits, oil and cultivated ornamentals.

Family Characteristics

Dioecious (Fijian species) or monoecious trees or shrubs with coloured latex (usually white or yellow in our species). Stipules lacking. Leaves opposite, decussate (Fijian species) or whorled, thick leathery and shiny dark green (our species), simple, entire and often gland-dotted with resin canals. Secondary veins of leaves pinnate and forming regularly curved arches. Flowers in terminal cymes. Fruit a drupe, berry or capsule.

Indigenous Genera and Species

Calophyllum (**damanu, dilo**) 7 spp., 5 endemic, 3 described

Garcinia (**laubu, buluwai**) 5 spp., 1 endemic, 2 described

Mammea (**vetau**) 1 sp. described

Key To Indigenous Genera

- | | |
|---|--------------------|
| 1a. Leaves with numerous, raised, dark glands beneath | <i>Mammea</i> |
| 1b. Leaves without dark glands beneath | |
| 2a. Interpetiolar ridge present; petioles expanded at the base and enclosing the stem; leaves often with dark resin canals (visible against light); secondary leaf veins often spaced | <i>Garcinia</i> |
| 2b. Interpetiolar ridge absent; petioles not swollen at the base or enclosing the stem; resin canals lacking; secondary leaf veins closely parallel | <i>Calophyllum</i> |

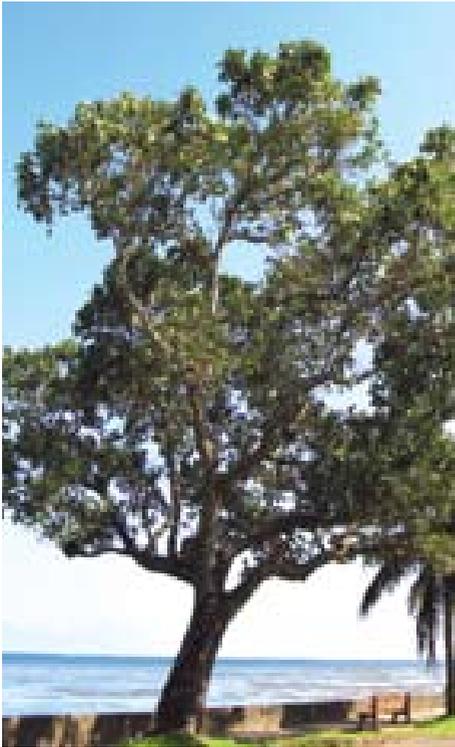


Fig. 115



Fig. 116



Fig. 118



Fig. 117



Fig. 119

Calophyllum inophyllum L.

Fijian name: Dilo.

Rotuman name: Hefau, hifau

Height: 6-25m, with spreading crown.

Bark: Dark grey and scaly.

Slash: Cut bark reddish brown on white, hard wood, exuding white or pale yellow latex when cut.

Leaves: Oblong, 8-14 x 4-8cm, dark green, with closely parallel lateral veins (1-2mm apart), apex rounded. Stipules absent.

Flowers: Bisexual, c. 2cm across, fragrant, borne in clusters in the axils of leaves. Petals and sepals 4. Petals white; stamens with conspicuous yellow anthers.

Fruits: Globose, 2.7-4.0cm in diameter, turning from green to purple or black at maturity.

Flowering & Fruiting: More or less throughout the year.

Habitat: Beaches, coastal thickets and forest, and streams near coast. Sometimes planted and naturalised further inland.

Distribution: Widespread in Fiji, occurring on most islands. Distribution extends through Malaysia, India to east Africa in the West and eastwards to the Tuamotus in the Pacific.

Uses: The timber is used for carving and for making furniture and other small utilitarian items. The leaves and fruits are used medicinally, and the fragrant fruits are used to scent coconut oil.

Comments: This species is easily distinguished from other species in the genus by being only found in coastal habitats, the long (more than 1cm) yellow petioles and by its grey bark (the bark is yellow tinged in most other native species).

Diagnostic features: Stiff, oblong, dark green leaves with numerous closely parallel lateral veins. Grey, scaly bark, exuding white or pale yellow latex when cut. White, fragrant flowers with yellow anthers. Relatively large globular fruits turning purple or black at maturity. Restricted to coastal or near-coastal habitats.

Fig. 115: Habit of *Calophyllum inophyllum*. (GK)

Fig. 116: Slash of the bark of *Calophyllum inophyllum*. (GK)

Fig. 117: Flowers of *Calophyllum inophyllum*. (RB)

Fig. 118: Leaves of *Calophyllum inophyllum*. (LT)

Fig. 119: Fruits of *Calophyllum inophyllum*. (RB)



Fig. 120



Fig. 121



Fig. 122



Fig. 123

Calophyllum leptocladum A.C. Sm. & S.P. Darwin

Fijian names: Damanu, dilodilo.

Trade names: Damanu draulalai

Height: 9-22m. Trunk to 50cm in diameter, sometimes slender.

Bark: Red-brown, tinged yellow and with large white blotches, fissured longitudinally.

Slash: Bark pink when cut, exposing pink wood.

Leaves: Elliptic to oblong, 3-6 x 2-3cm, dark green, stiff, with parallel lateral veins, apex acuminate. Stipules absent. Terminal leaf bud not more than 3.7mm long, copper colored when young

Flowers: Bisexual, c. 2cm across, fragrant, borne in clusters in the axils of leaves. Petals absent; sepals 4; stamens with conspicuous white anthers.

Fruits: Globose, pale green, white when mature, c. 1.5 cm across.

Flowering & Fruiting: December and March; May to July.

Habitat: Dense forest and transition zone between forest and grassland.

Altitude: 50m to 670m.

Distribution: Endemic to Fiji, and so far recorded from Viti Levu, Vanua Levu, Kadavu, Ovalau and Gau.

Uses: The timber is of good quality.

Comments: *Calophyllum leucocarpum* A.C. Sm. (a rare endemic that is restricted to a small area in Vanua Levu) is the other native species in the genus that lacks petals. It can be distinguished by its hairy branches, petioles and peduncles. *C. cerasiferum* Vesque is another species that sometimes has small leaves but has petals present, inconspicuous venation, and fruits that usually exceed 2cm in diameter.

Diagnostic features: Elliptic, small (to 6cm) leaves with numerous parallel lateral veins. Slash dark pink exposing pink wood. White, flowers without petals. Relatively small globose fruits turning white at maturity.

Fig. 120: Habit of *Calophyllum leptocladum*. (GK)

Fig. 121: Slash of the bark of *Calophyllum leptocladum*. (GK)

Fig. 122: Leaves of *Calophyllum leptocladum*.

Fig. 123: Leaves of *Calophyllum leptocladum*. (SPRH)

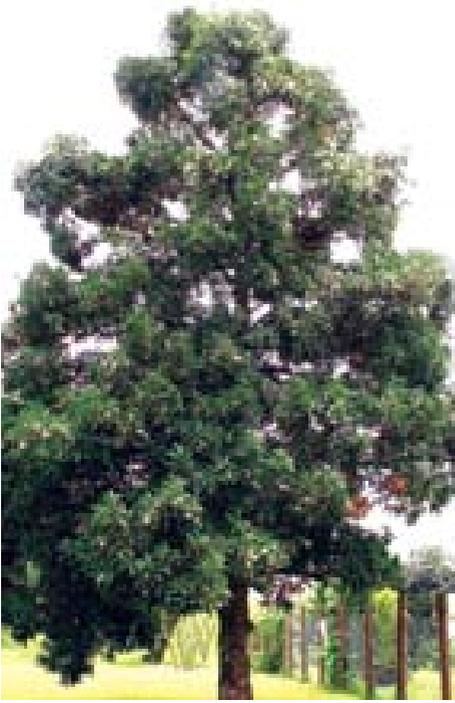


Fig. 124



Fig. 125



Fig. 126



Fig. 127

Calophyllum vitiense Turrill

Fijian name: Damanu.

Height: 5-30m.

Bark: Yellow-brown, with longitudinal fissures.

Slash: Bark dark pink when cut, exposing pink wood.

Leaves: Elliptic, 8-14 x 4-8cm, dark green, lateral veins not closely parallel, apex acuminate. Stipules absent. Terminal leaf bud longer than 3.7mm, copper coloured when young

Flowers: Bisexual, c. 2cm across, fragrant, borne in clusters in the axils of leaves. Petals and sepals 4; petals white; stamens with conspicuous white anthers.

Fruits: Globose, 2.7-4.0cm in diameter, turning from green to purple or black at maturity.

Flowering & Fruiting: More or less throughout the year

Habitat: Dense or open forest, sometime grassland.

Altitude: 90m to 1050m.

Distribution: Endemic to Fiji, and so far recorded from Viti Levu, Vanua Levu, Ovalau and Nairai.

Uses: Timber is of a very high quality.

Comments: Most other species of *Calophyllum* differ from *Calophyllum vitiense* by having smaller leaves (less than 10cm long). However, *C. amblyphyllum* A.C.Sm.S.P.V Darwin and *C. neo-ebudicum* Guillaumin may also have large leaves and a yellow-brown bark. *C. amblyphyllum* lacks the acuminate leaf apex found in the other two species. *C. vitiense* has stouter petioles (2mm or more in diameter) than *C. neo-ebudicum* (less than 2mm in diameter).

Diagnostic features: Elliptic, large (8-14cm long) leaves with numerous parallel lateral veins. Slash dark pink exposing pink wood. White, fragrant flowers with yellow anthers. Relatively large globular fruits turning purple or black at maturity.

Fig. 124: Habit of *Calophyllum vitiense*. (RB)

Fig. 125: Slash of the bark of *Calophyllum vitiense*. (GK)

Fig. 126: Flowers and leaves of *Calophyllum vitiense*. (RB)

Fig. 127: Globose fruits of *Calophyllum vitiense*. (RB)



Fig. 128



Fig. 129



Fig. 130



Fig. 132



Fig. 131

Garcinia myrtifolia A.C. Sm.

Fijian names: Laubū, sueru (Vuda, Ba)

Height: 6-28m; crown spreading. Branches straight and rising at an angle of c. 60° from the trunk.

Bark: Grey, tinged yellow, smooth or with longitudinal fissures.

Slash: Cut bark pale yellow, exposing white wood, emitting a sweet smell. Latex yellow or brown.

Leaves: Oblanceolate, thick and leathery, 7-17 x 4-11cm; apex rounded or truncate; stipules absent.

Flowers: Unisexual, the male and female flowers on separate trees; flowers c. 2cm across, borne in clusters in the axils of leaves. Petals and sepals 4. Petals white or greenish-white.

Fruits: Subglobose, 20-45 x 15-30mm, turning dull red or purple at maturity.

Flowering & Fruiting: Throughout the year.

Habitat: Dense forest, particularly near creeks.

Altitude: 45m to 900m.

Distribution: In Fiji recorded from Viti Levu, Vanua Levu and Kadavu. Elsewhere in the Pacific found in Tonga and Samoa.

Uses: Timber is of high quality.

Comments: There are three other native species of *Garcinia* that lack a ligule. All of them differ from *G. myrtifolia* by having much darker bark. *G. vitiensis* (A. Gray) Seem. differs from other species by its leaf blades being long decurrent on the petiole. The remaining two species usually have a dark bark and are known as **bulu**. *G. sessilis* (G.Forst.) Seem. can be differentiated by having 4 petals and is sometimes differentiated as **buluwai**, while *G. adiantha* A.C. Sm. & S. P. Darwin, also known as **bulumagayalewa**. (a name that is also applied to *G. pseudoguttifera* Seem), has only 2 petals.

Diagnostic features: Grey tinged yellow bark and yellow or brown latex; branches at a c. 60° angle from the main trunk. Dull red to purple mature fruits.

Fig. 128: Habit of *Garcinia myrtifolia*.

Fig. 129: Slash of *Garcinia myrtifolia*. (GK)

Fig. 130: Opposite leaves of *Garcinia myrtifolia*. (GK)

Fig. 131: Branch of *Garcinia myrtifolia*. (LT)

Fig. 132: Flower of *Garcinia myrtifolia*. (LT)



Fig. 133



Fig. 134



Fig. 136

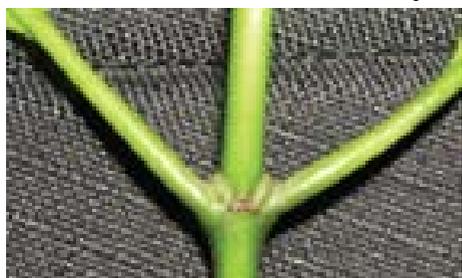


Fig. 137



Fig. 135

Garcinia pseudoguttifera Seem.

Fijian names: Buluwai, bulumagayalewa, sueru (Waya), sueri (Vuda, Ba)

Trade name: Bulu m.

Height: 4-25m slender; crown spreading. Branches straight at an angle of c. 90° from the trunk. Base of the trunk with prop roots.

Bark: Dark brown to black, roughly fissured, flaking in large scales, exposing light grey-white areas.

Slash: Cut bark with an outer yellow layer and orange inner layer, wood white. Latex yellow, hardening on exposure.

Leaves: Broadly ovate to rounded, 5-13.5 x 2.5-7.5cm, apex rounded or truncate; petiole expanded at the base, enclosing the stem, forming a ligule.

Flowers: Unisexual, the male and female flowers on separate trees. Flowers c. 2cm across, borne in clusters in the axils of leaves. Petals and sepals 4. Petals white or yellow-white, turning pale pink to red with age.

Fruits: Ovoid, c. 1.5cm in diameter, turning red or dark red at maturity, crowned with the persistent calyx.

Flowering & Fruiting: Throughout the year.

Habitat: Dense or open forest, and in beach thickets. Common.

Altitude: Sea level to 500m.

Distribution: In Fiji recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Rabi, Makogai, Ovalau, Vanuabalavu, Moala and the Yasawa Islands. Elsewhere in the Pacific found in Vanuatu and Tonga.

Uses: Valued for its timber. The edible fruit is also used for extracting an aromatic oil. The leaves are medicinal.

Comments: Easily differentiated from other species in the genus by the presence of ligules and prop roots.

Diagnostic features: Dark brown bark with a yellow exudate. Branches at about 90° angle to the trunk. Prop roots often present at the base of trunk. Large, almost rounded leaves with closely parallel veins and petioles that are expanded at the base to form a ligule.

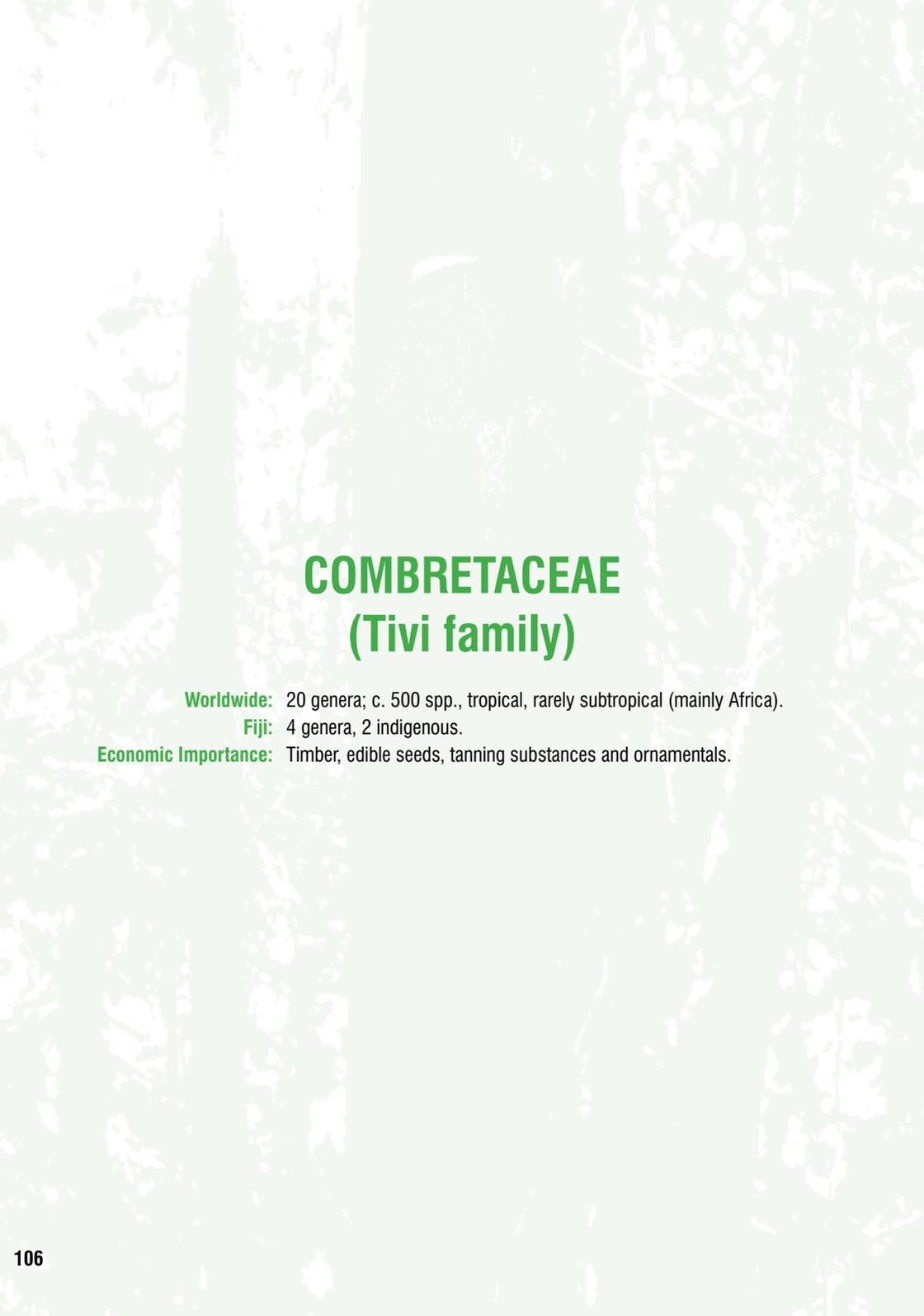
Fig. 133: Habit of *Garcinia pseudoguttifera*.

Fig. 134: Prop roots of *Garcinia pseudoguttifera*. (GK)

Fig. 135: Slash of *Garcinia pseudoguttifera*. (GK)

Fig. 136: Leaves of *Garcinia pseudoguttifera*. (GK)

Fig. 137: Close up of the petioles of *Garcinia pseudoguttifera*, showing the ligules (the basal parts of the petioles that sheath the stem). (GK)



COMBRETACEAE (Tivi family)

Worldwide: 20 genera; c. 500 spp., tropical, rarely subtropical (mainly Africa).

Fiji: 4 genera, 2 indigenous.

Economic Importance: Timber, edible seeds, tanning substances and ornamentals.

Family Characteristics

Often spreading trees (Fijian species) or shrubs. Stipules lacking. Leaves simple, entire, alternate (spirally arranged in our species) or whorled and often crowded at the end of branches. Venation pinnate. Flowers small, mostly bisexual, aggregated into racemes, spikes or heads. Fruit a 1-seeded capsule or drupe-like.

Indigenous Genera and Species

Lumnitzera (**sagale**) 1 sp., described

Terminalia (**tivi, tavola**) 10 spp. 8 endemic, 1 described

Key To Indigenous Genera

- | | | |
|-----|---|-------------------|
| 1a. | Trunks buttressed with whorls of branches originating horizontally at set intervals. Leaves with petioles and congested at the end of branches; secondary veins conspicuous. Deciduous or semi-deciduous. Flowers white | <i>Terminalia</i> |
| 1b. | Trunks not buttressed, branches not in whorls. Leaves sessile (or nearly so) and less crowded at the end of branches; secondary veins inconspicuous. Evergreen. Flowers red. | <i>Lumnitzera</i> |



Fig. 138



Fig. 139



Fig. 140



Fig. 141

Lumnitzera littorea (Jack) Voigt

Fijian names: Sagale, sagali

Height: 3-12m, with a compact crown. Trunk straight. *Terminalia*-branching.

Bark: Mud-grey, deeply fissured, peeling off in thick flakes, exposing light grey patches.

Slash: Outer layer flame-orange, turning paler inwards to a light yellow; wood yellow.

Leaves: Spirally arranged, up to 8 x 2.5cm, narrow obovate-elliptic, sessile, tough and dark green, apex obtuse with an emarginate tip.

Flowers: Red, conspicuous, at the tips of branches, 5-10mm long.

Fruits: Ellipsoid, green, maturing brown, c. 2.5cm long.

Flowering & Fruiting: More or less throughout the year.

Habitat: A mangrove associated tree, present on the drier edges of mangrove swamps; also found in strand and coastal forests.

Altitude: Sea level.

Distribution: Throughout tropical Asia, northern Australia, Micronesia and eastwards to Tonga. In Fiji found on most islands.

Uses: A timber tree which yields a hard durable timber used as piles in water, house posts and for general construction. The bark is medicinal.

Comments: The species has declined in numbers and disappeared in some locations because of over-utilization of its timber for house posts.

Diagnostic features: Dark green, narrow obovate leaves with obtuse tips notched in the middle that are sessile and spirally arranged; small, red flowers. *Terminalia*-branching.

Fig. 138: Habit of *Lumnitzera littorea*. (GK)

Fig. 139: Trunk of *Lumnitzera littorea* with slash.

Fig. 140: Flowers of *Lumnitzera littorea*. Also note the fleshy leaves in the background. (LT)

Fig. 141: Flowering branches of *Lumnitzera littorea*. (GK)

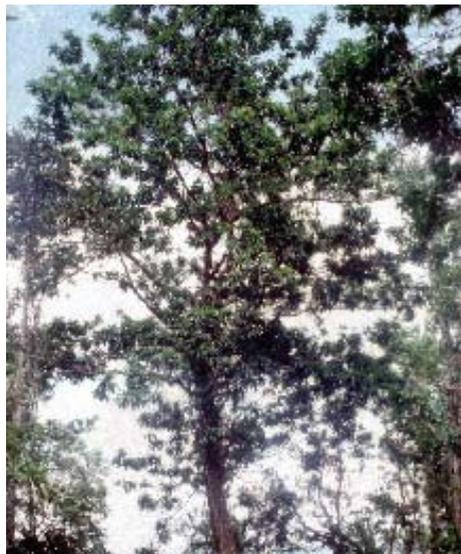


Fig. 142

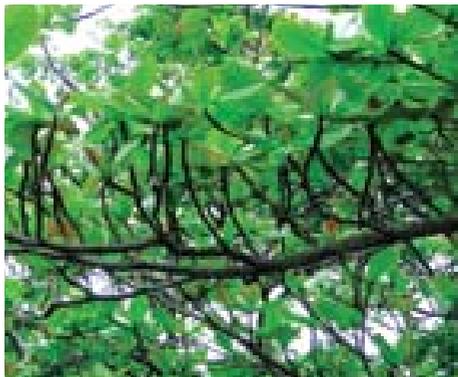


Fig. 143



Fig. 146



Fig. 144



Fig. 147



Fig. 145

Terminalia capitanea A.C. Sm.

Fijian names: Tivi loa, tavola ni veikau.

Height: To 26m, with characteristic *Terminalia*-branching.

Bark: Dark brown-black, with closely spaced longitudinal fissures, is fibrous, can be peeled off in long strips.

Slash: Outer layer brown, over a yellow layer, covering yellow wood.

Leaves: Large, arranged spirally at the tips of branches, obovate, usually 14-30 x 5-11cm, margin entire, apex obtuse, often with an emarginated tip, pink / red when young.

Flowers: White, small (about 1cm across), in small flagelliferous racemes that are 20-30 cm long.

Fruits: Hard, dry, provided with broad wings, looking like flat ovoid disks.

Flowering & Fruiting: January; March to July.

Habitat: Dense or ridge forests.

Altitude: 50m to 300m

Distribution: Endemic to Fiji. Recorded from southeastern parts of Viti Levu.

Uses: A timber tree.

Comments: There are 10 native *Terminalia* species. Two, *T. catappa* L. and *T. litoralis* Seem, are coastal and common on beaches and in coastal forest and are usually referred to as **tavola** or **tivi** in Fijian. *T. catappa* has bigger fruits (more than 3.5cm) and leaves than *T. litoralis*. Both coastal species have fleshy fruits without wings. The other 8 species (all with winged fruits) are restricted to inland forests and are generally known as **tivi** or **tavola ni veikau**. All these 8 species are endemic to relatively small areas in Fiji and usually not a common component of the forest. *T. simulans* A.C. Sm., *T. luteola* A.C. Sm., *T. strigillosa* A.C. Sm., *T. psilantha* A.C. Sm. and *T. crebrifolia* A.C. Sm. have only been reported from Vanua Levu, while *T. vitiensis* A.C. Sm., *T. pterocarpa* Melville & P. S. Green and *T. capitanea* A.C. Sm. are only known from Viti Levu. The species are difficult to differentiate in the field, but can be differentiated using the key of Smith (1985).

Diagnostic features: Horizontal branches with *Terminalia*-branching. Leaves congested towards the tip of branches. Semi-deciduous. Fruits with broad wings.

Fig. 142: Habit of *Terminalia capitanea*.

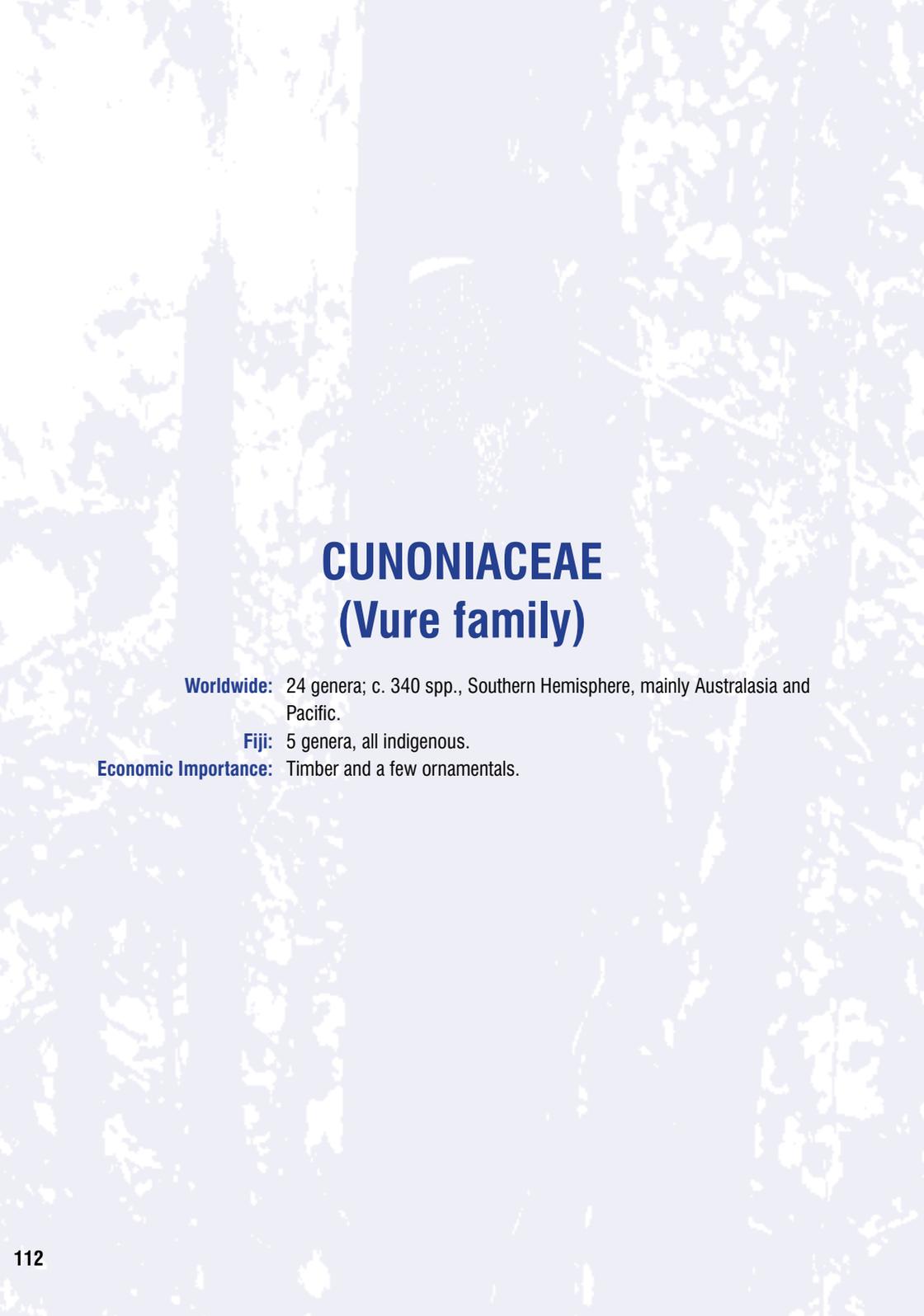
Fig. 143: Typical branching of species of *Terminalia* ("*Terminalia*-branching"), with branches curving upwards, as seen in *Terminalia catappa*. (RB)

Fig. 144: Slash of *Terminalia capitanea*.

Fig. 145: Leaves of *Terminalia capitanea*. (LT)

Fig 146: Flowers of *Terminalia litoralis*. (RB)

Fig. 147: Fruit of *Terminalia capitanea*. (RB)



CUNONIACEAE (Vire family)

Worldwide: 24 genera; c. 340 spp., Southern Hemisphere, mainly Australasia and Pacific.

Fiji: 5 genera, all indigenous.

Economic Importance: Timber and a few ornamentals.

Family Characteristics

Small trees or shrubs (Fijian species), rarely climbers. Stipules large and often leave interpetiolar scars. Leaves leathery, often glandular, opposite or in whorls, trifoliolate or imparipinnately compound. Flowers usually small, red or white, bisexual, 4- to 5-merous, in heads or racemes. Fruit usually a dry, splitting 2-valved capsule, rarely a drupe, nut, or follicle.

Indigenous Genera and Species

Acsmithia 1 endemic sp.

Geissois (**vure**) 4 endemic spp., 1 described

Pullea 1 endemic sp.

Spiraeanthemum (**katakata**) 3 endemic spp.

Weinmannia 5 endemic spp.

Key To Indigenous Genera

1a. Leaves simple

2a. Inflorescences branched. Fruit a drupe or a follicle

3a. Leaves opposite, apex acute or mucronate

4a. Petiole swollen at base and partially or entirely winged;
fruit a drupe

4b. Petiole not swollen at base, not winged; fruit a follicle

3b. Leaves whorled, apex obtuse

2b. Inflorescences not branched; fruit a 2-valved capsule

1b. Leaves compound

5a. Leaflets 3 (rarely 5), more than 10cm long, margins entire;
flowers red

5b. Leaves more than 3, less than 10cm long, margins dentate;
flowers white

Pullea

Spiraeanthemum

Acsmithia

Weinmannia

Geissois

Weinmannia



Fig. 148



Fig. 149



Fig. 150



Fig. 151

Geissois superba Gillespie

Fijian names: Vure, vota (Vanua Levu)

Height: 6-13m. Branches irregular forming a light spreading crown.

Bark: Greyish.

Slash: Reddish brown over white wood.

Leaves: Tri-foliolate; leaflets 24-50 x 10-19cm, ovate-elliptic, margin entire, apex acute, hairy on both surface. Stipules densely hairy, joined at the base and recurved at the margins. Stipules persisting up to the third mature leaf.

Flowers: Sepals and stamens red, conspicuous, in spicate inflorescences up to 45cm, arising from leafless branches, sometimes amongst the leaves.

Fruits: Capsule, cylindrical, dehiscent. Seeds irregularly winged.

Flowering & Fruiting: October to May; July to December.

Habitat: A subcanopy tree of dense forest, remnant forest and forest edges.

Altitude: 150m to 900m.

Distribution: Endemic to Fiji. So far recorded only from Viti Levu.

Uses: Timber.

Comments: The other indigenous species of *Geissois*, *G. imthurnii* Turrill, *G. ternata* A. Gray and *G. stipularis* A.C. Sm., have shorter inflorescences (less than 11cm) and leaflets (less than 23cm) than *G. superba*. *G. imthurnii* differs from the other species by having sessile to subsessile leaflets. *G. stipularis* differs from *G. ternata* by the young stipules forming a spherical structure at the tip of branches, while those of the latter are flattened.

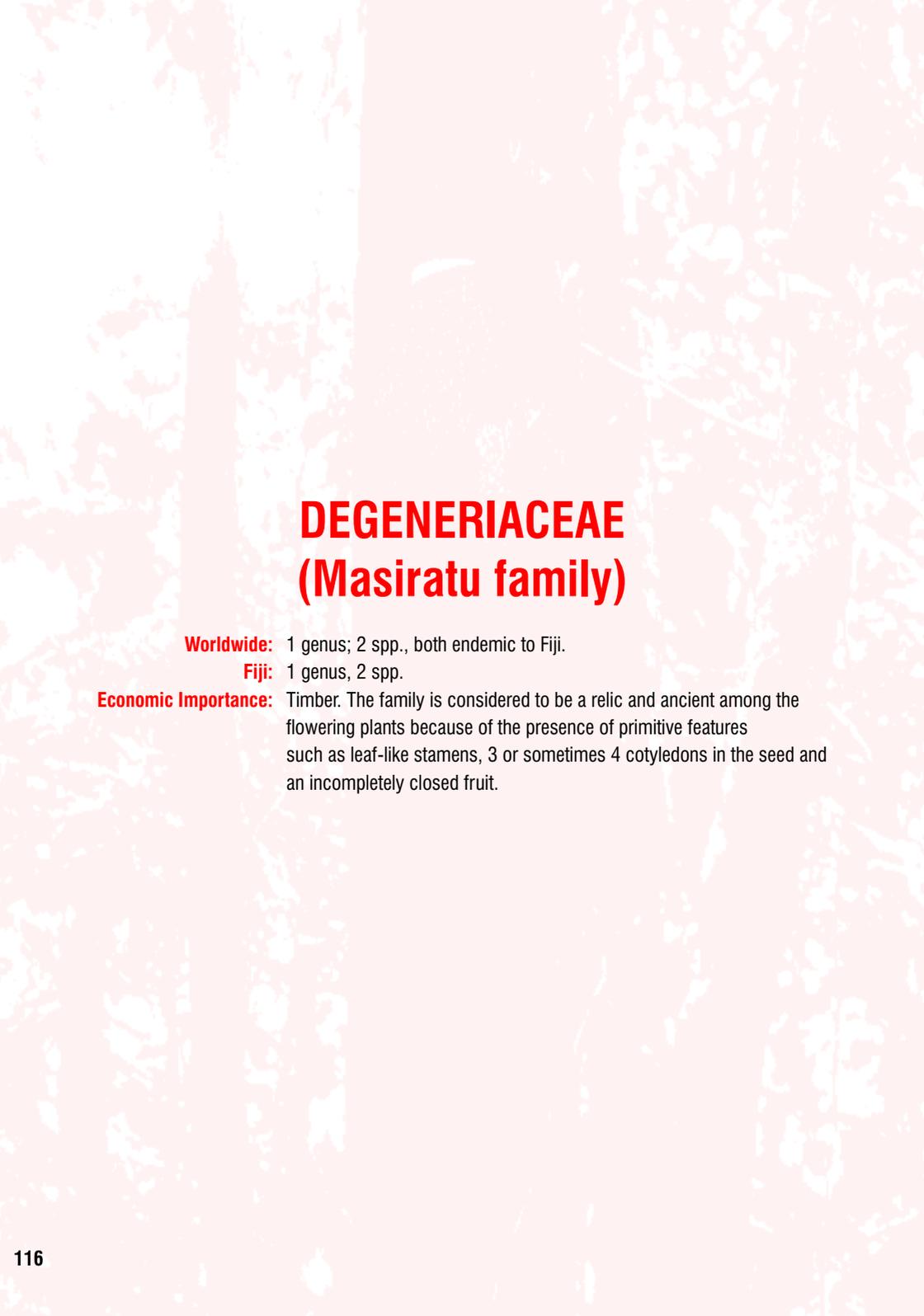
Diagnostic features: Large, opposite, tri-foliolate leaves with densely hairy stipules, joined at the base and recurved at the margins. Showy red flowers in large inflorescences.

Fig. 148: Habit of *Geissois superba*.

Fig. 149: Slash of *Geissois superba*.

Fig. 150: Inflorescence of *Geissois superba*.

Fig. 151: Opposite, tri-foliolate leaves of *Geissois ternata* (GK).



DEGENERIACEAE (Masiratu family)

Worldwide: 1 genus; 2 spp., both endemic to Fiji.

Fiji: 1 genus, 2 spp.

Economic Importance: Timber. The family is considered to be a relic and ancient among the flowering plants because of the presence of primitive features such as leaf-like stamens, 3 or sometimes 4 cotyledons in the seed and an incompletely closed fruit.

Family Characteristics

Trees with rounded buttresses and grey bark. Stipules absent. Leaves alternate (spirally arranged), simple, entire with pinnate venation. Petioles long (more than 3cm), yellow, and leave shield-like scars on the branches. Flowers large, bisexual, solitary, aromatic, 3-merous (with 3 sepals and 12 to 18 petals in 3 to 5 whorls), peduncles long. Fruit a large, leathery follicle containing numerous flattened, orange-red seeds.

Indigenous Genera and Species

Degereria (**masirātū**, **vāvāloa**) 2 endemic sp., 1 described.



Fig. 152

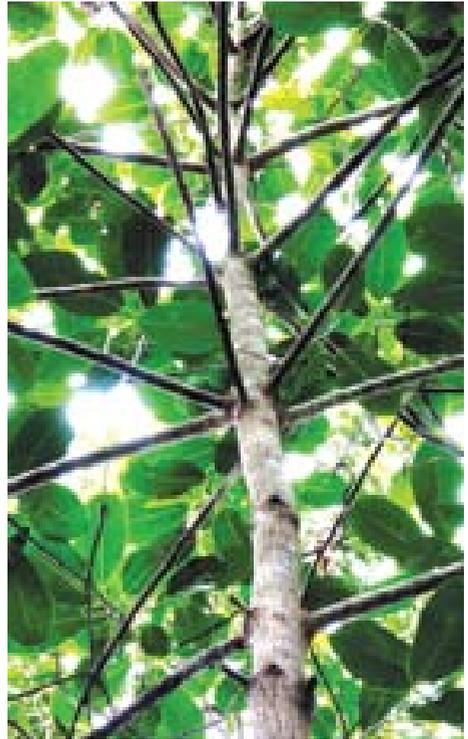


Fig. 156



Fig. 153



Fig. 155



Fig. 154

Degeneria vitiensis I.W. Bailey & A.C. Sm.

Fijian names: Masirātū, vāvāloa.

Height: To 30m, with a close canopy. Trunk slender, reaching up to 1m in diameter, with buttresses at the base.

Bark: Dark, charcoal-grey, thick with irregular longitudinal fissures.

Slash: Inner bark creamy-white, turning dark brown on exposure. When cut the bark emits a faint sweet smell, similar to that in species of *Litsea*. *L. magnifolia* Gillespie, shares the name **valvaloa** with **masiratu** because of the similarity of the smell from the cut bark of the two species.

Leaves: 5-27 x 2.5-14cm, oblong-obovate, margin entire, apex obtuse to slightly emarginate, with long petiole (more than 3.5cm).

Flowers: Creamy to light c. 6cm across, somewhat succulent, solitary in the axils of leaves, fragrant; all flower parts arranged spirally.

Fruits: Cylindrical, c. 11 x 5cm, curved, green, turning pink to purple as it matures and finally black. Seeds with a bright-orange outer fleshy testa, embedded in green pulp.

Flowering & Fruiting: May to July; September to December.

Habitat: Dense, light or open and secondary forest.

Altitude: 30m to 1150m.

Distribution: Endemic to Fiji. So far recorded from Viti Levu, Vanua Levu and Taveuni.

Uses: Timber tree.

Comments: The second endemic species in the genus, *Degeneria roseiflora* John .M. Mill. (**karawa**), is distinguished by its smaller flowers (less than 4cm across), pink-white to magenta and smaller fruits (generally less than 6cm long). It is also a timber tree.

Diagnostic features: Dark charcoal-grey bark. Large, alternate, leathery leaves with a distinct yellow midrib and long (more than 3.5cm) petiole.

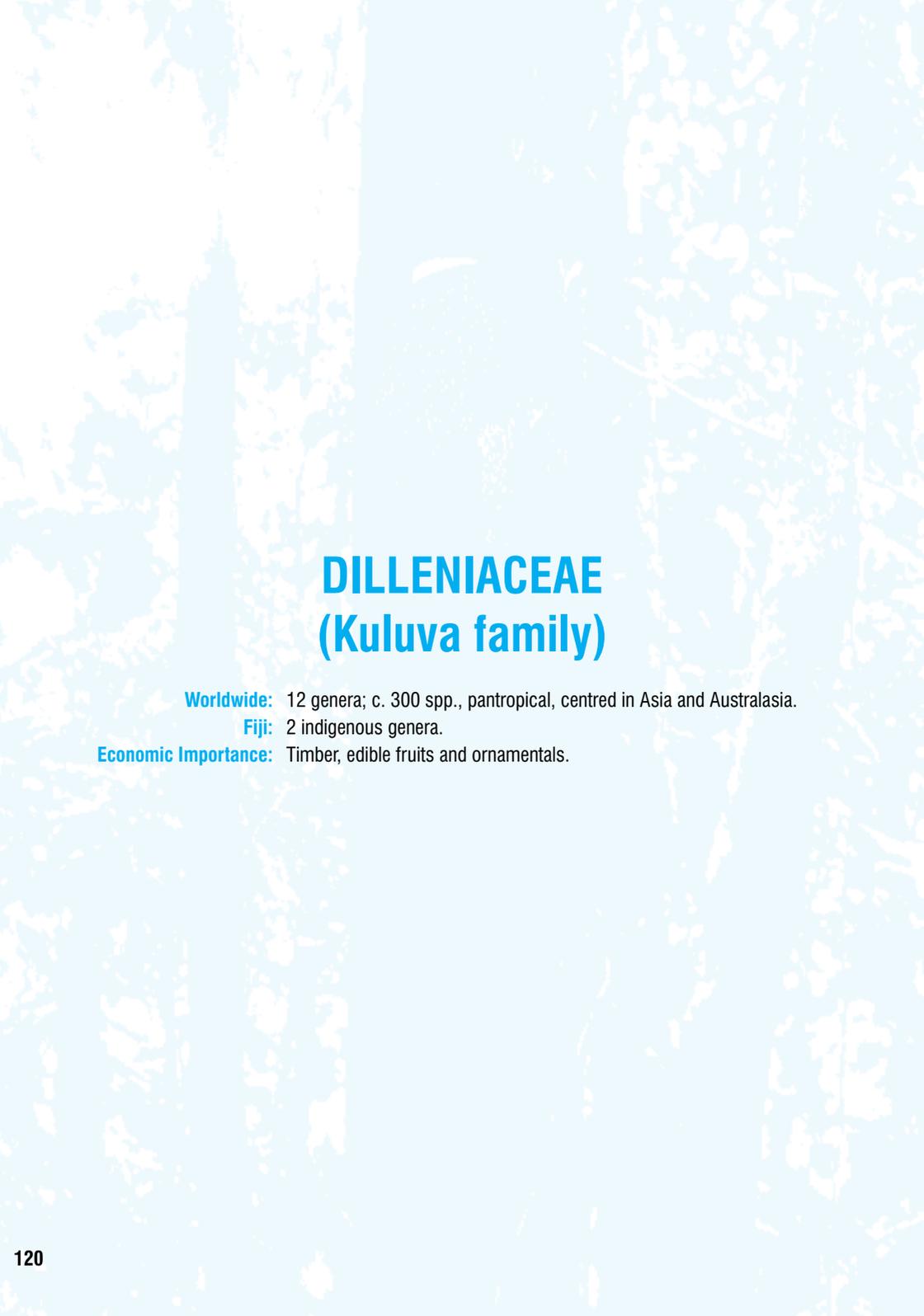
Fig. 152: Habit of *Degeneria vitiensis*.

Fig. 153: Slash of *Degeneria vitiensis*. (GK)

Fig. 154: Leaves and flower buds of *Degeneria vitiensis*.

Fig. 155: Immature fruits of *Degeneria roseiflora* which are similar to those of *D. vitiense*. (GK)

Fig. 156: Canopy of *Degeneria vitiensis*. (RB)



DILLENIACEAE (Kuluva family)

Worldwide: 12 genera; c. 300 spp., pantropical, centred in Asia and Australasia.

Fiji: 2 indigenous genera.

Economic Importance: Timber, edible fruits and ornamentals.

Family Characteristics

Monoecious or dioecious trees, shrubs or herbs or lianas (not in Fiji). Stipules lacking or attached as wing-like structures to the petiole. Leaves alternate (usually spirally arranged), simple and hair on the lower surface (at least when young). Petiolar base grooved. Flowers usually 5-merous yellow or white, solitary or borne in spikes (in Fijian species), cymes or racemes. Fruits capsular and dehiscent or berry-like.

Indigenous Genera and Species.

Dillenia (**kuluva**) 1 sp., described

Hibbertia 1 sp.

Key to Indigenous Genera

- | | | |
|-----|--|------------------|
| 1a. | Leaves to 17cm long and less than 2cm wide, sessile (or nearly so), margin entire, with metallic-shiny hair on underside; secondary veins closely parallel, terminating in an intramarginal vein; interpetiolar ridge absent. Inflorescence usually 2-flowered; carpels 2 | <i>Hibbertia</i> |
| 1b. | Leaves more than 18cm long and 4cm wide, petiole conspicuously winged, margin dentate, glabrous at maturity; secondary veins spaced and ending in teeth of leaf margin; stipules broadly attached leaving an interpetiolar ridge. Inflorescence few flowered; carpels 5 to 10. | <i>Dillenia</i> |



Fig. 157



Fig. 158



Fig. 159



Fig. 160

Dillenia biflora (A. Gray) Martelli ex Dur and Jacks.

Fijian names: Kuluva, kukuluva (Wainibuka, Ovalau), kulukulu (Waya, Bua, Macuata), kulukulu (Ba).

Height: Small 3-20m, with a narrow rounded crown.

Bark: Brown with a red tinge, peeling off in large scales that feel like paper.

Slash: Red, exuding a red sap and revealing pinkish brown wood. A piece of cut bark held close to the ear makes a hissing sound.

Leaves: Alternate, spirally arranged at the tips of branches, petioles provided with wings which fall off as leaves mature; leaves large, 18-50 x 9-25cm, broadly elliptic to ovate, margins dentate, apex acute. Young leaves bright pink or light green.

Flowers: White or cream, to 3cm across, borne singly or in pairs, in terminal inflorescences.

Fruits: Berry-like green maturing black, enclosed by the sepals that curve back when fruit is mature, splitting when ripe.

Flowering & Fruiting: Throughout the year.

Habitat: Dense and secondary forest, edges of forests and in forest patches.

Altitude: Sea level to 1075m.

Distribution: In Fiji recorded from Viti Levu, Vanua Levu, Taveuni and Ovalau. Elsewhere in the Pacific found in Vanuatu.

Uses: A useful timber tree, also used as a living fence. Parts of the tree are used in traditional herbal medicine.

Comments: The tree grows adventitious roots when it is damaged and is therefore difficult to eradicate. It also readily sprouts again when cut and may have several stems.

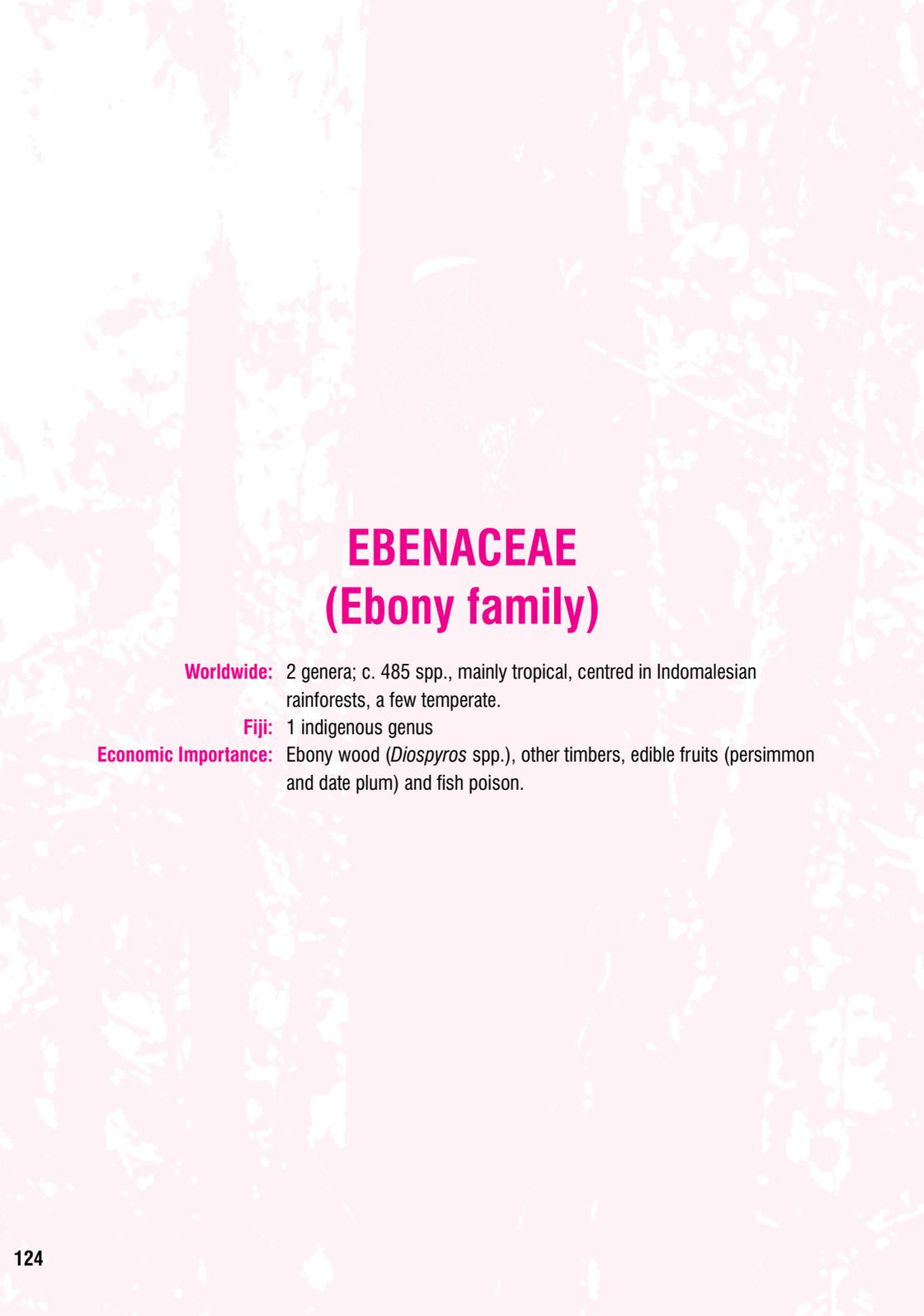
Diagnostic features: Large leaves with dentate margins and a winged petiole; young leaves reddish or light green in colour. Reddish brown bark with red slash and sap. A hissing sound is heard when the bark is cut.

Fig. 157: Habit of *Dillenia biflora*. (RB)

Fig. 158: Slash of *Dillenia biflora*. (SPRH)

Fig. 159: Leaves of *Dillenia biflora*, showing the winged petiole. Pink young leaf. (RB)

Fig. 160: Flowers of *Dillenia biflora*. (RB)



EBENACEAE (Ebony family)

Worldwide: 2 genera; c. 485 spp., mainly tropical, centred in Indomalaysian rainforests, a few temperate.

Fiji: 1 indigenous genus

Economic Importance: Ebony wood (*Diospyros* spp.), other timbers, edible fruits (persimmon and date plum) and fish poison.

Family Characteristics

Mostly small (2-10m high in our species), dioecious trees or shrubs with usually black, gritty and charcoal-like stems and branches zigzagging at the tips. Lenticels elongating longitudinally. Stipules absent. Leaves alternate, simple, entire sometimes bearing glands. Petiole short, flat and swollen. Main vein sunken on the upper leaf surface and prominent below. Flowers small, yellowish white with a slight sweet scent 3- or 5-merous, in axillary, cymose inflorescences or solitary. Calyx persistent and hardening in fruit. Fruit a berry, ovoid, ripening yellowish green to red or brownish.

Indigenous Genera and Species

Diospyros (**kauloa**) 7 spp., 3 endemic, 1 described.



Fig. 161



Fig. 162



Fig. 163



Fig. 164

Diospyros major (G.Forst.) Bakh.

Fijian names: Maba, baba (Waya), bama (Rakiraki, Wainibuka).

Trade name: Kauloa

Height: Small tree, 3-15m, slender.

Bark: Dark grey to black.

Slash: Pale brown over white wood.

Leaves: Alternate, 7-21 x 4-17cm, elliptic-oblong, margins entire, apex obtuse.

Flowers: Unisexual, tree dioecious, flowers white or cream tinged with purple, about 1.5cm across.

Fruits: Globose, up to c. 50mm in diameter, hairy, fragrant, yellow, turning brown at maturity.

Flowering & Fruiting: December to February; throughout the year.

Habitat: Dense, open or dry forest, sometimes cultivated in villages.

Altitude: Sea level to 1,130m.

Distribution: Indigenous to Fiji, Tonga, Wallis and Futuna, cultivated in Samoa. In Fiji, recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau, Koro, Gau, Yasawa Islands, Rabi, Kabara and Ogea Driki.

Uses: The tree yields timber used in general construction and for firewood. Bark and leaves are used in traditional herbal medicine.

Comments: The name **kauloa** is shared by all 7 species of *Diospyros*. *D. major* can be differentiated from *D. gillespiei* (Fosberg) Koster. and *D. samoensis* A. Gray by having 3 (rarely 4) calyx lobes (persistent in fruit) as compared to 4 or 5 and from most of the remaining species by having bigger leaves and fruits. A detailed key to *Diospyros* in Fiji is provided by Smith (1981).

Diagnostic features: Dark grey to black bark. Alternate, dark green elliptic-oblong leaves that are arranged in one plane. Hairy, fragrant fruits.

Fig 161: Fruits of *Diospyros samoensis*. (LT)

Fig. 162: Slash of *Diospyros major*.

Fig. 163: Leaves of *Diospyros major*.

Fig. 164: Fruits of *Diospyros elliptica*, which are not hairy like those of *Diospyros major*. Note the persistent calyx lobes on the fruits. (GK)



ELAEOCARPACEAE (Kabi family)

Worldwide: 10 genera; c. 520 spp., tropical and subtropical (absent from continental Africa).

Fiji: 1 indigenous genus.

Economic Importance: Timber, edible fruits and ornamentals.

Family Characteristics

Trees or shrubs. Stipules present but soon falling off. Leaves alternate (spirally arranged), often thick and leathery, elliptic to ovate lanceolate, sometimes crowded, usually with shallowly crenate margins. Venation pinnate. Petiole swollen at tip and base. Petiolar scars shield-like. Flowers bisexual, 4 or 5-merous, white, in racemes or cymes. Fruit a beaked drupe (Fijian species), often bluish at maturity, or a capsule.

Indigenous Genera and Species

Elaeocarpus (**kabi**) 21 spp., 20 endemic, 1 described



Fig. 165



Fig. 166



Fig. 168

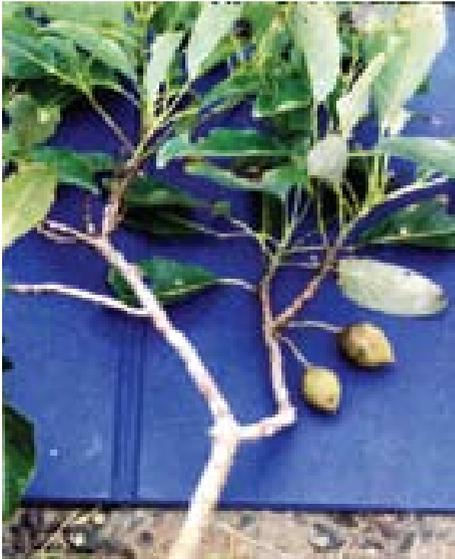


Fig. 167



Fig. 169

Elaeocarpus lepidus A.C. Sm.

Fijian names: **Kabi**, sivi (Wainibuka).

Rotuman name: umasa (*E. grandis*).

Height: 16-27m, trunk up to 70cm (or more) in diameter.

Bark: Dark grey to pink-brown.

Slash: Red-brown, over white wood. No sap.

Leaves: Alternate, arranged spirally, 7-11 x 2-4cm, elliptic to ovate-lanceolate, margins wavy, entire or shallowly crenate to serrate, apex acute, veins conspicuously yellow-green.

Flowers: Small (c. 2cm across), white, in cymes amongst leaves or on bare branches.

Fruits: Subglobose, c. 4cm, blue-green, beaked at the apex.

Flowering & Fruiting: January; June to October.

Habitat: Dense forests, inside and at the edges, and along streams.

Altitude: 100m to 800m.

Distribution: Endemic to Fiji. Recorded from Viti Levu, Vanua Levu, Koro and Gau.

Uses: Useful timber tree.

Comments: In Fiji, there are 21 morphologically similar species recorded in the genus, 10 of which are seemingly rare species with a supposedly very restricted range, while an additional 2 are still insufficiently known. Most species are known as **kabi**, but may also have various other names in different parts of Fiji. Generally flowers are required for identifying a species (see Smith's key, 1981, vol. 2, pages 351-351). However, the more common species may be differentiated as follows. *E. lepidus* usually has very wavy leaf margins. *E. pyriformis* A. Gray (**kesa**) has serrate margins and hair on the branches and on the underside of leaves. *E. kambi* Gibbs (**kabi**) has small, entire leaves that do not exceed 7 × 3.5cm. *Elaeocarpus chelonimorphus* Gillespie (**sivia**), seemingly the most common species of the genus, and *E. storckii* Seem (**qaiqai**), both have leathery and mostly entire leaves, with the latter having thicker leaves and more robust branches (7mm or more in diameter towards the apex). The leaves of *E. subcapitatus* Gillespie (**corikula**, **kabi**), *E. graeffei* Seem. (**midri**, **drivi**), *E. casinoides* A. Gray and *E. vitiensis* Gillespie (**tabadamu**) all have shallowly crenate margins. *Elaeocarpus grandis* F. Muell (blue Quandon) from Australia is presently investigated as fast growing plantation species.

Diagnostic features: Spirally arranged leaves with wavy margins that are shallowly crenate to serrate. Flowers borne on leafless branches. Fruits bluish.

Fig. 165: Habit of *Elaeocarpus lepidus*.

Fig. 166: Slash of *Elaeocarpus lepidus*.

Fig. 167: Leaves and immature fruits of *Elaeocarpus lepidus*.

Fig. 168: Flowering branch of *Elaeocarpus chelonimorphus* showing the spiral leaf arrangement, petioles and flowers typical of the genus *Elaeocarpus*. (GK)

Fig. 169: Leaves and fruits of *Elaeocarpus grandis*. (RB)

EUPHORBIACEAE (Kauvula family)

Worldwide: 321 genera; c. 7,950 spp., cosmopolitan.

Fiji: 29 genera, 21 indigenous.

Economic Importance: Rubber, vegetables, oils of industrial and medicinal importance (Ricinus), edible roots (cassava, Manihot), edible fruits, timber, dyes, hydrocarbons and many ornamentals. (e.g Acalypha, Croton, Poinsettia).

Family Characteristics

Monoecious or dioecious trees, shrubs or herbs, sometimes with white latex. The bark of youngest parts of branches often ruptures to form characteristic longitudinal slits. Lenticels, if present, usually elongate longitudinally upon secondary thickening of stem. Leaves alternate (opposite in a few species), simple (trifoliate in *Bischofia*), often pinnately veined and with or without stipules. Flowers small, usually 3 or 5-merous, in basically cymose inflorescences. Fruit a 3-locular capsule, drupe or berry.

Indigenous Genera and Species

Acalypha (**kalabuci**) 5 spp., 2 endemic
Aleurites (**laūci, sikeci**) 1 sp., aboriginal introduction, described
Antidesma 5 endemic spp.
Austrobuxus 1 endemic sp.
Baccaurea (**midra**) 1 end. sp.
Bischofia (**koka**) 1 sp., described
Chamaesyce 1 sp.
Claoxylon 3 spp., 2 endemic
Cleidion 1 endemic sp.
Cleistanthus 1 endemic sp.
Codiaeum (**sacasaca**) 1 sp.
Croton 4 spp., 3 endemic

Drypetes 2 spp., 1 endemic
Endospermum (**kauvula**) 2 endemic spp., 1 described
Euphorbia (**vasa damu**) 1 endemic sp.
Excoecaria (**sinu gaga**) 3 sp., 2 endemic
Glochidion (**molau**) 18 spp., 17 endemic, 2 described
Homalanthus (**tadano**; synonym: *Omalanthus*) 1 sp., described
Macaranga (**mavu, gadoa, davo, mama**) 9 spp., 7 endemic, 1 described
Mallotus (**yaqata, qetata**) 1 sp., described
Nothobaccaurea (**midra**) 2 spp., 1 endemic
Phyllanthus 5 spp., 4 endemic
Stillingia (**vasa**) 1 sp.

Key to Indigenous Genera

- 1a. Petiole usually more than 2cm long
 - 2a. Leaves opposite *Mallotus*
 - 2b. Leaves alternate or spiral
 - 3a. White latex present; stipules inconspicuous
 - 4a. Leaf venation pinnate
 - 5a. Leaves papery *Stillingia*
 - 5b. Leaves leathery
 - 6a. Petiole with basal thickening; leaves more than 20cm long *Codiaeum*
 - 6b. Petiole not thickened at base; leaves less than 10cm long *Excoecaria*
 - 4b. Leaf venation palmate
 - 7a. Petioles with two conspicuous glands at the apex; leaves usually more than 8cm long *Aleurites*
 - 7b. Petioles lacking glands; leaves less than 5cm long *Homalanthus*
 - 3b. Latex not white or absent; stipules conspicuous
 - 8a. Leaves trifoliolate *Bischofia*
 - 8b. Leaves simple
 - 9a. Leaves peltate *Macaranga*
 - 9b. Petiole attached to leaf base, leaves not peltate
 - 10a. Petiole without conspicuous glands at the apex
 - 11a. Petiolar scars raised or sticking out *Baccaurea/Nothobaccaurea*
 - 11b. Petiolar scars not raised or sticking out
 - 12a. Leaf margins smooth
 - 13a. Leaf spatulate (spoon-shaped) *Acalypha*
 - 13b. Leaf not spatulate *Claoxylon*
 - 12b. Leaf margins toothed
 - 14a. Leaf spoon-shaped (spatulate) *Cleidion*
 - 14b. Leaf not spatulate *Acalypha*
 - 10b. Petiole with two or more conspicuous glands at the apex
 - 15a. Petiole more than 3cm long *Endospermum*
 - 15b. Petiole less than 3cm long *Croton*
- 1b. Petiole usually less than 2cm long
 - 16a. Petiole more than 1cm long, wrinkled and grooved *Drypetes*
 - 16b. Petiole less than 1cm long, smooth
 - 17a. Milky latex present
 - 18a. Leaves alternate; stipules absent *Euphorbia*
 - 18b. Leaves opposite; stipules present *Chamaesyce*
 - 17b. Milky latex absent

Key to Indigeneous Genera continued

- 19a. Leaves along main branches reduced to scales
(less than 5cm long) subtending the branches
- 19b. Leaves on main branches not reduced
 - 20a. Petals present; sepals valvate *Cleistanthus*
 - 20b. Petals absent; sepals overlapping
 - 21a. Flowers in racemes or spikes *Antidesma*
 - 21b. Flowers in axillary clusters or arising from defoliate nodes
 - 22a. Stipules absent *Austrobuxus*
 - 22b. Stipules present *Phyllanthus*

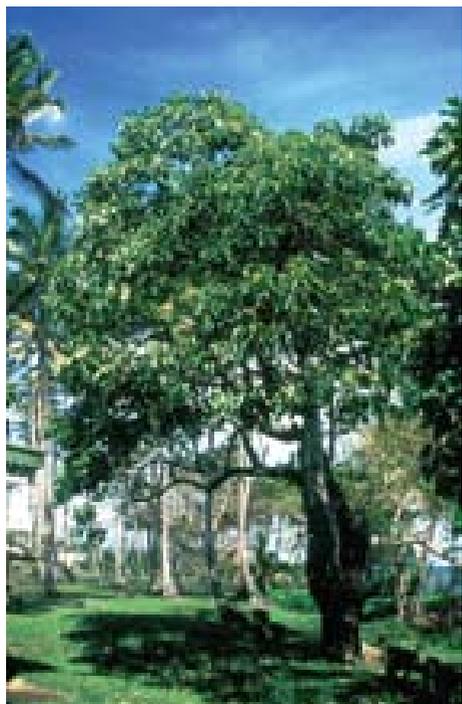


Fig. 170



Fig. 171



Fig. 172



Fig. 173

Aleurites moluccana (L.) Willd.

Fijian names: **Lauci**, laci (Bua), loci (Wainibuka), qereqere (Vuda, Vatulele, Kadavu, Yasayasa), sikeci (Vanua Levu, Vatulawa, Lau), toto (Waya, Ba, Nadroga, Emalu, Serua), tuitui (Ono)

Rotuman name: si'esi

English name: Candlenut tree, kukui (Hawaii)

Height: 10-25m, with a light spreading crown.

Bark: Light-grey all over.

Slash: White; sap white, thin, turning deep red-brown.

Leaves: Alternate, arranged spirally on the stems, 24 x 12cm, deltoid to ovate-oblong, or shallowly 3-lobed, paler beneath. Young leaves deeply 3-lobed. A pair of glands present at the base of leaf.

Flowers: Unisexual, tree monoecious (male and female flowers on the same tree); flowers small (about 7mm across), white, at the end of branches, the male flowers maturing before the female.

Fruits: A fleshy drupe, globose, to 4cm across, the green outer skin rotting soon after ripening, exposing a woody seed; seed globose ridged along its length, kernel fleshy and oily.

Flowering & Fruiting: Throughout the year.

Habitat: Secondary forests, near old and new villages, edges of dense forests, thickets, along streams and along coasts.

Altitude: Sea level to 600m.

Distribution: Probably an early introduction to Fiji and found on many islands. Indigenous to Malaysia, naturalized in Southeast Asia, Melanesia, and Polynesia. Common in many tropical regions.

Uses: Wood used for case timber. The oily fruit was used for lighting (candle-nut), its soot for tattoos and as ink for tapa designs. The “nut” is used in some Asian cuisine and as a substitute for macadamia-nuts. The oil was also used as wood polish or added to coconut oil for skin and hair dressing, while the roots provided a red dye for tapa designs. Parts of the tree are also medicinal.

Diagnostic features: Deltoid to ovate-oblong, or shallowly 3-lobed leaves (young leaves deeply 3-lobed); glands present at the base of leaf; leaves paler beneath. Stem light-grey and exuding a white latex.

Fig. 170: Habit of *Aleurites moluccana*.

Fig. 171: Slash of *Aleurites moluccana*. (GK)

Fig. 172: Flowers, fruits and leaves of *Aleurites moluccana*.

Fig. 173: Young seedling of *Aleurites moluccana*. (LT)

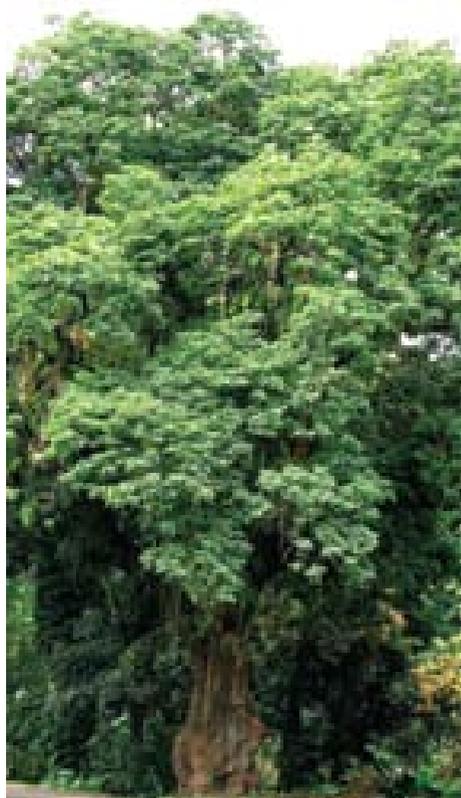


Fig. 174



Fig. 176



Fig. 177

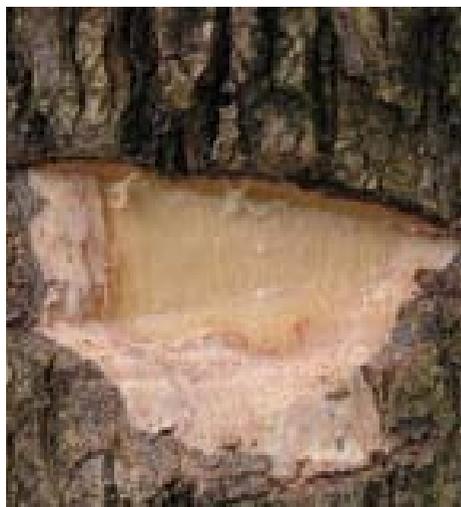


Fig. 175

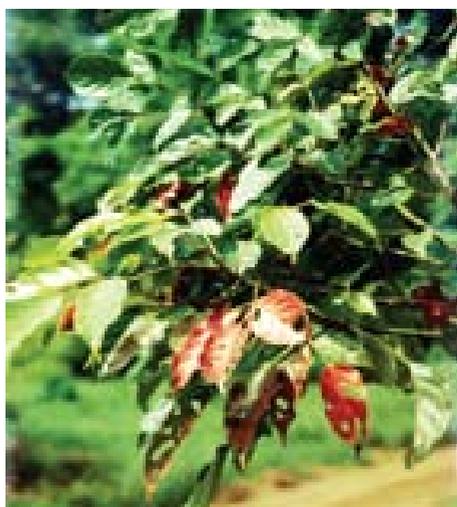


Fig. 178

Bischofia javanica Blume

Fijian names: **Koka**, tea (Vatulawa, Cicia, Lakeba, Matuku), togo (Serua, Emalu), togotogo (Ba, Vuda, Keiasi, Nadroga)

English name: Java cedar.

Height: 5-30m, with a dense spreading crown. Trunk up to 70cm in diameter.

Bark: Red-brown to black, rough, peeling in thin scales.

Slash: Dark red with a pink inner layer over white to cream wood. Heartwood red brown. Sap clear turning red after exposure.

Leaves: Alternate, arranged spirally on the stem, trifoliolate; leaflets 5-10 x 3.5-6.5 cm, the terminal leaflet largest, ovate to ovate-elliptic, margin toothed, apex acute to acuminate.

Flowers: Unisexual, tree dioecious, rarely monoecious, (male and female flowers on the same tree); flowers small, c. 1mm across, cream to pale-green or yellow, axillary, borne towards the tips of branches.

Fruits: Subglobose, c. 5mm across, beaked at the apex, maturing pink to dull orange-brown, fleshy when ripe.

Flowering & Fruiting: September to March; throughout the year.

Habitat: Secondary forests, grassland thickets, edges of dense forests.

Altitude: Sea level to 900m.

Distribution: Throughout Fiji. Found from India, central China, through Malaysia, eastwards to Vanuatu, Tonga, Niue and Samoa. Introduced in the Cook Islands, Tahiti and Hawaii.

Uses: Wood is heavy and gives a good quality timber used for making durable posts. Wood used for firewood. The bark is medicinal and used to dye the brown tapa cloth of Tonga. Fruits are reported to be edible.

Diagnostic features: Trifoliolate leaves and leaflets with toothed margins. Dense crown. Dying leaves often reddish.

Fig. 174: Habit of *Bischofia javanica*. (RB)

Fig. 175: Slash of the bark of *Bischofia javanica*. (GK)

Fig. 176: Trifoliolate leaf and flowers of *Bischofia javanica*. (GK)

Fig. 177: Fruits of *Bischofia javanica*. (RB)

Fig. 178: Red senescent leaves of *Bischofia javanica*.

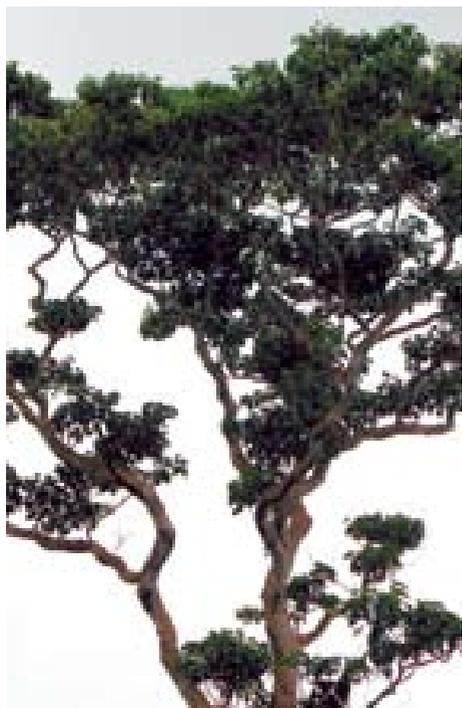


Fig. 179



Fig. 180



Fig. 181



Fig. 183



Fig. 182

Endospermum macrophyllum (Muell. Arg.) Pax & K. Hoffm.

Fijian names: **Kauvula**, lekutu, (Namosi, Wainimala), vulavula (Serua, Kadavu, Namosi, Wainibuka, Verata, Ovalau, Bua)

Height: 12-35m, with a small compact crown. Trunk straight, remaining unbranched for up to 15m, and reaching up to 1.5m in diameter. Buttresses present at the base.

Bark: White-grey, smooth.

Slash: Yellow outer layer over a white inner layer, covering white wood. Sap almost colourless.

Leaves: Alternate, spirally arranged on the stems, 6.5-15 x 5-12cm, deltoid to cordate, essentially glabrous and margin wavy. Leaves dull green beneath. Two pale glands present at the apex of the petiole.

Flowers: Unisexual, tree dioecious (male and female flowers on separate trees); flowers small (about 2 to 3mm across), white.

Fruits: Globose, 3-locular, about 8mm across, with an outer fleshy covering.

Flowering & Fruiting: More or less throughout the year.

Habitat: Dense and secondary forests, thickets near mangroves.

Altitude: Sea level to 900m.

Distribution: Endemic to Fiji and recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu and Ovalau.

Uses: A major timber tree of Fiji. Its light wood is easy to process and is highly valued.

Comments: The other endemic species, *E. robbianum* A.C. Sm., is distributed in the central and southern parts of Vanua Levu. It can be distinguished by its larger, glabrous leaves that usually exceed 15cm in length and by there being usually 4 black or brown glands on the petiole.

Diagnostic features: Bark smooth, white-grey. Alternate, spirally arranged leaves, deltoid to cordate, with wavy margins, dull green beneath. Petiole with several glands at apex.

Fig. 179: Habit of *Endospermum macrophyllum*. (RB)

Fig. 180: *Endospermum macrophyllum* overhanging a cleared area. (GK)

Fig. 181: Slash of *Endospermum macrophyllum*.

Fig. 182: Leaves and fruits of *Endospermum macrophyllum*.

Fig. 183: Seeding of *Endospermum robbianum*. (RB)



Fig. 184



Fig. 185



Fig. 186

Glochidion seemannii Muell. Arg.

Fijian names: Molau

Height: Shrub to small tree, 2-15m, with short branches and a narrow crown.

Bark: Mud-grey, thin and scaly.

Slash: Red, covering white to pinkish wood. Latex absent.

Leaves: Alternate, 5-7 x 1-2.5cm, ovate-elliptic to lanceolate, margin entire, apex acute to acuminate.

Flowers: Unisexual tree monoecious (male and female flowers on the same tree); flowers minute (about 2mm across), pale yellow or green, reduced, with no petals, clustered along the stems.

Fruits: Capsules, about 6mm across, tinged red or pink, minutely hairy.

Flowering & Fruiting: Throughout the year.

Habitat: Dense to secondary forest and bush, abandoned gardens, thickets and open areas.

Altitude: Sea level to 1,150m.

Distribution: Endemic to Fiji, widespread. Recorded from Viti Levu, Vanua Levu, Taveuni, Ovalau, and Moala.

Uses: Stems and leaves are used in traditional herbal medicine. Wood is used in general construction and for firewood.

Comments: There are 18 native species of *Glochidion* (most of which are referred to as **molau**), 14 have green undersides of leaves (the rest have a whitish undersurface and are differentiated under the next described species, *G. vitiense* (Muell. Arg.) Gillespie) and may be differentiated from *G. seemannii*: as follows: Many of the species have very restricted distributions: *G. melvilliorum* Airy Shaw (Nausori Highlands), *G. inusitatum* A.C. Sm. (Mt. Naduna, Macuata), *G. collinum* A.C. Sm. (Nadarivatu), *G. euryoides* A.C. Sm. (Mt. Koroba), *G. podocarpum* (Muell. Arg.) C.B. Rob., and *G. calciphilum* Croizat (southern Lau Group). Among the remaining species with a green underside, only *G. cordatum* Seem. has leaves that are hairy, cordate and sessile. *G. concolor* Muell. Arg., *G. bracteatum* Gillespie, *G. atrovirens* A.C. Sm. and *G. anfractuosum* Gibbs have leaves that are usually larger (exceeding 7cm in length) than those of *G. seemannii*. Of the remaining species, *G. brunnescens* A.C. Sm. is restricted to mountain peaks and has a rounded apex, while *G. atalotrichum* A.C. Sm. has very small leaves (less than 4cm) and is hairy on young branchlets.

Diagnostic features: Acuminate (finely pointed), alternately arranged leaves. Scaly mud-grey bark.

Fig. 184: Habit of *Glochidion seemannii*.

Fig. 185: Slash of the bark of *Glochidion seemannii*. (GK)

Fig. 186: Leaves and flowers of *Glochidion seemannii*.



Fig. 187



Fig. 188

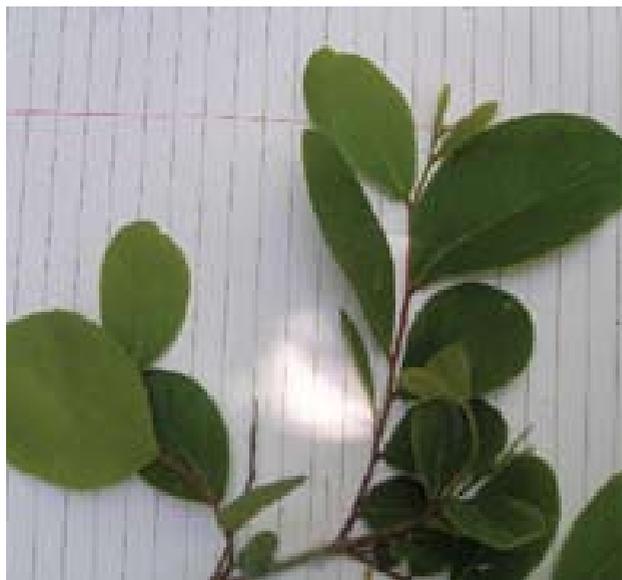


Fig. 189



Fig. 190

Glochidion vitiense (Muell. Arg.) Gillespie

Fijian names: Molau, qalo (Waya, Vuda, Ba, Serua, Beqa)

Rotuman name: 'am'ama (G ramiflorum)

Trade name: molau tagane

Height: Shrub to small tree, 0.6-8m, with short branches and a narrow compact crown. Young twigs covered with fine hair.

Bark: Grey-brown.

Slash: Light brown over cream-coloured wood.

Leaves: Small, 2-6.5 x 1.5-3.5cm, hairy, whitish grey on the underside, orbicular-elliptic to oblong-ovate, margin entire, apex obtuse.

Flowers: Unisexual, tree monoecious (male and female flowers on the same tree); flowers small (c. 2mm across), pale yellow or green, axillary; petals absent.

Fruits: Capsule globose, c. 5mm in diameter.

Flowering & Fruiting: June to January; December to February.

Habitat: Dense or secondary or dry forests, open grasslands, abandoned gardens.

Altitude: Sea level to 600m.

Distribution: Endemic to Fiji, and known from several islands. Recorded from Viti Levu, Vanua Levu, Kadavu, Ovalau, Nairai, Kanacea and Vanua Balavu.

Uses: Leaves used in traditional herbal medicines. Wood is used in general construction and for firewood.

Comments: Only four species of *Glochidion* have leaves with whitish undersides. Of these only *G. vitiense* has a rounded or retuse leaf tip and base. *G. gillespiei* Croizat and *G. multilobum* A.C. Sm. are restricted to mountainous areas and have small (less than 5cm) leaves. The former is only found on Viti Levu and has a rounded base but pointed apex, while the latter is restricted to Vanua Levu and has narrow leaves that are pointed at the apex and base. *G. amentuligerum* (Muell. Arg.) Croizat usually exceeds 5cm in length and has a pointed apex.

Diagnostic features: Small, somewhat rounded, alternately arranged leaves with rounded tips and hairy cover that is whitish on the underside. Twigs and other vegetative parts with fine hair.

Fig. 187: Habit of *Glochidion vitiense*.

Fig. 188: Slash of the bark of *Glochidion vitiense*. (GK)

Fig. 189: Leaves of *Glochidion vitiense*. (GK)

Fig. 190: Unopened flowers of *Glochidion amentuligerum*. (GK)

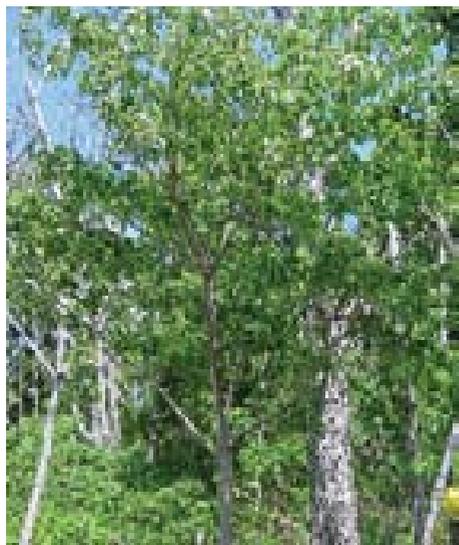


Fig. 191



Fig. 192



Fig. 193



Fig. 194

Homalanthus nutans (G.Forst.) Guill.

Fijian names: Tadau, dautau (Wainibuka), maomaoa (Lauicake), tautau (Waya, Vuda, Ba)

Trade name: Tadano

Height: Shrub to medium sized tree, 2-15m with a rounded crown. Trunk up to 25cm in diameter.

Bark: Mud-brown, with prominent leaf-scars.

Slash: Light green (turning yellow brown in old trees) over white wood. Latex copious, white.

Leaves: Simple, arranged spirally on the stems, petiolate, petioles up to 7cm, leaves 4-17 x 3-16cm, deltoid to ovate, margin entire, apex acute, undersurface of leaf paler than the upper surface.

Flowers: Unisexual, monoecious (male and female flowers on the same tree), yellow-green or bright yellow, without petals, male flowers more numerous and conspicuous along the inflorescence, the female flowers usually solitary at the base of the catkin-like, to 7cm long inflorescence.

Fruits: Globose, compressed, c. 1cm in diameter, pink, maturing deep red.

Flowering & Fruiting: Throughout the year.

Habitat: A pioneer species of cleared and stony areas. Also found in dense and secondary forests, thickets and amongst reeds.

Altitude: Sea level to 1,120m.

Distribution: Widespread and common in Fiji. Recorded on the larger islands (Viti Levu, Vanua Levu, Kadavu, Ovalau, Koro, Yasawa Islands). In the Pacific it occurs in the Caroline Islands, Vanuatu, New Caledonia, and eastwards to Tahiti and Rapa.

Uses: Leaves and fruits are widely used in traditional herbal medicines. Anti-HIV constituents (prostratin) are now drawing interest of the international pharmaceutical research and industry.

Homalanthus nutans (J.R. & G. Forst.) Guillemin.

Diagnostic features: Long petiolate leaves of deltoid to ovate shape with a pale green undersurface; obvious leaf scars remain on stem after leaves have fallen.

Fig. 191: Habit of *Homalanthus nutans*. (RB)

Fig. 192: Slash of the bark of *Homalanthus nutans*.

Fig. 193: Inflorescences, fruits and leaves of *Homalanthus nutans*. (GK)

Fig. 194: Fruits of *Homalanthus nutans*. (RB)



Fig. 195



Fig. 196



Fig. 198



Fig. 197



Fig. 199

Macaranga harveyana (Muell. Arg.) Muell.Arg.

Fijian names: **Mavu**, mavuvula, davo (Serua, Beqa), gadoa gadoavula (Yasayasamuala, Lauicake, loupata (Lauicake), lutulutu (Kadavu), mama (Bua, Wailevu), rote (Cakaudrove), tavutulawa (Rewa), velutu (Waya, Ba, Vuda, Nadroga), venuma (Kadavu, Muala, voioutu (Macuata)

Rotuman name: sa'ora

Height: 3-10m with a spreading crown.

Bark: Dusty grey to brown.

Slash: Cut bark white, over white wood.

Leaves: Simple, arranged spirally on the stems, petiolate, peltate; up to 30 x 26cm, triangular, margin entire, apex acute, undersurface of leaf covered with pale yellow or pale brown glands, glabrous or nearly so. Young growth often covered with a film of white hairs. Stipules yellowish.

Flowers: Unisexual, monoecious or dioecious (male and female flowers borne on the same or different trees), in axillary inflorescences; male flowers minute, female flowers c. 1cm.

Fruits: Capsule c. 1cm in diameter, brown tinged with purple when mature, with soft spikes.

Flowering & Fruiting: March to July; August to December.

Habitat: Secondary forests and thickets, particularly in intermediate to dry locations.

Altitude: Sea level to 400m.

Distribution: Recorded on the larger islands of Viti Levu, Vanua Levu, Vanuabalavu and Yacata. In the Pacific it occurs east of Fiji to the Cook Islands, Tahiti and the Austral Islands.

Comments: There are 8 other species of *Macaranga* in Fiji, which can be differentiated as follows: *M. secunda* Muell. Arg. differs from *M. harveyana* by the lower surface of leaves being hairy and having dark glands. *M. seemanii* (Muell. Arg.) Muell. Arg. can be recognised by its young leaves being glabrous and often having reddish veins. *M. vitiensis* Pax & K. Hoffm. is readily distinguished by its leaves being more elongate (2.5 to 3 times as long as broad, compared to 2 times in other species) and *M. membranacea* Muell. Arg. has leaves that are hairy on both surfaces. *M. magna* Turrill and *M. caesariata* A.C. Sm. both have leaves that usually exceed 30cm in length, with thick, persistent hair on leaf undersides. Petioles and young stems are hairy in the former but not in the latter. Of the remaining species, *M. graeffeana* Pax & K. Hoffm. has deltoid leaves that are hairy when young and stipules that are to 5cm long and *M. marikoensis* A.C. Sm. has broadly ovate blades (to 17 × 16.5cm) with stipules that are 5cm or more long.

Diagnostic features: Large, glabrous, peltate leaves, with yellow glands on the lower surface of leaves. Yellow stipules and white film of hairs on young portions of stem. Fruits with soft spines.

Fig. 195: Habit of *Macaranga harveyana*. (GK)

Fig. 196: Slash of the bark of *Macaranga harveyana*. (GK)

Fig. 197: Leaves of *Macaranga harveyana*. (GK)

Fig. 198: Characteristic yellow stipules of *Macaranga harveyana*. (GK)

Fig. 199: Inflorescence of *Macaranga harveyana*. (LT)



Fig. 200



Fig. 201



Fig. 202



Fig. 203

Mallotus tiliifolius (Blume) Muell. Arg.

Fijian names: *Yaqwata* (Waya, Mamanuca), *yaqata* (Bua)

Trade name: Qetata

Height: 8-16m with spreading crown, sometimes a shrub.

Bark: Light grey, with parts peeling off in large flakes in old trees.

Slash: Brownish over white wood.

Leaves: Opposite or spirally arranged, ovate, 3-veined from the leaf base, sometimes with light green hair on the underside. Opposing leaves often of different sizes.

Flowers: Small, arranged in pendulous inflorescences, sepals yellow to pale green.

Fruits: Usually a muricate or echimate schizocarp, the seeds globose to ovoid, with a fleshy testa.

Flowering & Fruiting: Throughout the year; November to January.

Habitat: Frequent in coastal vegetation and remaining stands of dry forest, but also found in open forest and in crest thickets.

Altitude: Sea level to 580m.

Uses: Firewood.

Distribution: Taiwan, Philippines and Western Malaysia eastward to Fiji and Samoa. In Fiji recorded from Viti Levu, Vanua Levu, Wakaya, Koro, Yadua Taba and the Yasawa Group.

Diagnostic features: Whitsh bark with circular pink-tinged patches. Leaves opposite, ovate and 3-veined from the base. Indument composed of stellate hairs.

Fig. 200: Habit of *Mallotus tiliifolius*. (GK)

Fig. 201: Bark of an old individual of *Mallotus tiliifolius*. (GK)

Fig. 202: Leaves and inflorescence of *Mallotus tiliifolius*. Note the different sizes of opposing leaves. (GK)

Fig. 203: Close-up of a flower of *Mallotus tiliifolius*. (GK)



FABACEAE (Bean family)

Worldwide: 437 genera; c. 11,300 spp., cosmopolitan.

Fiji: 63 genera, 19 indigenous.

Economic Importance: Edible seeds (beans, garden peas, dhal), fodder, green manure cover-crops (nitrogen-fixation), dyes, oils (soybean), insecticides (e.g. derris) and ornamentals.

Family Characteristics

Trees, shrubs, herbs or vines. Stipules usually present. Leaves alternate and pinnately compound, trifoliolate (then lateral leaves usually asymmetric and smaller than the terminal one) or simple. Petioles and petiolules often swollen at base. Flowers usually bisexual, 5-merous, papilionaceous, in racemes, spikes or heads. Fruit commonly a dry, dehiscent pod.

Indigenous Genera and Species

<i>Abrus</i> (diridamu) 1 sp. (climber)	<i>Mucuna</i> (waqiri) 3 spp. (climber)
<i>Canavalia</i> (tokatoludraubibi) 4 spp. (climbers)	<i>Ormocarpum</i> 1 sp.
<i>Dalbergia</i> (denimana) 1 sp. (climber)	<i>Millettia</i> (vesiwai) 1 sp., described
<i>Dendrolobium</i> 1 sp.	<i>Sesbania</i> 1 sp.
<i>Derris</i> (duva) 1 sp. (climber)	<i>Sophora</i> (kauniyalewa) 1 sp.
<i>Dioclea</i> 1 sp. (climber)	<i>Strongylodon</i> 1 sp. (climber)
<i>Erythrina</i> (drala) 2 spp., 1 described	<i>Tephrosia</i> (tuwakei) 1 sp. (herb)
<i>Glycine</i> 1 sp. (climber)	<i>Uraria</i> 1 sp. (herb)
<i>Inocarpus</i> (ivi) 1 sp., described	<i>Vigna</i> (tokatolu) 3 spp. (climbers)
<i>Macropsychanthus</i> † sp. (climber)	

Key To Indigenous Tree Genera

1a. Leaves simple; flowers not papilionaceous; fruit indehiscent, 1-seeded	<i>Inocarpus</i>
1b. Leaves compound; flowers papilionaceous; fruit a pod	
2a. Leaves paripinnate	<i>Sesbania</i>
2b. Leaves imparipinnate (with a terminal leaflet)	
3a. Leaflets more than 8 in number	
4a. Leaflets hairy; fruit constricted between seeds	<i>Sophora</i>
4b. Leaflets glabrous; fruit not constricted between seeds	<i>Ormocarpum</i>
3b. Leaflets less than 8 (usually 3 or 5) in number	
5a. Leaflets hairy on the underside	<i>Dendrolobium</i>
5b. Leaflets glabrous beneath	
6a. Leaves trifoliolate; flowers red	<i>Erythrina</i>
6b. Leaves usually with 5 or 7 leaflets; flowers purple	<i>Millettia</i>



Fig. 204



Fig. 206



Fig. 205



Fig. 208



Fig. 207

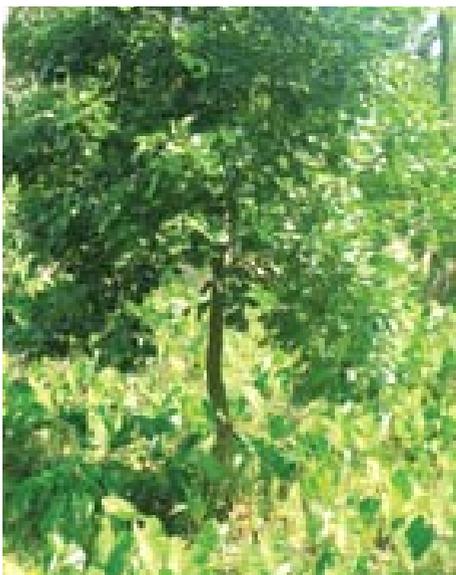


Fig. 209

Erythrina variegata L.

Fijian names: **Drala**, drara (Wainibuka), rara, (Yasayasaira, Rakiraki, Bua, Macuata), segai (Kadavu)

English name: Coral Tree

Height: To 15m with a rounded spreading crown and a trunk up to 1m in diameter.

Bark: Grey-brown.

Slash: Green over white wood.

Leaves: Composed of three leaflets, alternate. The leaflets are to 25 x 30cm, triangular with entire margins and a pointed apex. Leaves are dropped regularly before flowering.

Flowers: Red and borne on inflorescences to 45cm long to produce a spectacular display when the tree is in flower.

Fruits: Pods to 20cm long and 2cm wide, usually with 5-15 seeds.

Flowering & Fruiting: July-September, October-November.

Habitat: Coastal locations and infrequently in dry forests.

Altitude: Sea level to 400m.

Distribution: A common tree and often cultivated. Found on the larger and most of the smaller islands in Fiji. Distributed from Indian Ocean as far east as the Marquesas and Society Islands.

Uses: Often planted with crops because of its nitrogen-fixing ability, support (vanilla) and living fence. Young leaves as forage

Comments: The traditional calendar of Fiji is associated with the flowering of this species which is a sign to plant yams.

Diagnostic features: Grey-brown trunk with a spreading crown. Trifoliate leaves with triangular leaflets. Spectacular red inflorescences when in bloom.

Fig. 204: Habit of *Erythrina variegata*. (GK)

Fig. 205: The same tree as in figure 204, when in flower. (GK)

Fig. 206: Slash of the bark of *Erythrina variegata*. (GK)

Fig. 207: Compound leaf of *Erythrina variegata*, composed of three leaflets. (GK)

Fig. 208: Red flowers of *Erythrina variegata*. (RT)

Fig. 209: *Erythrina variegata* interplanted in Taro. (RB)



Fig. 210



Fig. 211



Fig. 212



Fig. 214



Fig. 213



Fig. 215

Inocarpus fagifer (Parkinson) Fosberg

Fijian name: Ivi

English name: 'Ivi, Polynesian Chestnut

Height: To 30m with a rounded spreading crown. Trunk fluted with large buttresses.

Bark: Dark grey-brown, rough with numerous small swellings.

Slash: Pale brown/ creamy white on white wood. Sap red.

Leaves: Simple, alternate, arranged in one plane of the stems, oblong, 40 x 18cm, margin entire, apex obtuse to emarginate.

Flowers: White or with pale pink sepals and white petals, fragrant, c. 5mm across in long slender inflorescences.

Fruits: Subglobose, 10 x 8 x 4.5cm, with a tough fibrous outer covering and a leathery inner layer.

Flowering & Fruiting: Throughout the year.

Habitat: Coastal forests close to or within mangrove swamps, along rivers, dry, open or dense forests.

Altitude: Sea level to 400m.

Distribution: A common tree and often cultivated near villages. Found on the larger and most of the smaller islands in Fiji. Distributed from Malaysia to as far east as the Marquesas, Society and Austral Islands.

Uses: Wood used for general construction, interiors, tool handles and as firewood. Seeds edible and often sold in local markets. The leaves and bark are medicinal. The tender juvenile leaves are edible and used to cover the food in the traditional pit oven, "lovo" before it is buried with soil. The leaves are also used as stuffing.

Diagnostic features: The tree form with a wide dense crown, buttresses at the base and the trunk often being drawn out into vertical pipe-like projections. Large, oblong leaves arranged in one plane. Large rounded, compressed fruits.

Fig. 210: Habit of *Inocarpus fagifer*.

Fig. 211: Base of the trunk of *Inocarpus fagifer*, showing the characteristic buttresses. (RT)

Fig. 212: Slash of the bark of *Inocarpus fagifer*. (GK)

Fig. 213: Flowers and distichous leaf arrangement of *Inocarpus fagifer*. (GK)

Fig. 214: Fruit of *Inocarpus fagifer*. (RB)

Fig 215: Branchlet with leaves and fruits of *Inocarpus fagifer*.

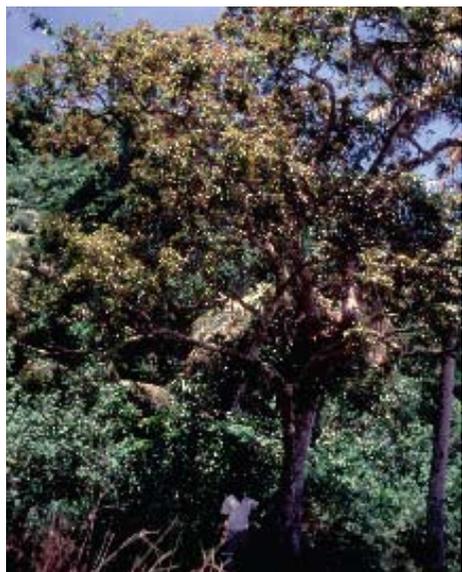


Fig. 216



Fig. 217



Fig. 219



Fig. 220

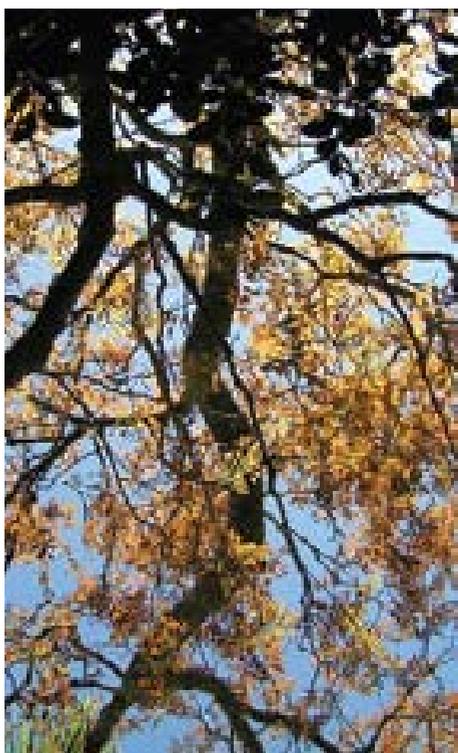


Fig. 218

Millettia pinnata (L.) Panigrahi

Synonym: *Pongamia pinnata* (L.) Pierre

Fijian names: **Vesiwai**, taceva (Rakiraki), tosigā (Vuda), vesivesi, vesivesiwai (Lau)

Height: 4-14m; trunk up to 1m in diameter with a dense, spreading crown.

Bark: Light grey-brown, slightly rough with large lenticels

Slash: Grey-brown, over creamy white wood.

Leaves: Pinnate with (3-) 5 to 7 leaflets; leaflets 6-16 x 2-8cm, broadly ovate, margin entire, somewhat wavy, apex acute to obtuse. New leaves red and emerge in flushes. Loses all its leaves during the dry season in low rainfall areas and crowns appear orange-red when the new leaves emerge.

Flowers: Pink, c. 1cm across, in delicate axillary inflorescence.

Fruits: Pods in clusters, ellipsoid, 3-8 x 2-3cm, with a beaked apex.

Flowering & Fruiting: More or less throughout the year.

Habitat: Coastal forests, river banks, beach thickets, on rocky shores and occasionally in lowland forest.

Altitude: Sea level to 150m.

Distribution: A monotypic genus, found in tropical Asia and the Mascarene Islands, throughout Malesia to Australia and eastward to Samoa

Uses: Timber tree. Parts of the tree are used in traditional herbal medicine. potential for biofuel (seeds)

Comments: A recent review considered the genus *Pongamia* to be part of the genus *Millettia*, which resulted in the name-change of this species from *Pongamia pinnata* to *Millettia pinnata*.

Diagnostic features: Grey-brown bark. Pinnate compound leaves with wavy margins. New leaves red, emerge in flushes, inflorescences with pink pealike flowers. Ellipsoid, beaked pods.

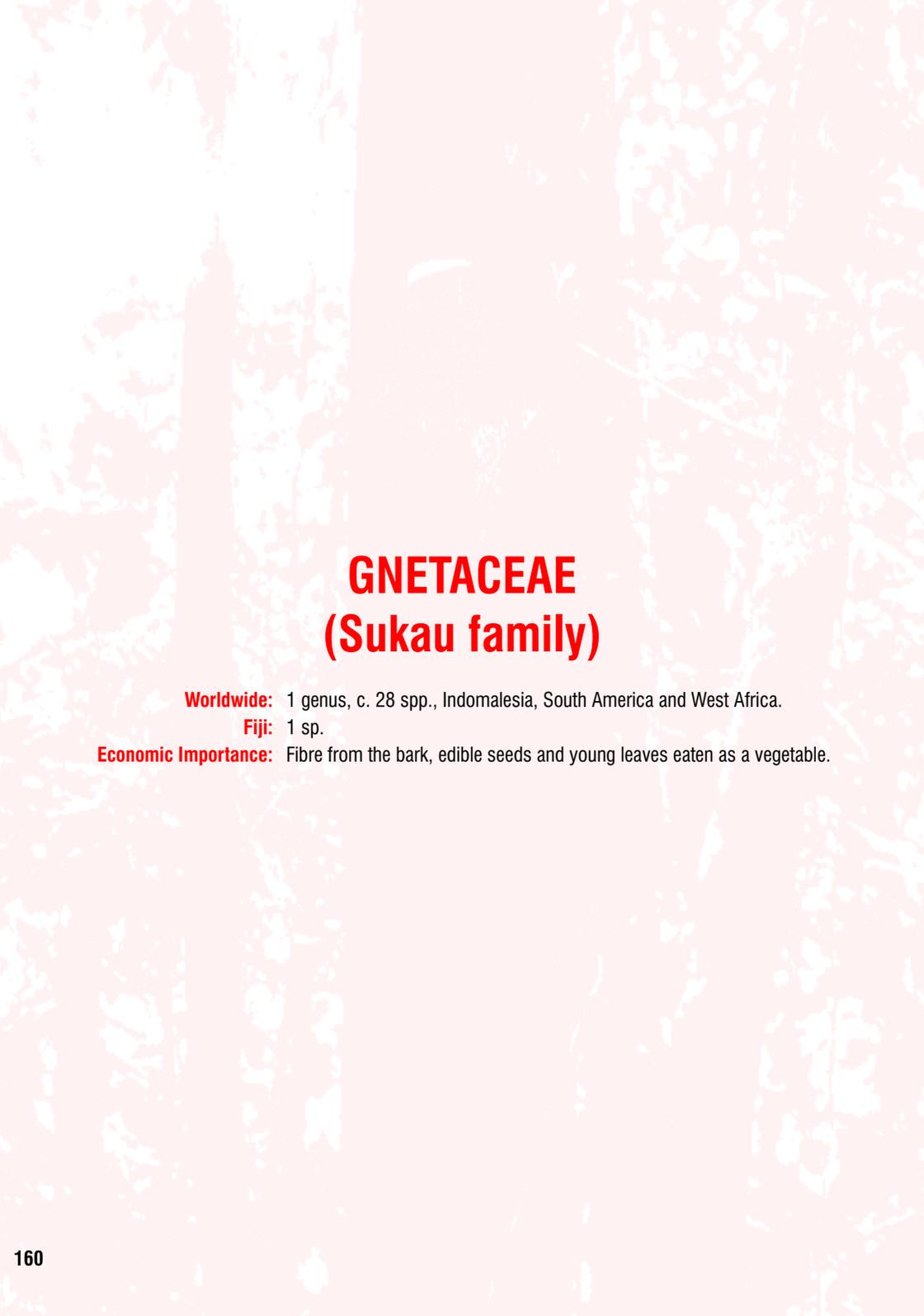
Fig. 216: Habit of *Millettia pinnata*.

Fig. 217: Slash of *Millettia pinnata*.

Fig. 218: Orange-red canopy of an individual of *Millettia pinnata*, resulting from replacement of old leaves lost during the dry season by new, red leaves. (GK)

Fig. 219: Fruits and flowers and leaves of *Millettia pinnata*. (GK)

Fig. 220: Close-up of flowers of *Millettia pinnata* (RB)



GNETACEAE **(Sukau family)**

Worldwide: 1 genus, c. 28 spp., Indomalaysia, South America and West Africa.

Fiji: 1 sp.

Economic Importance: Fibre from the bark, edible seeds and young leaves eaten as a vegetable.

Family and Genus Characteristics

Gymnosperm. Often dioecious trees and shrubs or lianas, with conspicuously swollen nodes. Leaves opposite, broad, adhere by white threads when broken. Venation pinnate and closed. “Flowers” aggregated in whorls of spike-like “inflorescences”, each whorl being subtended by fleshy collars. Fruit drupe-like.

Indigenous Genera and Species

Gnetum (**sukau**) 1 sp., described

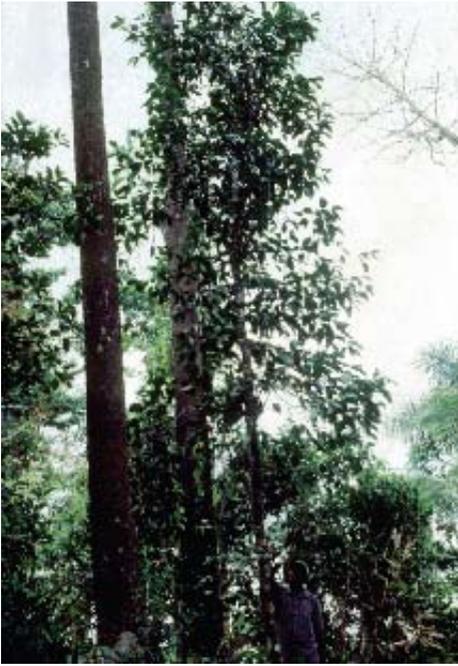


Fig. 221



Fig. 222



Fig. 223



Fig. 224



Fig. 225

Gnetum gnemon L.

Fijian names: **Sukau**, belesikau (Bau, Macuata), belesukau (Yasayasabeqa, Bau, Gau, Koro), sikau (Kadavu, Udu, Taveuni)

Height: Tall shrub to a small tree, 4-15m. Branches arising opposite to each other from the main stem, drooping. Nodes (where branches arise) conspicuously swollen and appearing knotted. Twigs green when young.

Bark: Light brown to grey-brown, thin.

Slash: Orange white over yellow wood.

Leaves: Simple, 12-20 x 6-8cm, oblong to oblong-elliptic, opposite, margin entire, apex acuminate. New leaves pink or light green and delicate.

Flowers: Male and female flowers on separate trees, less than 1 cm long and in small axillary spikes at the tips of branches; male “flowers” in whorls; female “flowers” minute.

Fruits: Seeds ovoid, c. 3cm, green, ripening yellow to orange to red and with a fleshy outer covering at maturity.

Flowering & Fruiting: October, November.

Habitat: A common component of the understory in diverse lowland formations; dense, dry, ridge, coastal and limestone forests.

Altitude: Sea level to 250m.

Distribution: Common in Fiji and recorded from all major Islands (Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau, Koro, Vanuabalavu). Found from Assam in India, through Malaysia to the Caroline Islands and Fiji.

Uses: The tender, pink or green juvenile leaves are eaten in some parts of Fiji. Fruits are edible, e.g. turned into chip-crackers (belinju) in Indomalesia.

Diagnostic features: Knotted stems resulting from swollen nodes. Opposite leaves with closed venation.

Fig. 221: Habit of *Gnetum gnemon*.

Fig. 222: Slash of the bark of *Gnetum gnemon*. (SPRH)

Fig. 223: Flowers of *Gnetum gnemon*, which are produced in a cone-like structure. (GK)

Fig. 224: Fruits of *Gnetum gnemon*. (SPRH)

Fig 225: Branches with ripe fruits of *Gnetum gnemon*. (RB)



HERNANDIACEAE (Evuevu family)

Worldwide: 4 genera; c. 68 spp., pantropical, mostly coastal.

Fiji: 2 indigenous genera.

Economic Importance: Some species yield timber.

Family Characteristics

Mostly dioecious trees, shrubs or lianas with longitudinally striate internodes. Stipules lacking. Leaves alternate, simple or palmately compound, entire and soft (hairy) on the upper surface. Petiolar scars broad and circular. Flowers small, 3- to 7-merous, arranged in cymose inflorescences. Fruit an achene (sometimes winged), a drupe or dry-dehiscent.

Indigenous Genera and Species

Gyrocarpus (**wiriwiri**) 1 sp., described

Hernandia (**evuevu, dalovoci**) 3 spp., 1 endemic, 1 described

Key to Indigenous Genera

- | | |
|---|-------------------|
| 1a. Leaves palmately 3 or 5-lobed; petiole not swollen apically; fruit drupaceous, with two conspicuous wings | <i>Gyrocarpus</i> |
| 1b. Leaves entire (peltate in <i>H. nymphaeifolia</i>); petiole swollen apically; fruit enclosed in the fleshy, expanded calyx | <i>Hernandia</i> |



Fig. 226



Fig. 227



Fig. 228



Fig. 229



Fig. 230

Gyrocarpus americanus Jacq.

Fijian names: Wiriwiri, koakoa (Nadroga), koyakoya (Vatulele), madora (Waya, Vuda, Ba), toutou (Yasawa, Waya)

Height: 8-20m, with a light rounded crown. Trunk to 80cm in diameter.

Bark: Yellowish grey, smooth, sometimes appearing glossy. May have vertical grooves and vertical rows of lenticels.

Slash: Bark green beneath over a pale inner bark with yellow streaks covering cream wood.

Leaves: Simple, margin entire, deltoid, 3-veined from base, to 15cm long, crowded towards the ends of branches. Petioles long (to 10cm or more).

Flowers: Monoecious (male and female flowers borne on the same tree), creamy white towards the tips of leafy branches, arranged in cymes to 8cm long, turning brown as they grow old, to 1cm across.

Fruits: Drupes ovoid with 2 elongate, leathery wings.

Flowering & Fruiting: April to July; July to January.

Habitat: Common in dry coastal areas.

Altitude: Sea level to 300m.

Distribution: Pantropical. Recorded from several islands in Fiji.

Uses: Bark is medicinal.

Comments: The Fijian species is often assigned to the subspecies *G. americanus* subsp. *americanus*, which is found throughout the tropics.

Diagnostic features: Glossy grey bark with rounded crown. Leaves deltoid and 3-veined, falling when fruiting. Fruits with two elongated wings.

Fig. 226: Habit of *Gyrocarpus americanus* with leaves during the wet season. (GK)

Fig. 227: Leafless tree of *Gyrocarpus americanus* during the dry season. (GK)

Fig. 228: Slash of the bark of *Gyrocarpus americanus*. (GK)

Fig. 229: Inflorescence and leaves of *Gyrocarpus americanus*. (GK)

Fig. 230: Winged fruits of *Gyrocarpus americanus*. (GK)



Fig. 232



Fig. 231



Fig. 233



Fig. 234

Hernandia olivacea Gillespie

Fijian name: Makoloa

Rotuman name: Popofo (*H. moerenhoutiana*)

Trade name: Dalovoci

Height: 4-25m, with a light rounded crown. Trunk slender, up to 80cm in diameter.

Bark: Brown, with a yellow tinge, smooth.

Slash: Brown on the outer layer, becoming lighter brown inside covering cream wood. Inner bark and wood turning grey on exposure.

Leaves: Simple, spiral or subopposite, 3.5-20 x 2-7.5cm, oblong to elliptic, margin entire, apex acute to obtuse. Venation pinnate or 3-veined.

Flowers: Unisexual, tree monoecious (male and female flowers borne on the same tree), creamy white on the tips of leafy branches, turning brown as they grow old, c. 2cm across.

Fruits: Drupes black at maturity with a fleshy covering, the cupule, green, ripening red; c. 2.5cm across.

Flowering & Fruiting: More or less throughout the year; May to November.

Habitat: Dense lowland and upland forest.

Altitude: Sea level to 1130m.

Distribution: Endemic to Fiji. Recorded from Viti Levu, Vanua Levu, Kadavu, Ovalau and Rabi.

Uses: A source of light timber, especially for casing. The names **makoloa**, **makaloa** and **vavaloa** refer to being dark wood, **makaloa** indicating that the wood is soft, similar to mako wood (*Trichospermum*) and being black (**loa**).

Comments: Two other species of *Hernandia*, *H. nymphaeifolia* (Presl) Kubitzki (**evuevu**) and *H. C. moerenhoutiana* Guill. occur in Fiji. *H. nymphaeifolia* is a common coastal tree distinguished by its distinct peltate leaves. *H. moerenhoutiana* supsp. *campanulata* is found in light forest at elevations usually lower than *H. olivacea* and is readily distinguished from it by its leaves which are conspicuously 3 (-5) -veined at the base.

Diagnostic features: Inner bark and wood turning grey on exposure. A fleshy cupule covering the fruit.

Fig. 231: Habit of *Hernandia olivacea*.

Fig. 232: Slash of *Hernandia olivacea*. (SPRH)

Fig. 233: Fruits of *Hernandia olivaceae*.

Fig. 234: Flowers of *Hernandia olivaceae*. (GK)

LAURACEAE

(Laurel family)

Worldwide: 45 genera; c. 2,200 spp., mainly tropical and subtropical (centred in Southeast Asia and Brazil), also present in warm temperate regions.

Fiji: 6 genera, 5 indigenous.

Economic Importance: Spices and flavourings (cinnamon and camphor from *Cinnamomum*), medicines, timbers, edible fruits (avocado, *Persea americana*) and ornamentals.

Family Characteristics

Dioecious trees or shrubs, often aromatic. Young stems grooved and angular. Stipules lacking. Leaves alternate, arranged spirally, or opposite, simple, entire, leathery, sometimes with white threads when broken. Venation 3-veined or pinnate, secondary veins few, tertiary veins net-like. Flowers generally small, 3-merous, lacking petals and usually in racemose or cymose inflorescences. Fruit a berry or drupe. *Cassytha* parasitic, twining, and virtually leafless.

Indigenous Genera and Species

Cassytha (**walutumailagi**) 1 sp. (climber)

Cinnamomum (**macou**) 6 endemic spp.

Cryptocarya (**macou, kalinimacou**) 8 spp., 6 endemic

Endiandra (**qeleqai, tabadamu**) 7 spp., 6 endemic, 2 described

Litsea (**lidi**) 13 spp., 12 endemic, 1 described

Key to Indigenous Tree Genera

1a. Venation pinnate

2a. Leaves opposite/subopposite or alternate; venation bullate, not scalariform; fruit with a cupule

Endiandra

2b. Leaves alternate; venation scalariform, not bullate; fruit lacking a cupule

3a. Petiole broadening away from stem; lenticels present

Cryptocarya

3b. Petiole not broadening away from stem; lenticels lacking

Litsea

1b. Venation 3-veined

4a. Leaves opposite or subopposite

Cinnamomum

4b. Leaves alternate

5a. Petiole broadening away from stem; lenticels present

Cryptocarya

5b. Petiole not broadening away from stem; lenticels absent

Litsea

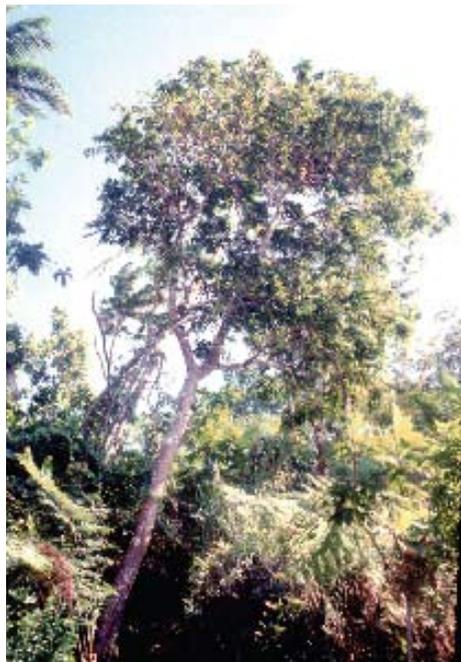


Fig. 235



Fig. 236



Fig. 237

Endiandra elaeocarpa Gillespie

Fijian names: Qeleqai, damabi

Trade name: Damabi

Height: 2-25m; trunk up to 1m in diameter.

Bark: Light grey, tinged yellow, thick.

Slash: Dark pink, covering light yellow wood, emitting a sweet smell. Sap colourless.

Leaves: Simple, (7-) 13-31 x (4-) 6-14cm, opposite to sub-opposite, obovate, margin entire, apex in young leaves acuminate or cuspidate (apex abruptly pointed), becoming acute when mature.

Flowers: White to yellow-green, becoming brown as they grow older, c. 3mm across. Inflorescence with sparse hairs.

Fruits: Ellipsoid to obovoid, c. 3 x 2cm, maturing black.

Flowering & Fruiting: October to January; April to October.

Habitat: Dense and light wet forest.

Altitude: 100m to 900m.

Distribution: In Fiji recorded from Viti Levu and Vanua Levu in the wetter zones. Elsewhere in the Pacific found in Tonga and Samoa.

Uses: A useful timber tree. The vernacular name *damabi* refers to its thick bark.

Comments: There are 6 other species of *Endiandra*. In 3 of these species, the leaf underside is similar in colour to the upper side, while the lower surface is greyish in the remaining species. Of the concolourous species, *E. trichotosa* A.C. Sm. is easily recognised by the hair that densely cover the underside of leaves and young branches. *E. luteola* A.C. Sm and *E. trichotosa* A.C. Sm have smaller (less than 13cm long) leaves than *E. elaeocarpa*.

Diagnostic features: Thick bark, dark pink when cut and covering a light yellow wood. Cut bark emits a sweet scent. Sap colourless. Leaves pointed, nearly same colour on upper and lower surfaces and with net-like venation.

Fig. 235: Habit of *Endiandra elaeocarpa*.

Fig. 236: Slash of the bark of *Endiandra elaeocarpa*. (SPRH)

Fig. 237: Leaves of *Endiandra elaeocarpa*. (SPRH)



Fig. 238



Fig. 239



Fig. 240

Endiandra gillespiei A.C. Sm.

Fijian name: Tabadamu

Height: 6-12m, with an open crown. Young twigs covered with fine red-brown hair.

Bark: Brown, thick, rough, covered with small scabies-like growths.

Slash: Red outer layer with a cream inner layer over white wood, emitting a sweet smell.

Leaves: Simple, 7-16 x 4-12cm, ovate, opposite to alternate, margin entire, apex rounded to retuse; leaves dark green above, paler beneath, with prominent secondary veins.

Flowers: Small, c. 1.8mm, hairy.

Fruits: Not known.

Flowering & Fruiting: January, but not adequately known.

Habitat: Dense wet forest and sometimes along streams.

Altitude: 100m to 550m.

Distribution: Endemic to Fiji. Recorded from Viti Levu, Vanua Levu and Ovalau.

Uses: A timber tree.

Comments: The vernacular name **tabadamu** refers to the red-brown hairs that cover young branches and twigs. Of the other 2 species of *Endiandra* that have leaves that are paler beneath than above, *E. tryphera* A.C. Sm. is seemingly very rare, and *E. monticola* A.C. Sm. differs from *E. gillespiei* by having a pointed, rather than rounded, leaf apex.

Diagnostic features: Cut bark emits a sweet scent. Young twigs red-brown. Leaves paler beneath and with a rounded or retuse apex. Inflorescences with crispy hairs.

Fig. 238: Habit of *Endiandra gillespiei*.

Fig. 239: Slash of bark of *Endiandra gillespiei*. (Close-Up)

Fig. 240: Leaves of *Endiandra gillespiei*. Note the greenish upper surface and silverish lower surface of the leaves.



Fig. 241



Fig. 242



Fig. 243

Litsea mellifera A.C. Sm.

Fijian name: Lidi

Height: 10-35m. Trunk to 1m or more in diameter.

Bark: Reddish brown.

Slash: Light brown over white wood. emitting a sweet scent.

Leaves: Simple, 7-16 x 4-12cm, ovate, opposite to alternate, margin entire, apex rounded to retuse; leaves dark green above, paler beneath, with prominent secondary veins.

Flowers: Pale-green. Small, c. 1.8mm, hairy.

Fruits: Red, darkening at maturity.

Flowering & Fruiting: April to August; August to September.

Habitat: Dense forest.

Altitude: Sea level to 850m.

Distribution: Fiji (Viti Levu, Vanua Levu, Taveuni and Ovalau) and Tonga ('Eua).

Uses: A timber tree.

Comments: The vernacular name **lidi** refers to all 13 indigenous species of *Litsea*. 7 of these are seemingly very rare and have a very restricted distribution. *L. palmatinervia* Benth. & Hook. f. ex Drake and *L. pickeringii* Benth. & Hook. f. ex Drake are 3-nerved from the base. *L. magnifolia* Gillespie does not have a lighter coloured underside and *L. vitiensis* Benth. & Hook. f. ex Drake and *L. seemannii* Benth. & Hook. f. ex Drake have smaller leaves than *L. mellifera*.

Diagnostic features: Reddish brown bark that emits a sweet scent when cut. Leaves alternate to sub-opposite.

Fig. 241: Habit of *Litsea mellifera*. (GK)

Fig. 242: Slash of the bark of *Litsea mellifera*. (GK)

Fig. 243: Leaves of *Litsea mellifera*. (GK)



LECYTHIDACEAE

(Vutu family)

Worldwide: 20 genera; c. 280 spp., tropical (centred in South American rainforests).

Fiji: 2 genera, 1 indigenous.

Economic Importance: Edible seeds (Brazil nut from *Bertholletia excelsa*, sapucaia nuts from species of *Lecythis*), timbers and ornamentals.

Family Characteristics

Tree or shrubs, with thick, grey bark (Fijian species). Stipules deltoid, small, dark brown (our species) and soon falling off. Leaves alternate (spirally arranged), simple, entire or serrate, often crowded at the apices of branches. Venation pinnate. Petiole swollen at base and flattened or with a groove on top. Flowers bisexual, 4- to 6-merous, epigynous, white (in our species), borne in often pendulous spikes. Stamens (Fijian species) more than 10, giving the flower a fluffy appearance. Fruit a capsule, berry or drupe.

Indigenous Genera and Species

Barringtonia (**vutu**) 4 spp., 2 endemic, 2 described

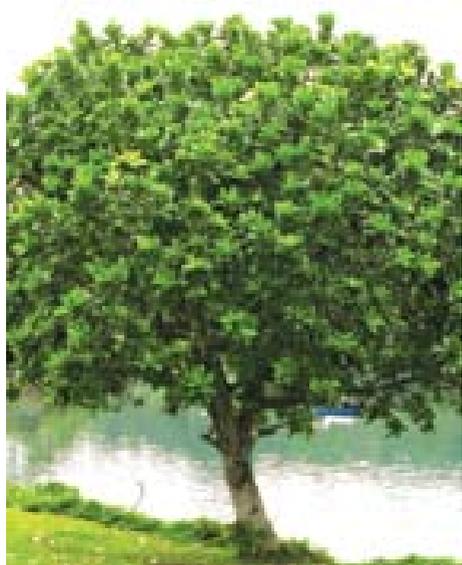


Fig. 244



Fig. 245



Fig. 247



Fig. 246



Fig. 248

Barringtonia asiatica (L.) Kurz

Fijian names: Vuturakraka, vutu (Yasayasaira, Kadavu, Yasayasabeqa, Vanualevu, Lau), vutumila (Taveuni)

Rotuman name: Hufu

Height: 10-20m; bole short with a thick, spreading crown.

Bark: Grey, thick, smooth.

Slash: Brown, covering white wood.

Leaves: Simple, large and glossy, crowded at the ends of branches, 12-60 x 6-24cm, obovate, margin entire, apex obtuse.

Flowers: Large and showy, c. 6cm across, white with conspicuously long stamens, white, tinged pink or red at the tips.

Fruits: Large and 4-angled, up to 11 cm long and wide, ridged at the angles and with the persistent calyx at the top, hanging down.

Flowering & Fruiting: More or less throughout the year.

Habitat: Coastal areas, along beaches, coastal thickets, mangrove swamps, riverbanks close to the sea.

Altitude: Sea level.

Distribution: Widespread and a common coastal tree in Fiji. Distributed from Madagascar and the Seychelles to India, eastwards through Malaysia, Micronesia, northern Australia and across the Pacific to the Society Islands.

Uses: Both flowers and fruit are buoyant. In earlier times, the fruits were used as floats for fishing nets. The flesh of the fruits is crushed and used to stupefy fish.

Comments: A night flowering tree with the flowers falling off by late morning. *B. racemosa* (L.) Spreng. (**vutuwai**) occasionally also occurs in coastal locations (but also occurs up to 400m elevation). It is usually found in swampy areas, inner edges of mangroves and along rivers and can be distinguished by its serrate leaf margins, cordate leaf bases, pendulous inflorescences and fruits that are less than 5.5mm wide.

Diagnostic features: Short, stout, grey bole with a spreading crown. Leaves glossy, obovate, spirally arranged and crowded at tips of branches. Conspicuous white flowers with pink anthers. Large four-angled fruits crowned by calyx lobes.

Fig. 244: Habit of *Barringtonia asiatica*. (RB)

Fig. 245: Slash of the bark of *Barringtonia asiatica*. (GK)

Fig. 246: Bark of *Barringtonia asiatica*. Note longitudinal fissures. (RB)

Fig. 247: Leaves and fruit of *Barringtonia asiatica*. Note calyx at the tip of the fruit.

Fig. 248: Flower of *Barringtonia asiatica*. (RB)

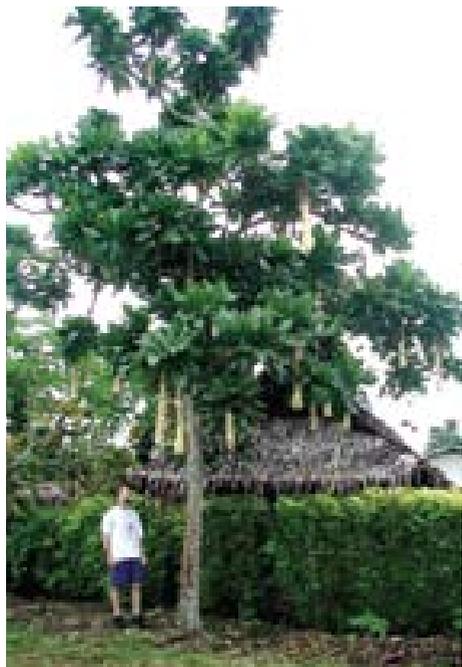


Fig. 249



Fig. 250



Fig. 251



Fig. 252

Barringtonia edulis Seem.

Fijian names: **Vutu**, kutuvala (Waya), vala (Ba, Nadroga, Serua, Vatulele, Kadavu, Yasayasabeqa, Macuata, Lau), vutukana (Vatulawa)

Height: 6-24m, with a narrow to broad crown.

Bark: Grey, thick, smooth.

Slash: Light brown, exposing white wood

Leaves: Simple, large, 20-45 x 7-20cm, obovate, glossy, crowded at the ends of branches, margin entire, apex obtuse to rounded.

Flowers: Large and showy, in pendant inflorescences, c. 4cm across, white with conspicuously long stamens, white, tinged pink at the tips.

Fruits: Oblong, flattened laterally, 6-10 x 4-7cm, with an outer fleshy covering, light green, ripening dark green to purple-green, crowned with persistent calyx.

Flowering & Fruiting: More or less throughout the year.

Habitat: Dense and open forest, abandoned gardens.

Altitude: Sea level to 400m.

Distribution: In Fiji, widespread and recorded from Viti Levu, Vanua Levu, Kadavu, Ovalau, Beqa, Matuku, Vanuabalavu and Lakeba. In the Pacific found in Vanuatu where it is also widely planted and forms one of the main edible nut plants.

Uses: Seeds are eaten raw or cooked. Wood may be used as casing timber.

Comments: The flowers open at night and fall off the following day. The species is similar to *Barringtonia seaturae* H.B. Guppy, also a forest species, but can be distinguished by its stouter (more than 3cm thick) petioles, 12 or less secondary leaves per side (12 or more in *B. edulis*), leaves that do not exceed 25cm in length and fruits that are less than 3.5cm wide.

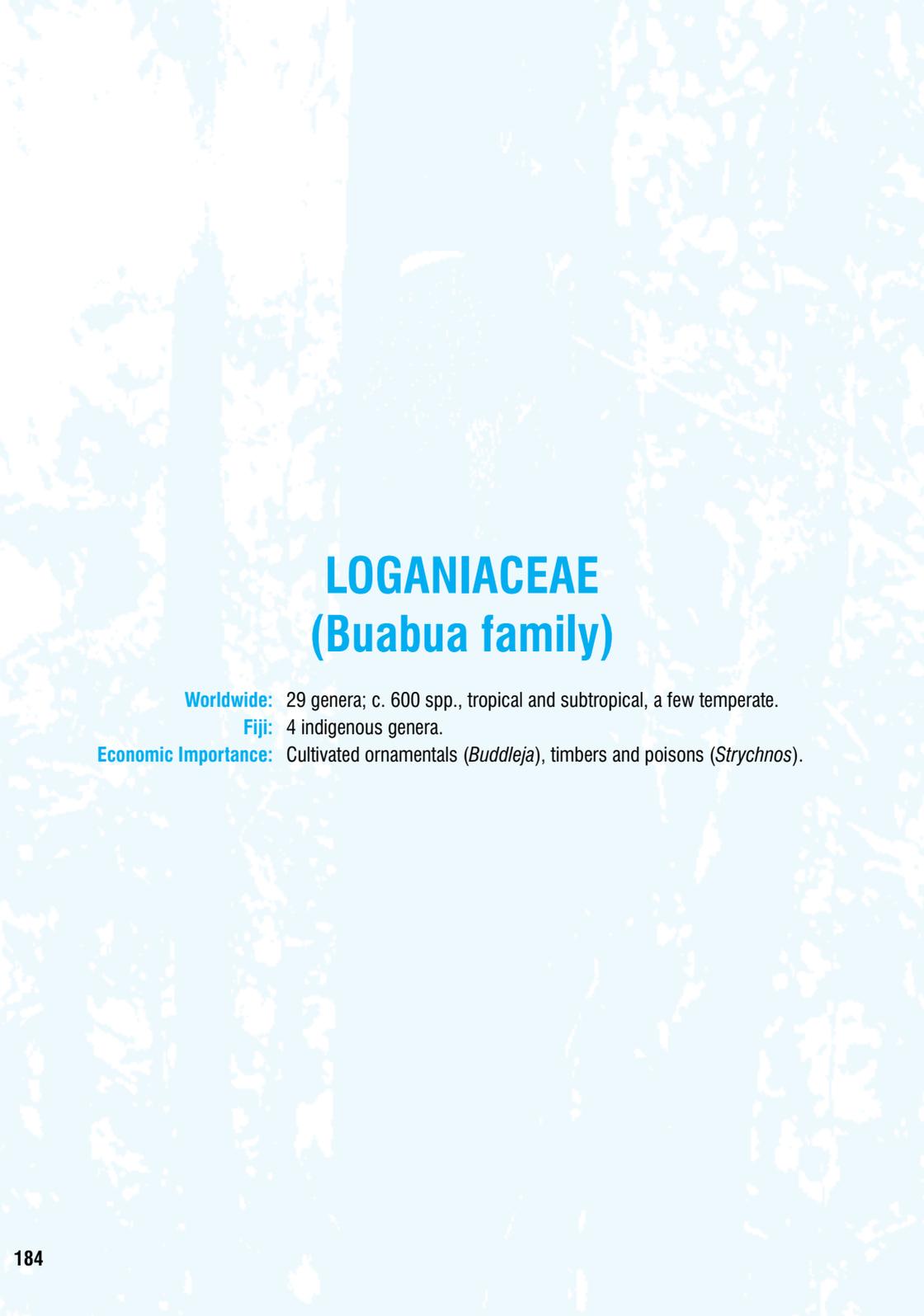
Diagnostic features: Grey bark. Leaves glossy, obovate, spirally arranged and crowded at tips of branches. Conspicuous white flowers with long stamens in pendant inflorescences. Fruit topped with the persistent calyx.

Fig. 249: Habit of *Barringtonia edulis*. (LT)

Fig. 250: Slash of the bark of *Barringtonia edulis*. (GK)

Fig. 251: Fruit of *Barringtonia edulis*. (RB)

Fig. 252: Hanging inflorescence of *Barringtonia edulis*. (GK)



LOGANIACEAE (Buabua family)

Worldwide: 29 genera; c. 600 spp., tropical and subtropical, a few temperate.

Fiji: 4 indigenous genera.

Economic Importance: Cultivated ornamentals (*Buddleja*), timbers and poisons (*Strychnos*).

Family Characteristics

Trees, shrubs or lianas, rarely (not in Fiji) herbs. Leaves opposite, entire and simple. Venation usually pinnate. Stipules often prominent, with interpetiolar ridges. Flowers regular 4 to 5-merous, often showy and borne in terminal or lateral cymes (or cauliflorous), rarely solitary. Fruit a capsule, berry or drupe.

Indigenous Genera and Species

Fagraea (**buabua**, **bua ni Viti**) 2 spp., 1 described

Geniostoma (**boiboida**) 9 spp., 6 endemic

Neuburgia (**bo**) 5 spp., 4 endemic

Strychnos 1 endemic sp. (climber)

Key To Indigenous Tree Genera

- | | |
|--|-------------------|
| 1a. Stipules joined into a sheath | |
| 2a. Stipules attached to petiole; fruit a drupe | <i>Neuburgia</i> |
| 2b. Stipules not attached to petiole; fruit a 2-valved capsule | <i>Geniostoma</i> |
| 1b. Stipules not united, but attached to the base of the petiole | |
| 3a. Tertiary and sometimes secondary veins inconspicuous;
fruit a berry | <i>Fagraea</i> |
| 3c. Tertiary veins conspicuous; fruit a 2-valved capsule | <i>Geniostoma</i> |



Fig. 253



Fig. 254



Fig. 255



Fig. 257



Fig. 258



Fig. 256

Fagraea gracilipes A. Gray

Fijian names: Buabua, boto (Kadavu).

Height: 3-25m. Trunk up to 1m in diameter.

Bark: Mud-grey to dark brown, longitudinally fissured.

Slash: Bright yellow, covering golden-yellow wood.

Leaves: Simple, 9-12 x 7-9cm, ovate-elliptic, margins entire, apex acute.

Flowers: Cream white, conspicuous, turning pale yellow as they grow old.

Fruits: Subglobose, c. 1.5cm in diameter, with a conical beak, white yellow to pink or cream when mature.

Flowering & Fruiting: Throughout the year.

Habitat: Dense and dry forest, forest patches in grassland, edges of mangrove swamps.

Altitude: Sea level to 500m.

Distribution: Endemic to Fiji. Recorded in Viti Levu, Vanua Levu and Kadavu.

Uses: Produces a durable timber, locally known as 'iron wood', used as house posts and wharf piles. Bark and leaves are medicinal.

Comments: The second indigenous species, *Fagraea berteriana* A. Gray ex Benth. (**buabua, buabua dina, buabua ni viti, buabua ni veikau**) can be distinguished by its longer (more than 3cm) fruits and by having intermediate minor secondary veins between each pair of major secondary veins. This species also often (but not always) grows as an epiphyte on large trees in the rainforest.

Diagnostic features: Ovate-elliptic, spirally arranged leaves crowded at the apex of branches. Dark-coloured bark with bright yellow slash exposing golden-yellow wood. Small white, yellow or pink fruits.

Fig. 253: Habit of *Fagraea fragans*. (RB)

Fig. 254: Slash of *Fagraea gracilipes*. (GK)

Fig. 255: Bark of *Fagraea fragans*. (RB)

Fig. 256: Leaves of *Fagraea gracilipes*. (GK)

Fig. 257: Flower of *Fagraea gracilipes*. RB (copyright – Johan Rova)

Fig. 258: Fruits of *Fagraea gracilipes*. (GK)



MELIACEAE (Mahogany family)

Worldwide: 51 genera; c. 575-1,000 spp., tropical and subtropical.

Fiji: 9 genera, 4 indigenous.

Economic Importance: High-quality timber (mahogany from species of *Swietenia*), edible fruits, insecticides, tannins, oil and ornamentals.

Family Characteristics

Tree or shrubs. Leaves alternate (spirally arranged), pinnately compound, imparipinnate or paripinnate or simple and often clustered towards ends of branchlets. Leaves/leaflets usually entire. Stipules lacking. Petiole sheathing, biconvex at the base (with a groove near stem, if compound) and leaving shield-like scars. Young parts often covered with hairs. Flowers mostly small, usually aggregated into cymose panicles. Fruit a capsule, berry or drupe.

Indigenous Genera and Species

Aglaia (**lidiyago, lagakali, kautoa**) 10 spp., 8 endemic, 1 described

Dysoxylum (**tarawau kei rakaka, sasawira, malamala**) 9 spp., 7 endemic, 2 described

Vavaea (**sevua, cevua**) 4 spp., 3 endemic, 1 described

Xylocarpus (**dabi**) 2 spp.

Introduced Species Described

Swietenia macrophylla (**King mahogany**)

Key to Indigenous Species

1a. Leaves compound

2a. Leaves mostly imparipinnate (terminal leaflet present)

3a. Base of leaflets symmetric or nearly so; fruit a capsule

Aglaia

3b. Base of leaflets usually of 2 unequal sides; fruit a berry

Dysoxylum

2b. Leaves paripinnate (without a terminal leaflet)

Xylocarpus

1b. Leaves simple

Vavaea



Fig. 259



Fig. 260



Fig. 261



Fig. 262

Aglaiia elegans Gillespie

Synonyms: *A. greenwoodii* A.C. Sm., *A. ventusa* A.C. Sm

Fijian names: Lagakali ni veikau, cavucavu (Lau), waicavucavu (Bua)

Trade name: Kautoa

Height: 4-10m. Young branches and twigs with stellate (star-shaped) hair.

Bark: Dark brown.

Slash: Red over white wood

Leaves: Pinnate, with 5-7 leaflets, less than 25cm long; leaflets 5-12 x 2.5-5cm, ovate-elliptic, margin wavy, apex acute, midrib hairy. Leaflets covered with brown hair when young.

Flowers: Not determined.

Fruits: Ellipsoid up to 2 x 1.5cm, borne in long drooping bunches.

Flowering & Fruiting: More or less throughout the year.

Habitat: Light to dense forest.

Altitude: Sea level to 1,075m.

Distribution: Endemic to Fiji. Recorded from Viti Levu, Vanua Levu and Taveuni.

Uses: Produces good firewood.

Comments: There are 9 other indigenous species of *Aglaiia* in Fiji. *A. amplexicaulis* A.C. Sm. has simple, sessile and cordate leaves. Other species that may have simple leaves are *A. unifolia* P.Y. Li et X.M. Chen (reported from near Nadarivatu) and *A. evanensis* A.C. Sm., which is restricted to the Mt. Evans range. The latter species may have 3 or more leaflets, as do all other species. These species can be separated by the type of hair or scales present on leaves and stems. *A. vitiensis* A.C. Sm., *A. gracilis* A.C. Sm., *A. evanensis* A.C. Sm., *A. basiphylla* A.C. Sm. and *A. saltatorum* A.C. Sm. lack hairs but have scales (you will need a hand lens to observe this). *A. archboldiana* A.C. Sm., *A. parksii* A.C. Sm. and *A. fragilis* A.C. Sm. have hairs, with the latter species being smaller (leaves to 14cm long) than *A. elegans* and leaflets 3 to 5 in number. *A. parksii* usually has 9 leaflets, while *A. archboldiana* usually has 7. *A. archboldiana* differs from *A. elegans* by having larger leaves.

Diagnostic features: Brown outer bark over red inner bark and white wood. Pinnate leaves with 5 to 7 ovate-elliptic, acute leaflets; young branches and twigs with brown, star-shaped hairs.

Fig. 259: Habit of *Aglaiia elegans*.

Fig. 260: Slash of the bark of *Aglaiia elegans*. (SPRH)

Fig. 261: Compound leaves and fruits of *Aglaiia elegans*.

Fig. 262: Inflorescence of an *Dysoxylum* species. (SPRH)



Fig. 263



Fig.264



Fig. 265



Fig. 266



Fig. 268



Fig. 267

Dysoxylum lenticellare Gillespie

Fijian name: Bausomi (Viti Levu)

Trade name: Malamala

Height: 3-25m. Trunk up to 60cm in diameter.

Bark: Grey, smooth.

Slash: Inner bark pale yellow over a light red wood, emitting smell of onions.

Leaves: Pinnate, with 6 to 12 leaflets; leaflets 7-22 x 3-9cm, elliptic-oblong, the lower ones usually smaller in size, margin entire, apex cuspidate.

Flowers: White, small (to 1cm across), in large inflorescences amongst leaves; petals free.

Fruits: Capsule c. 2cm across, subglobose, brown, with lenticels.

Flowering & Fruiting: More or less throughout the year

Habitat: Dense or dry secondary forest, in transition zones to grasslands, ridge thickets.

Altitude: 50m to 1,150m.

Distribution: Endemic to Fiji. Recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau and Gau.

Uses: A timber tree.

Comments: The 9 species of *Dysoxylum* in Fiji are endemic. They can be divided into 2 groups, one that includes *D. lenticellare* and has the base of the leaflets not touching the rachis and another that includes *D. richii* (A. Gray) C.DC. (described after this species) and has leaflet bases that touch the rachis. Within the *D. lenticellare* group, *D. seemanii* Gillespie can be distinguished by having longer (50-130cm compared to up to 60cm in other species) leaves than the other species. *D. aliquantum* A.C. Sm. differs by having smaller leaves that are usually 18-24cm long. *D. hornei* Gillespie can be distinguished from the remaining 3 species by having hairy fruits and leaflets with two almost equal halves, while leaflets are distinctly unequal in other species. *D. gillespieanum* A.C. Sm. has simply racemose inflorescences and flower parts in multiples of 4 (4-merous) while *D. lenticellare* and *D. myriandrum* A.C. Sm. have paniculate inflorescences and flower parts in multiples of 5 (5-merous). This last two species can be distinguished by the size of their flowers with those of *D. myriandrum* measuring about 2cm across and those of *D. lenticellare* being only about 1cm or less across.

Diagnostic features: Pinnate leaves with 6 or more elliptic-oblong leaflets that do not overlap the rachis. Pale yellow inner bark and a deep red wood.

Fig. 263: Canopy of *Dysoxylum lenticellare*. (RB)

Fig. 264: Slash of the bark of *Dysoxylum lenticellare*.

Fig. 265: Compound leaves of *Dysoxylum lenticellare*. (SPRH)

Fig. 266: Close-up of the compound leaf of *Dysoxylum lenticellare*, showing the asymmetric base of the leaflets. (RB)

Fig. 267: Fruits of *Dysoxylum* spp. (LT)

Fig. 268: Leaves, flowers and fruits of *Dysoxylum aliquantum*. (RB)



Fig. 269



Fig. 270



Fig. 271



Fig. 272



Fig. 273



Fig. 274

Dysoxylum richii (A. Gray) C. DC.

Fijian names: Tarawaukeirakarakā, keatarawaunakucuve (Waya), makota (Lau), sasawira (Vatulele, Serua, Wainibuka), sawira (Vuda, Ba, Nadroga), sorovulu (Vuda, Ba), tarawaikaka (Tunuloa), tarawaukeicoqe (Macuata, Bua), tarawaukeikaka (Taveuni), tarawaumerakaka (Kadavu), tarawaunakaka (Yasayasabeqa) tarawauralewakalou (Ovalau), toaraukeicoqe (Macuata).

Trade name: Sasawira

Height: 5-25m.

Bark: Mud-grey, with small rough swellings.

Slash: Outer layer orange over an inner yellow layer, covering a light yellow to creamy wood. The bark emits a smell of onion when cut.

Leaves: Pinnate, with 13 to 21 leaflets; leaflets 8-20 x 2.5-6cm, ovate-elliptic, margin entire apex acuminate to cuspidate. Bruised or cut leaves smell of onion.

Flowers: White, small, tubular, to 5mm long; in large inflorescence amongst leaves.

Fruits: Capsule, small, c. 2cm across, globose, brown.

Flowering & Fruiting: Throughout the year.

Habitat: Dense and dry forest, thickets and the edges of mangrove swamps.

Altitude: Sea level to 1000m.

Distribution: Endemic to Fiji, widespread. Recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau, Koro, Gau, Vanuabalavu, Matuku, Kabara, Lakeba and Naitauba.

Uses: A timber tree also used for house posts. Parts of the tree are used in traditional herbal medicine.

Comments: Beside the described species, there are two other species of *Dysoxylum* that have leaflets that touch the rachis with their bases. *D. quercifolium* (Seem.) A.C. Sm. can be easily distinguished by the leaflets being covered in hairs beneath. Usually, *D. richii* can be distinguished from *D. tenuiflorum* A.C. Sm. by its bigger leaves (up to 80 cm in length compared to up to 50 cm), more leaflets (13-21 compared to 7-13) per leaf and the characteristic onion-like smell of the cut bark.

Diagnostic features: Large (to 80cm long), pinnate leaves with 13-21 falcate-oblong leaflets that overlap the rachis. Grey bark smells like onions when cut, as sometimes do the bruised leaves.

Fig 269: Habit of *Dysoxylum richii*. (RB)

Fig. 270: Slash of the bark of *Dysoxylum richii*, which smells very strongly like onions.

Fig. 271: Leaves of *Dysoxylum richii*. (RT)

Fig. 272: Characteristic leaves of a seedling of *Dysoxylum richii*. (RT)

Fig. 273: Inflorescence of *Dysoxylum richii*. (RB)

Fig. 274: Flowers of *Dysoxylum richii*. (RB)

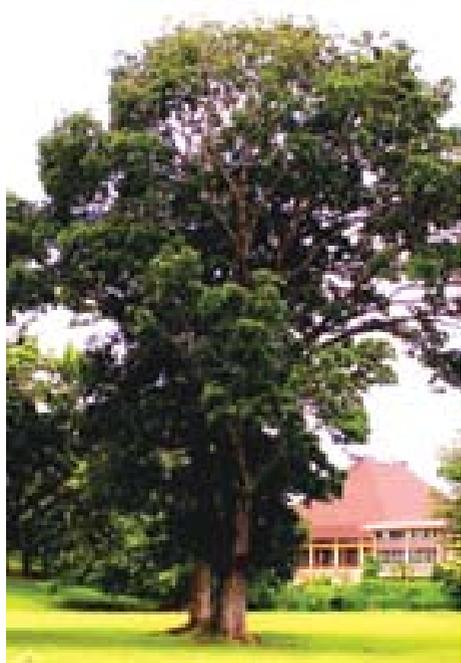


Fig. 275

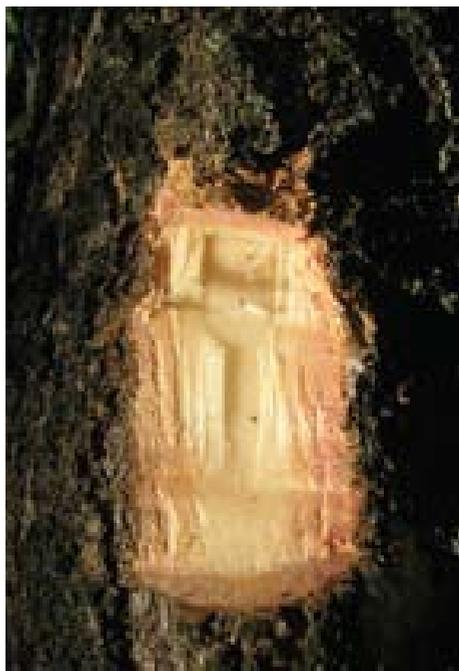


Fig.276



Fig.277



Fig.278



Fig. 279

Swietenia macrophylla King

Fijian name: Mahogany

English names: Big-leaved mahogany, Honduras mahogany.

Height: 30-35m. Trunk reaching up to 80cm in diameter.

Bark: Grey and smooth when young, turning dark-brown with longitudinally fissured.

Slash: Light red to pinkish, over cream inner layer, covering white wood.

Leaves: 35-50cm long, paripinnately compound and spirally arranged. Leaflets are 4-6 pairs, dark green, elliptic, entire and 9-18cm long.

Flowers: White and small in paniculate inflorescences that are 10-20cm long.

Fruits: Large (to 20cm long), 5-lobed, brown capsule, which splits open when ripe, releasing the winged fruits.

Flowering & Fruiting: October; April - June.

Habitat: Mostly plantations, where it is planted as a fast growing, valuable timber. Has recently also been observed in primary and secondary rain forest.

Altitude: Sea level to 800m.

Distribution: Native to Central and South America but cultivated elsewhere. In Fiji it is the major plantation tree in the South-eastern parts of the main islands.

Uses: Highly valued timber with excellent characteristics. Wide range of applications e.g. for furniture, panelling, flooring, construction, arts and crafts.

Comments: Another mahogany, *S. mahagoni* (L.) Jacq., has been planted in Fiji. It can be differentiated by having smaller leaves.

Diagnostic features: Dark brown, longitudinally fissured bark; dark green, compound, spirally arranged leaves. Conspicuous brown woody capsules containing winged seeds.

Fig. 275: Habit of *Swietenia macrophylla*. (RB)

Fig. 276: Slash of the bark of *Swietenia macrophylla*. (RB)

Fig. 277: Leaves and fruit of *Swietenia macrophylla*. (RB)

Fig. 278: Split fruit with germinating seeds of *Swietenia macrophylla*. (RB)

Fig. 279: Bark of *Swietenia macrophylla*. (GK)



Fig. 280



Fig. 281



Fig. 282



Fig. 283

Vavaea amicornum Benth.

Fijian names: *Sevua*, *cevuā* (Vanua Levu, Taveuni), *sevuā* (Lau)

Trade name: *Cevua*

English name: False sandalwood.

Height: 3-20m. Trunk up to 20cm in diameter.

Bark: Mud-brown, with white blotches.

Slash: Outer layer brown, over a yellow inner layer, covering white wood, yellow inside. Cut bark emits a fragrance similar to that of sandalwood.

Leaves: Crowded towards the ends of branches, simple, spirally arranged; leaves 6-15 x 2.5-8cm, broadly elliptic, glabrous or sparsely hairy on the undersurface, rarely on the upper surface; petioles 1-4cm long.

Flowers: White to pale-yellow or orange, fragrant, in branched inflorescences amongst leaves.

Fruits: Globose, green, maturing black.

Flowering & Fruiting: Throughout the year.

Habitat: Beach thickets, inner edges of mangrove swamps, limestone cliffs, forest-grassland zones.

Altitude: Sea level to 1150m.

Distribution: Very common, recorded from many islands from all parts of the Fiji Group and likely to occur on many others. In the Pacific found in Tonga and possibly elsewhere.

Uses: Timber tree with fragrant wood that is used for making cabinets, house posts and fences.

Comments: Three other species of *Vavaea*, *V. harveyi* Seem., *V. degeneri* A.C. Sm. and *V. megaphylla* C.H. Wright also occur in Fiji. These can be divided into 2 groups. One has comparatively stout branches that are covered with scars of fallen leaves and inflorescences and includes *V. degeneri* and *V. megaphylla*, the former being hairy on the underside of leaves while the latter is almost glabrous. The remaining two species form another group with smaller, smoother branches. Of these two, *V. harveyi* can be easily distinguished in having leaves that appear almost sessile (petiole less than 1cm long) and by being persistently hairy, while those of *V. amicornum* have a distinct petiole.

Diagnostic features: Spirally arranged, simple leaves that are crowded towards the apex. Cut bark fragrant smelling of sandalwood. White flowers with 5 petals borne in clusters, as are the green fruits that mature black.

Fig. 280: Habit of *Vavaea amicornum*.

Fig. 281: Slash of the bark of *Vavaea amicornum*. (GK)

Fig. 282: Leaves and fruits of *Vavaea amicornum*.

Fig. 283: Tip of branchlet of *Vavaea amicornum*, showing the developing leaves and the hairy indument that is often present in individuals growing in the rainforest. (GK)

MIMOSACEAE (Vaivai family)

Worldwide: 58 genera; 3,100 spp., tropical and subtropical.

Fiji: 14 genera, 5 indigenous; also many widespread weeds such as sensitive grass (*Mimosa pudica*, **cogadrogadro**), *Leucaena leucocephala* (**vaivai**), rain trees (*Albizia lebbbeck*, *Samanea saman*), red bead tree (*Adenanthera pavonia*, **lera**).

Economic Importance: Timber (especially *Albizia* and *Acacia*), wattle bark (used in tanning), gum Arabic and pods as animal stock feed.

Family Characteristics

Trees, shrubs or lianas, rarely herbs that commonly harbour nitrogen-fixing bacteria in root nodules. Stipules present. Leaves alternate and bipinnate (then usually with numerous, very small leaflets) or modified into phyllodes (leaf-like modified petioles with parallel venation). Rachis often glandular. Petiole swollen at base. Flowers usually bisexual, 5-merous, in racemes, spikes or heads. Fruit commonly a dry and dehiscent pod. Seeds often flattened.

Indigenous Genera and Species

Acacia (**qumu, tatāgia**) 3 spp. 2 endemic, 1 described

Entada (**wālai**) 1 sp. (climber)

Parkia 1 endemic sp.

Schleinitzia (**Vaivai ni Viti**) 1 sp.

Serianthes (**vaivai ni baravi**) 2 spp., 1 endemic, 1 described

Introduced Species Described

Samanea saman (Jacq.) Merr. (**vaivai ni valagi**)

Key To Indigenous Genera

- | | |
|--|---------------------|
| 1a. Leaves compound; phyllodes absent | |
| 2a. Lenticels few or lacking; calyx lobes not overlapping in bud | |
| 3a. Leaflets alternate; stamens more than 10 | <i>Serianthes</i> |
| 3b. Leaflets opposite; stamens 10 or less | <i>Schleinitzia</i> |
| 2b. Branches with many lenticels. Calyx lobes overlapping in bud | <i>Parkia</i> |
| 1b. Leaves absent; phyllodes (leaf-like structures) present | <i>Acacia</i> |



Fig. 284



Fig. 285



Fig. 286



Fig. 287

Acacia richii A.Gray

Fijian names: Qumu, lolo (Navosa), loalao.

Height: 6-20m, freely-branching.

Bark: Grey to grey-brown.

Slash: Cream to white; wood white.

Leaves: True leaves pinnate present only at seedling stage; phyllodes (leaf stalk expanded to form the functioning leaf) 5-8 x 0.7-1.9mm, narrow lanceolate, apex acute, with prominent parallel veins, often curved (falcate).

Flowers: Bisexual, grouped 10-20 together in globose heads, usually at the end of branches. Individual flower small, with 5 petals and sepals; 5 long stamens.

Fruits: Pod, linear, 8-12cm, brown when mature.

Flowering & Fruiting: May to December.

Habitat: Dense to open forest, crests and ridges and in clearings.

Altitude: 20m to 900m.

Distribution: Endemic to Fiji. Recorded from Viti Levu and Vanua Levu.

Uses: The wood is valued as timber and is also used as a source of black dye.

Comments: Two other species of *Acacia* occur in Fiji, *A. simplex* (Sparrman) Pedley (**tatagia**) and *A. mathuataensis* A.C. Sm. *A. simplex* is restricted to sandy coastal beaches, while *A. mathuataensis* is known only from a summit ridge on Vanua Levu. *A. richii* is distinct from both these species in having phyllodes that are 4 to 9 times as long as broad, while those of the other 2 species are less than 3 times as long as broad.

Diagnostic features: Linear, often curved, 'leaves' with many parallel veins and fluffy yellow globose heads of flowers.

Fig. 284: Habit of *Acacia richii*. (GK)

Fig. 285: Slash of the bark of *Acacia richii*. (SPRH)

Fig. 286: 'Leaves' (phyllodes) and flowers of *Acacia richii*.

Fig. 287: 'Leaves' (phyllodes) and fruit of *Acacia richii*. (SPRH)



Fig. 288



Fig. 290



Fig. 291



Fig. 289



Fig. 292

Samanea saman (Jacq.) Merr.

Synonyms: *Albizia saman* (Jacq.) F. Muell., *Pithecellobium saman* (Jacq.) Benth.

Fijian names: **Vaivai ni vavalagi**, also known as vaivai moce

English names: Raintree, monkey pod tree, French tamarind, sirsa

Height: Large tree, reaching to 35m in height and to 1m or more in diameter, with widely spreading, umbrella-shaped crown.

Bark: Blackish grey with longitudinal fissures.

Slash: Brown corky layer over cream inner bark and cream wood.

Leaves: Alternate and bipinnately compound, to 34 × 36 cm; pinnate in 2-6 pairs, each bearing 2-8 pairs of opposite leaflets. Leaflets sessile, oblong to elliptic and 1.5-6 × 1-3cm, with entire margins, obtuse apices and unequal bases. The species is evergreen in moist regions but loses its leaves during the dry season (deciduous) in Fiji's dry zone.

Flowers: White or cream to pale-yellow, in branched inflorescence towards the end of branches, stamens long, pink to deep red (similar to *Serianthes melanesica*, **vaivai ni Viti**).

Fruits: Indehiscent, woody, flattened pod, 10-25 x 2.5-3.5cm, straight or curved, dark brown. Seeds embedded in pulp

Flowering & Fruiting: November - May; July - December.

Habitat: Gardens and secondary forests. Invasive in Fiji's dry zone, where it may be the major canopy or co-dominate with another, so called rain tree, *Albizia lebeck* (L.) Benth.

Altitude: Sea level to 750m.

Distribution: Native to Central America and South America but widely cultivated and naturalised elsewhere.

Uses: Planted as a shade tree (e.g. along road sides, plantations) and ornamental. The wood (particularly dark core) is used for general construction, flooring, carving/handicrafts and firewood.

Comments: *Albizia lebeck* differs from *Samanea saman* by having yellow-green flowers and flat pods that lack pulp.

Diagnostic features: Spreading habit of the crown. Blackish-grey, deeply fissured bark. Bipinnate leaves with numerous small alternate leaflets. Smooth, elongated pods. Showy flowers with pink to red stamens.

Fig. 288: Spreading habit of *Samanea saman*. (GK)

Fig. 289: Slash of *Samanea saman*. (GK)

Fig. 290: Compound leaves of *Samanea saman*. (GK)

Fig. 291: Flower of *Samanea saman*. (GK)

Fig. 292: Seed pods of *Samanea saman*. (RB)



Fig. 293



Fig. 294



Fig. 295



Fig. 296

Serianthes melanesica Fosberg

Fijian names: Vaivai ni viti, Vaivainiviti, vaivai ni veikau, vaivai

Height: Small to medium sized tree, 4-21m, with a light spreading crown.

Bark: Ash-grey, smooth.

Slash: Not determined.

Leaves: Bipinnate; leaflets small, 0.6-2.0cm, oblong, closely arranged; usually with raised glands on the petiole and rachis.

Flowers: White or cream to pale-yellow, in branched inflorescences towards the end of branches, stamens long, pink to deep red.

Fruits: Pod, woody, 8-12 x 3-4.5cm, thicker on the margins, turning red-brown at maturity, covered with soft velvet russet-brown hair.

Flowering & Fruiting: February to July; March to September.

Habitat: Dense forest, forested slopes, along rocky shores and edges of mangrove swamps.

Altitude: Sea level to 750m.

Distribution: Two varieties are recognized, *S. melanesica* var. *melanesica* and *S. melanesica* var. *meeboldii*. Both are endemic and are difficult to distinguish in the field. In Fiji, both varieties are recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu and several islands in the Lau Group. Six other varieties of the species are recognized and the species is distributed from Vanuatu and the Loyalty Islands through Fiji eastwards to Tonga and Samoa.

Uses: Timber, the wood also being used for general construction, carving, and as firewood. Seeds are used for making necklaces.

Comments: The other indigenous species, *Serianthes vitiensis* A. Gray, can be distinguished by its longer petiole and rachis and the lack of glands on the petiole and rachis. It is a more robust species and has been recorded only from Vanua Levu.

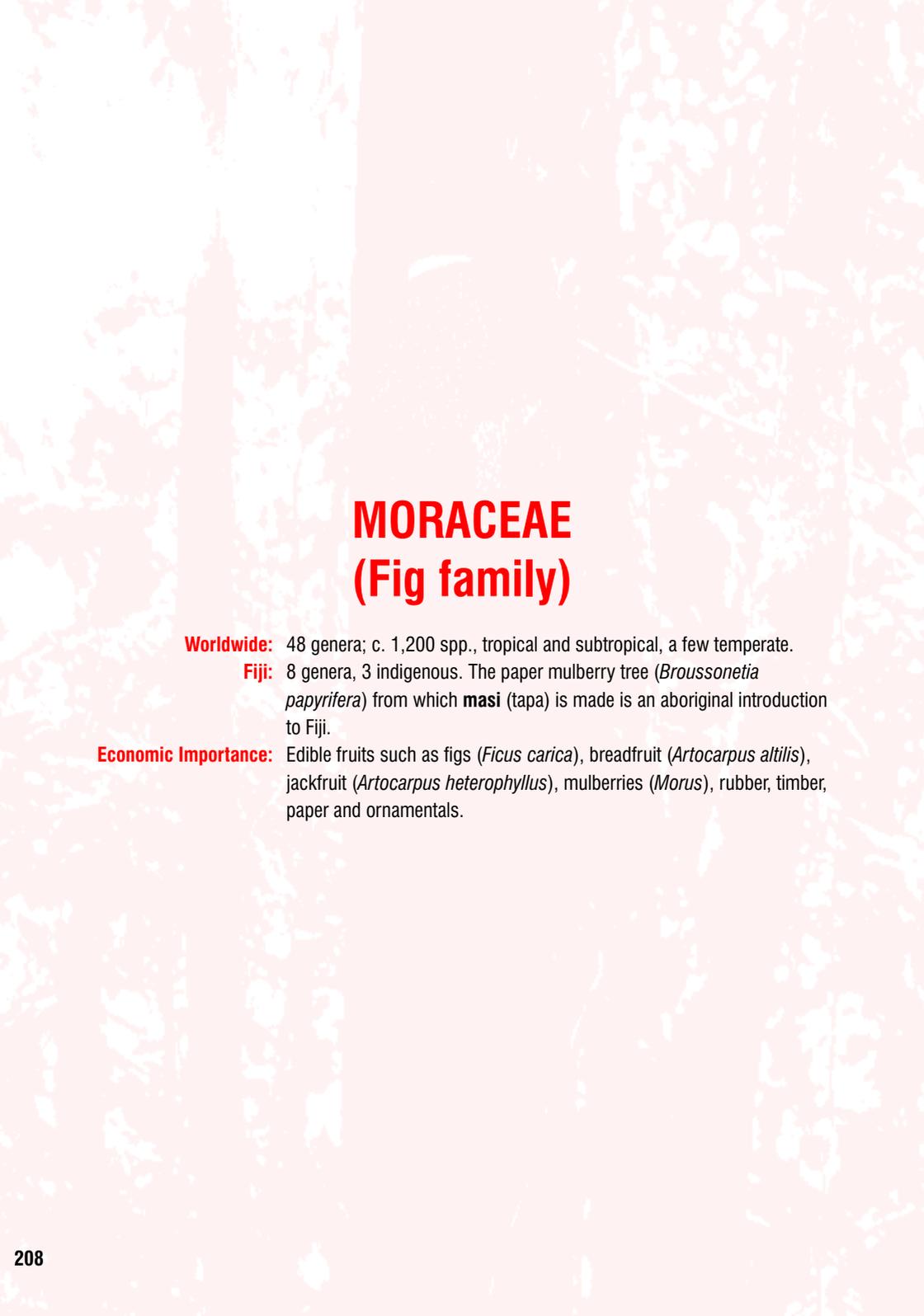
Diagnostic features: Bipinnate leaves with numerous small alternate leaflets. Smooth ash-grey bark. Russet-brown velvety pods. Showy flowers with pink to red stamens.

Fig. 293: Habit of *Serianthes melanesica*.

Fig. 294: Slash of *Serianthes melanesica*. (SPRH)

Fig. 295: Compound leaves and fruits of *Serianthes melanesica*. (SPRH)

Fig. 296: Flower of *Serianthes melanesica*. (SPRH)



MORACEAE (Fig family)

Worldwide: 48 genera; c. 1,200 spp., tropical and subtropical, a few temperate.

Fiji: 8 genera, 3 indigenous. The paper mulberry tree (*Broussonetia papyrifera*) from which **masi** (tapa) is made is an aboriginal introduction to Fiji.

Economic Importance: Edible fruits such as figs (*Ficus carica*), breadfruit (*Artocarpus altilis*), jackfruit (*Artocarpus heterophyllus*), mulberries (*Morus*), rubber, timber, paper and ornamentals.

Family Characteristics

Monoecious or dioecious trees, shrubs, lianas or herbs (not in indigenous Fijian species) with a milky latex. Stipules usually prominent and then inserted on the stem as a stipular hood, protecting developing leaves and leaving interpetiolar ridges. Leaves alternate, usually simple, entire or dentate and adhering by white threads when broken. Venation pinnate or 3- or more veined from the base. Flowers small, 4-merous and in compact axillary inflorescences. Fruit variable, often fleshy when ripe.

Indigenous Genera and Species

Ficus (**baka, lolo, nunu, losilosu**) 14 spp., 7 endemic, 2 described

Malaisia 1 sp. (Climber)

Strebulus 2 spp.

Key To Indigenous Tree Genera

- | | |
|--|------------------|
| 1a. Lenticels present; flowers pendulous; fruit a drupe | <i>Strebulus</i> |
| 1b. Lenticels absent; flowers enclosed in forming a fig; fruit a fig | <i>Ficus</i> |



Fig. 297



Fig. 298



Fig. 299



Fig. 300

Ficus obliqua G. Forst.

Fijian names: Baka, bakaniviti, cawa (Nadrau), yayawa, (Nadroga)

Height: 4-30m, with a spreading crown. Initially an epiphyte, which later sends down aerial roots that then enclose and kill its host tree. Eventually becomes a large tree with a fluted trunk (formed by the descending roots) that may be more than a metre in diameter.

Bark: Grey, smooth with white sap.

Slash: Pink. Latex white.

Leaves: Alternate, to 16x7cm, elliptic to lanceolate, asymmetrical at the base, margin entire, apex acute, leaves smooth beneath.

Flowers & Fruits: Enclosed in the fig; figs maturing from green to yellow, orange and red.

Flowering & Fruiting: Throughout the year

Habitat: Coastal, dry, wet and secondary forest.

Altitude: Sea level to 900m

Distribution: Southeast Asia, Australia and extending to the Pacific islands of Tonga, Niue and Samoa. Found on all bigger and many smaller islands of the Fiji Group.

Comments: *F. obliqua* differs from the other two species of strangler figs, which share the same vernacular names, *F. prolixa* G.Forst. (leaves to 6.5cm long) and *F. tinctoria* G. Forst. (leaves to 13cm long) by having very closely spaced secondary veins.

Diagnostic features: Strangler fig that begins as an epiphyte that kills its host tree by sending down aerial roots that later form its fluted trunk. White latex. The base of the leaf is symmetrical.

Fig. 297: Habit of *Ficus obliqua*. (GK)

Fig. 298: Slash of the bark of *Ficus obliqua*. Note the white sap. (JM)

Fig. 299: Leaves and immature fruits of *Ficus obliqua*. (GK)

Fig. 300: Ripe fruits of *Ficus obliqua*. (LT)



Fig. 301



Fig. 302



Fig. 304



Fig. 305



Fig. 303

Ficus smithii Horne ex Baker

Fijian names: Nunu, losilosu, lolōlolō

Height: To 30m.

Bark: Grey, tinged pink.

Slash: White, soon turning light cream. Latex thick, white.

Leaves: Alternate, up to 22 x 10cm, ovate, margin entire, apex obtuse, base symmetrical or slightly asymmetrical, rough to touch.

Flowers & Fruits: Figs usually borne among leaves, rarely on the stem; figs 0.5 x 1.5cm, figs green when young, turning yellow, pink or red at maturity.

Flowering & Fruiting: Throughout the year.

Habitat: Edges of dense or open forests, thickets, open slopes, rarely at the edges of mangroves.

Altitude: Sea level to 1,150m.

Distribution: Endemic to Fiji. Common in forests of many high islands including Viti Levu, Vanua Levu, Kadavu, Gau, Ovalau, Moala.

Uses: The figs are edible and the bark is used for traditional herbal medicine. Leaves used as sandpaper.

Comments: *F. pritchardii* Seem. has smooth leaves of similar size and shape that are also almost symmetrical at the base, but differs by bearing its figs on the trunk. All other species either have narrower (*F. bambusifolia* Seem., **loselose ni wai**, restricted to streams) or larger leaves (*F. theophrastoides* Seem., **lolo tagane**). *F. vitiensis* Seem. (**lolo**) has symmetrical scabrid (sandpaper-like) leaves, while the remaining species have scabrid leaves that are asymmetrical at the base. (See Smith, 1981: pp. 173-174, for a key to the indigenous species of *Ficus*)

Diagnostic features: Alternate leaves that feel like sandpaper. White latex. Fruits (figs) borne among the leaves.

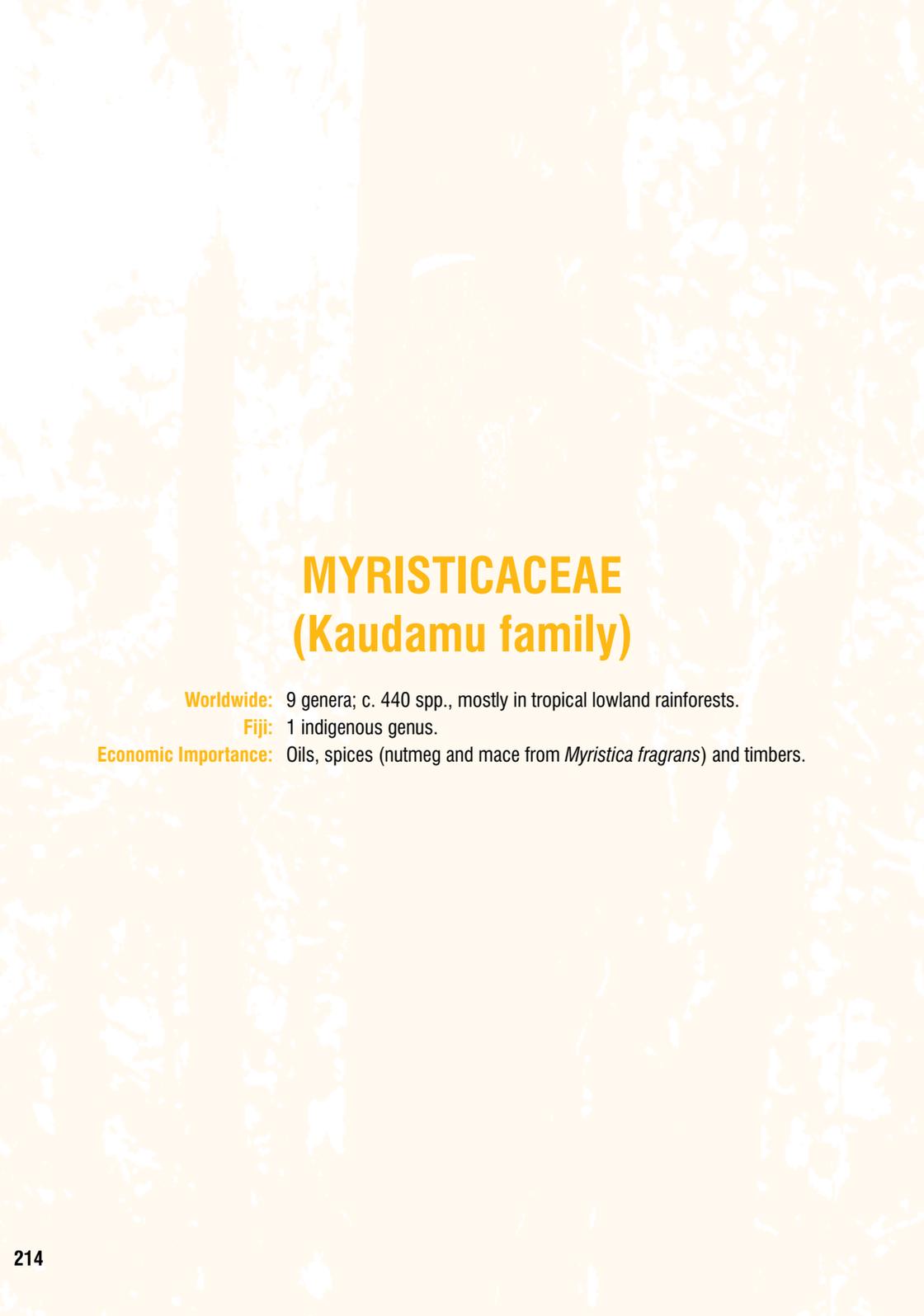
Fig. 301: Habit of *Ficus smithii*. (GK)

Fig. 302: Slash of the bark of *Ficus smithii*, showing the white latex that is often exuded by this tree. (SPRH)

Fig. 303: Developing inflorescence of *Ficus smithii*. (GK)

Fig. 304: Fig (infrutescence) of *Ficus smithii*. (GK)

Fig. 305: Leaves of *Ficus smithii*. (SPRH)



MYRISTICACEAE (Kaudamu family)

Worldwide: 9 genera; c. 440 spp., mostly in tropical lowland rainforests.

Fiji: 1 indigenous genus.

Economic Importance: Oils, spices (nutmeg and mace from *Myristica fragrans*) and timbers.

Family Characteristics

Mostly dioecious, often aromatic trees that exude a red sap when wounded and Fijian species often with buttresses. Branches often whorled and almost horizontal. Stipules lacking. Leaves alternate, in one plane, simple, entire, glabrous, often pale beneath and often gland-dotted. Venation pinnate and scalariform (Fijian species). Petioles stout, grooved and curving upwards and sideways to position the leaves horizontally above the branch. Flowers small, inconspicuous, 3-merous, borne in cymes. Fruit dehiscent, ellipsoid to ovoid in our species, with a single seed partially covered by a fleshy aril.

Indigenous Genera and Species

Myristica (**kaudamu, male**) 6 endemic spp., 1 described

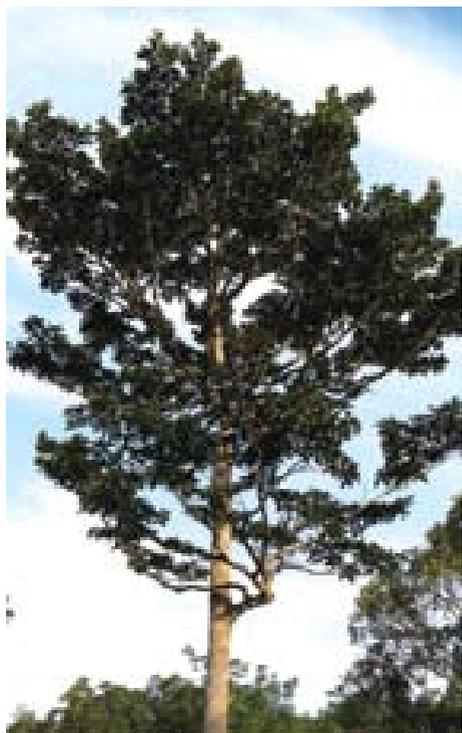


Fig. 306



Fig. 307



Fig. 308



Fig. 309

Myristica castaneifolia A. Gray

Fijian names: Kaudamu, kaidam (Waya), d̄raḍra (Vuda, Ba), male (Ovalau, Kadavu, Vanua Levu, Vatulele, Vatulawa, Lau)

Rotuman name: tata (*M. hypargyrea*)

English name: Fiji nutmeg.

Height: 5-30m, with a narrow crown. Trunk straight and slender up to 60cm in diameter. Branches horizontal and straight, borne at regular intervals along the main stem, tending to droop at the ends. Buttresses and stilt roots sometimes present.

Bark: Brown, smooth.

Slash: Outer layer blood-red over an orange layer, pink inner layer over a white, spotted pink wood. Sap watery, blood-coloured, sometimes yellowish, exuding slowly.

Leaves: Simple, arranged in one plane, large, 10-32 x 4-14cm, oblong-elliptic to oblanceolate, margin entire, apex obtuse. Petioles grooved and curving upwards and sideways to position the leaves horizontally.

Flowers: Unisexual, tree dioecious (male and female flowers present on separate trees), axillary, in clusters. Flowers yellow-brown, covered in brown hair.

Fruits: Subglobose, 2.8-4.5 x 1.8-3.0cm, beaked at the apex, covered in rust-brown hair. Seeds with a red fleshy aril.

Flowering & Fruiting: Throughout the year.

Habitat: Canopy or subcanopy tree of dense and light open forests. Relatively common.

Altitude: 30m to 1,150m.

Distribution: Endemic to Fiji. Recorded from Viti Levu, Vanua Levu, Kadavu and Ovalau.

Uses: Widely used timber and plywood.

Comments: The vernacular name **kaudamu** refers to the red slash and timber of all *Myristica* species. The 6 endemic species of *Myristica* in Fiji are timber trees and form a common components of the canopy or subcanopy of dense forests. All are trees with straight boles and exude a dark red watery sap. *M. grandifolia* A.DC. has the largest leaves (up to 50cm or more) and *M. chartacea* Gillespie has the smallest (6-15cm) and are easy to recognise. *M. castaneifolia* and *M. gillespieana* A.C. Sm. can be differentiated by their fruit stalk which is stout and short (4-5mm) being almost knob-like in *M. castaneifolia* but longer and more slender (7-8mm) in *M. gillespieana*. *M. macrantha* A.C. Sm. may easily be confused with *M. castaneifolia* but usually has longer leaves and longer and thicker petioles. De Wilde (1994) described a new species, *M. acsmithii* W.J. de Wilde, which is very similar to *M. castaneifolia* but reportedly more slender in structure.

Diagnostic features: Horizontal branches. Slash with blood-red outer layer and red sap. Prop roots often present. Leaves alternate in one plane with silvery underside. Petioles grooved and curving upwards and sideways to position the leaves horizontally.

Fig. 306: Habit of *Myristica castaneifolia*. (RB)



Fig. 310

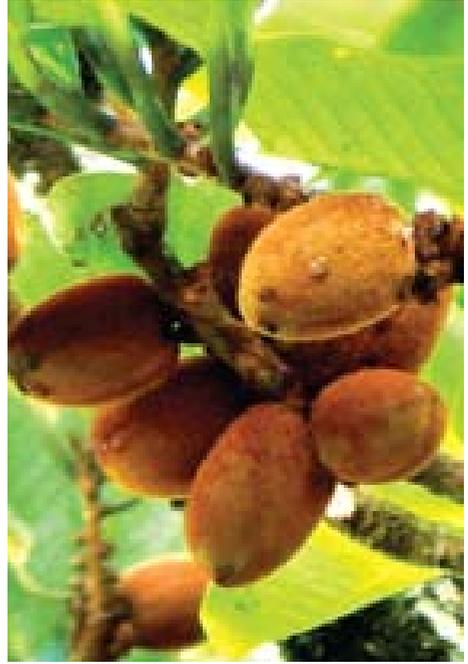


Fig. 312

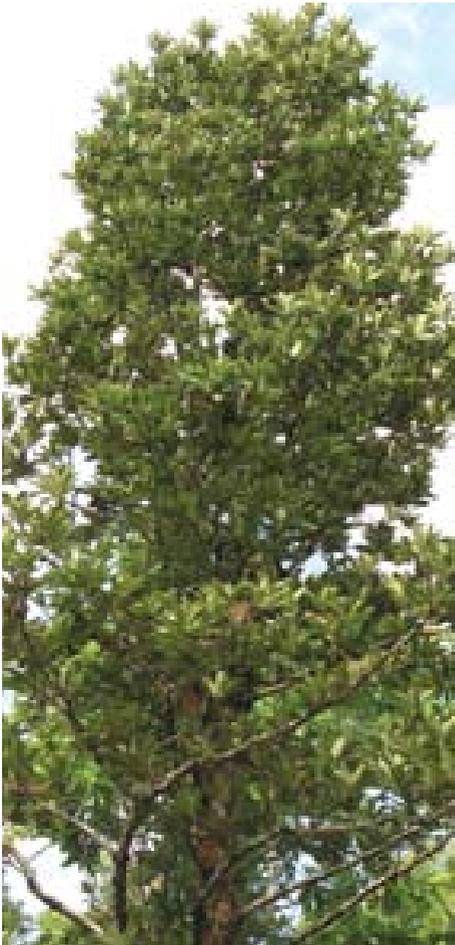


Fig. 311



Fig. 313

Fig. 307: Slash of the bark of *Myristica castaneifolia*. (SPRH)

Fig. 308: Leaves of *Myristica castaneifolia*. Note the S-shaped petiole and the silvery colour of the leaf underside.

Fig. 309: Leaves and fruits of *Myristica gillespieana*. (SPRH)

Fig. 310: Split fruit with red aril of *Myristica gillespieana*. (RB)

Fig. 311: Habit of *Myristica castaneifolia*. (RB)

Fig. 312: Cluster of fruits of *Myristica macrantha*. (RB)

Fig. 313: Canopy with very large leaves of *Myristica grandifolia*. (RB)

MYRTACEAE (Yasiyasi family)

Worldwide: 120 genera; c. 3,850 spp., tropical and subtropical centred in America and Australia.

Fiji: 14 genera, 6 indigenous, **guava** (*Psidium guajava*) and **kavika** (*Syzygium malaccense*) are naturalised introductions.

Economic Importance: Timber (*Eucalyptus*), edible fruits (**guava**, **kavika**), spices and medicinal oils (e.g. species of *Eucalyptus* and *Syzygium*) and cultivated ornamentals

Family Characteristics

Trees or shrubs with branches that are sometimes distinctly 4-angled at extremities. Stipules inconspicuous or lacking. Leaves opposite, leathery, entire and gland-dotted (often inconspicuously so), often reddish when young. Venation pinnate (often closely spaced) and with 1 or 2 intramarginal veins. Flowers bisexual, epigynous and usually aggregated into cymose or racemose inflorescences. Stamens more than 10. Fruit usually a few-seeded berry, sometimes a capsule, rarely (not our indigenous species) a drupe or a nut.

Indigenous Genera and Species

Decaspermum (**nuqanuqa**) 2 endemic spp., 1 described

Eugenia 1 sp.

Metrosideros (**vuga**) 2 sp., 1 endemic, 1 described

Ptilocalyx 1 endemic sp.

Syzygium (**yasiyasi**; incl. *Cleistocalyx*) 32 spp., 24 endemic, 1 described

Key To Indigenous Genera

- | | |
|---|---------------------|
| 1a. Leaves fleshy, dark green, less than 8cm long; fruit a red berry. Restricted to coastal locations | <i>Eugenia</i> |
| 1b. Characters not as above | |
| 2a. Elongated tip of leaf apex more than 1cm long; flowers white | <i>Decaspermum</i> |
| 2b. Cupstate leaf apex less than 1cm long | |
| 3a. Flowers showy; fruit a capsule, | <i>Metrosideros</i> |
| 3b. Flowers not very conspicuous; fruit berry-like, | |
| 4a. Young branches often 4-angled; petiole not distally broadened | <i>Syzygium</i> |
| 4b. Young branches slightly flattened; petiole distally broadened | <i>Ptilocalyx</i> |



Fig. 314



Fig. 315



Fig. 316



Fig. 317

Decaspermum vitiense (A. Gray) Nied.

Fijian names: Nuqanuqa, niqwa (Vuda, Ba, Nadrau), nuqa (Nadrga, Waidina, Wainimala, Wainibuka, Verata, Moturiki)

English name: Fiji Christmas tree.

Height: Shrub to small tree, 2-14m, with small, slender branches.

Bark: Red-brown, smooth, thin.

Slash: Pink.

Leaves: Opposite, light green, 8 x 4cm, ovate to ovate-elliptic to lanceolate, margin entire, somewhat wavy, with a drawn out pointed apex. Older leaves orange-brown.

Flowers: Small (c. 1cm across), bisexual or male, white to white tinged with pink, in showy inflorescences in the axils of leaves.

Fruits: Globose, c. 5cm in diameter, blue-green, maturing black.

Flowering & Fruiting: Throughout the year.

Habitat: Open or dry forest, thickets, secondary forests, light bush.

Altitude: Sea level to 1,195m.

Distribution: Endemic to Fiji and common on most of the islands. Recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Vatulele, Ovalau, Nairai, Lakeba, Vanuabalavu.

Uses: Larger trees used for timber and as firewood. Roots are medicinal.

Comments: The common English name Christmas bush, comes from the fact that the tree is in full bloom during the Christmas season. The second endemic species, *Decaspermum cryanthum* A.J. Scott (so far known only from the type collection) has congested leaves that are conspicuously black gland-dotted.

Diagnostic features: Small, opposite pointed leaves with an intramarginal vein. Red bark. Sprays of white flowers.

Fig. 314: Habit of *Decaspermum vitiense*. (GK)

Fig. 315: Slash of the bark of *Decaspermum vitiense*. (GK)

Fig. 316: Opposite leaves of *Decaspermum vitiense*. (GK)

Fig. 317: Flowers of *Decaspermum vitiense*. (GK)

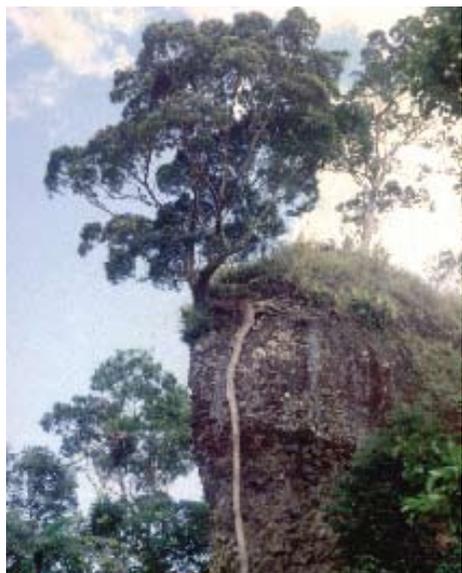


Fig. 318



Fig. 319



Fig. 320



Fig. 321

Metrosideros collina (J.R. Forst. & G. Forst.)

A. Gray

Fijian names: *Vuga*, sekula (Waya)

Height: Shrub or tree, 1-20m, sometimes as a large straggler. Branches spreading. Bole short and often with fused aerial roots.

Bark: Brown to white-grey, with longitudinal light brown streaks, rough, fibrous, with longitudinal fissures. Prop roots may be present at base of the tree.

Slash: Red, exposing yellow wood.

Leaves: Opposite and decussate, up to 4-8 x 1.5-6cm, elliptic-lanceolate, stiff and leathery, margin entire, apex acute, veins prominent on both upper and lower surfaces. Three varieties are recognised based on leaf characters. These are not easy to tell apart in the field: *M. collina* var. *collina* has leaves that are usually less than 3cm wide and narrow elliptic and flower stalks that are less hairy. *M. collina* var. *villosa* (L.f.) A. Gray has generally broader leaves (to 6cm) that are less than twice the width long and flower stalks that are hairy. *M. collina* var. *fruticosa* J.W. Moore has leaves that are less than 3.5cm wide and elliptic and flower stalks that are glabrous.

Flowers: Showy, borne in bunches towards the tips of branches, appearing red to shades of pink or yellow from colour of the numerous stamens. Petals falling soon.

Fruits: Globose to subglobose, tough, less than 1cm in diameter.

Flowering & Fruiting: Throughout the year.

Habitat: Dense forest, open swamps, dry hillsides, thickets of crests and ridges.

Altitude: Sea level to 1,120m.

Distribution: In Fiji the most abundant variety is *M. collina* var. *collina* which has been recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau, Matuku and Lakeba. *M. collina* var. *villosa* has been recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau, Vanuabalavu, Lakeba and the Yasawa Islands. The least common variety is *M. collina* var. *fruticosa*, which has been recorded from Viti Levu, Vanua Levu and Ovalau. Elsewhere in the Pacific, species of *M. collina* occur from Vanuatu eastwards to the Marquesas and Tuamotu islands.

Uses: Larger trees used for timber, and for house posts. Flowers often used as decoration.

Comments: The Fijian endemic species, *Metrosideros ochranthus* A.C. Sm. is distinguished by its sessile leaves (not larger than 3.5cm). It has been recorded only from Mt. Kasi in Vanua Levu.

Diagnostic features: Rough, brown to grey bark Tree habit with distinctive aerial roots. Showy red to pink or yellow flowers.

Fig. 318: Habit of *Metrosideros collina*.

Fig. 319: Slash of *Metrosideros collina*. (RB)

Fig. 320: Red flowers of *Metrosideros collina*. (GK)

Fig. 321: Flowers of a yellow-coloured variety of *Metrosideros collina*. (SPRH)



Fig. 322



Fig. 323



Fig. 324

Syzygium decussatum (A.C. Sm.) Biffin & Craven

Synonym: *Cleistocalyx decussatus* A.C. Sm.

Fijian names: Yasimoli, yasiyasi.

Height: Medium sized tree, 4-12m. Upper internodes of young twigs 2-angled with 2 lateral ridges or wings.

Bark: Grey-white, thick, hard with numerous fissures and falling off in large scales exposing light grey patches.

Slash: Outer layer red, pink under layer.

Leaves: Simple, sessile (without petiole), stiff, up to 27 (-73) x 5-13 (-21)cm long, oblong, margin entire, base cordate, apex rounded, often emarginated. Distinct marginal veins present.

Flowers: White, c. 2cm across, in branched inflorescences.

Fruits: Oblong, 2-ridged longitudinally, apex with the remains of the persistent sepals.

Flowering & Fruiting: No records

Habitat: Sub-canopy tree of dense forest, occasionally in forest clearings.

Altitude: 150m to 180m.

Distribution: Endemic to Fiji. Recorded from Viti Levu and Vanua Levu

Uses: A useful timber tree.

Comments: Biffin *et al.* (2005) included all species of the genus *Cleistocalyx* (fused sepals) in the genus *Syzygium* (free sepals). Two other species with fused sepals, *S. myrtoides* (A. Gray) R. Schmid (previously *C. ellipticus* (A.C. Sm.) Merr. & L.M. Perry; **yasiyasi**, **yasiloa**) and *S. seemanii* (A. Gray) Biffin & Craven (previously *C. seemanii* (A. Gray) Merr. & L.M. Perry; **yasiyasi**) are also common timber trees. *S. myrtoides* can be identified by its elliptic leaves with one collecting vein clearly defined along the leaf margin and a second less distinct outer one. The leaves of *S. seemanii* are long and narrow with a long acuminate tip and the topmost internode of young branchlets is distinctly 4-angled.

Diagnostic features: Grey bark. Large, opposite leaves with distinct intermarginal veins without petioles, with the upper internodes 2-angled with 2 lateral ridges or wings.

Fig. 322: Habit of *Syzygium decussatum*.

Fig. 323: Slash of bark of *Syzygium decussatum*.

Fig. 324: Inflorescence and thick leaves of *Syzygium decussatum*.



Fig. 325



Fig. 326



Fig. 327



Fig. 328



Fig. 329

Syzygium fijiense L.M. Perry

Fijian names: *Yadisravi*, *yasiyasi*

Height: 10-20m, with a rounded crown.

Bark: Dull brown.

Slash: Red-brown.

Leaves: Simple, opposite, stiff 4.5-10.5 x 2.0-5.5cm, oblanceolate, margin entire, apex acuminate; veins conspicuous with 2 parallel marginal veins running along the length of the leaf.

Flowers: Small (to 1cm across), white, many, in inflorescences just below or amongst the leaves; hypanthium pink bearing a ring of white stamens.

Fruits: Berry obovate, up to 10mm in diameter.

Flowering & Fruiting: July to February; November to March.

Habitat: Canopy tree of dense forest or in open country.

Altitude: 50m to 750m.

Distribution: Endemic to Fiji. Recorded from Viti Levu, Vanua Levu, Taveuni, Ovalau, Koro.

Uses: A timber tree.

Comments: Many important timber trees belong to the genus *Syzygium*. Fiji includes most species under the common name *yasiyasi* because of their similarities. Distinguishing features of some of the more common species of *Syzygium* are given here: *S. rubescens* var. *rubescens* (A. Gray) C. Muell. (*yasidravu*, *yasidamu*) can be distinguished by its abruptly acuminate leaves and a clearly defined collecting vein along the margin of the leaf with a faint one outside and a reddish-brown bark. In *S. effusum* (A. Gray) C. Muell. (*yasidravu*, *yasiloa*, *yasivula*), the leaves have a rounded apex and an acute base. In *S. seemannianum* Merr. & L.M. Perry (*yasiwai*), the leaves are narrow elliptic and acuminate at the apex and the flowers are borne on the trunk or the main branches. The leaves of *S. nidie* Guillaumin (*yasidamu*, *yasiloa*) and *S. purpureum* (L.M. Perry) A.C. Sm. (*yasiyasi*), are small, narrow and with acute apices and slightly recurved margins, but the flowers are borne on the trunk in the latter species and not in the former. A detailed key is given by Smith (1985, pg. 315).

Diagnostic features: Brown bark. Stiff leaves with two conspicuous parallel margin veins.

Fig. 325: Habit of *Syzygium fijiense*.

Fig. 326: Slash of bark of *Syzygium fijiense*.

Fig. 327: Leaves and inflorescence of *Syzygium fijiense*.

Fig. 328: Inflorescence of *Syzygium fijiense*.

Fig. 329: Young red leaves and yellow flowers of *Syzygium gillespiei*. (GK)



PITTOSPORACEAE

(Duva ni veikau family)

Worldwide: 9 genera; c. 240 species, tropical and warm Old World, especially Australia.

Fiji: 1 indigenous genus.

Economic Importance: Timber, oil, ornamentals and fish poison.

Family Characteristics

Trees, shrubs and lianas with resin canals. Leaves simple, usually entire, leathery, spirally arranged, often crowded into distinct whorls. Stipules lacking. Venation pinnate. Flowers usually bisexual, regular, 5-merous, often white to yellowish (Fiji species) or reddish to purplish, either solitary or in corymbs or thyrses. Fruits a capsule or berry with numerous, black to reddish seeds often embedded within a sticky pulp.

Indigenous Genus and Species

Pittosporum (duva ni veikau, tuvakalou) 5 spp., 3 endemic, 1 described



Fig. 330



Fig. 331



Fig. 333



Fig. 334



Fig. 332

Pittosporum pickeringii W.Rich ex A. Gray

Fijian names: Tuvakalou, tuva (Waya, Nadrau), tuvabo (Nadroga, Beqa), tuvakau (Wainibuka)

Tade name: Duva ni veikau

Height: 3 to 20m, with a slender or spreading crown. Trunk often slender.

Bark: Grey.

Slash: White over green wood with clear resin.

Leaves: Entire, alternate, to 20cm long, spirally arranged, crowded into distinct whorls, apex pointed.

Flowers: White to pale yellow, fragrant, to 1cm long.

Fruits: Smooth, to 2.5cm across, maturing from green to black. Seeds embedded in a sticky pulp and varying from black to red.

Flowering & Fruiting: Throughout the year.

Habitat: Dense, dry or open forests, forest-grassland transition zone, crest thickets.

Altitude: Sea level to 1,323m (Fiji's highest mountain).

Distribution: Endemic and recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Koro, Ovalau, Nairai and Kabara.

Uses: Fruits used to prepare fish poison. Leaves medicinal. Limited utilisation for construction purposes.

Comments: The vernacular name **duva** is applied to all 5 native species of *Pittosporum*. *P. rhytidocarpum* A. Gray and *P. oligodontum* Gillespie differ by having fruits with a rough, warty surface. The former species has very warty fruits and longer leaves (to 35cm) and petioles (to 4cm), while the latter has fruits with a surface that is only slightly rough and smaller leaves (to 17cm) and petioles (to 2cm). The other three species have smooth fruits. *P. pickeringii* can be differentiated from the others by its leaves gradually narrowing to a pointed apex, while the other two species have an apex that is usually rounded or, if pointed, it does not result from a gradual narrowing. The other two species are best differentiated by floral characteristics. *P. arborescens* W. Rich ex A. Gray has a shorter (to about 1cm) calyx than *P. brackenridgei* A. Gray (1.5cm or more).

Diagnostic features: Light grey bark. Leaves clustered into successive distinctive whorls. Seeds embedded in a sticky pulp.

Fig. 330: Split fruit of *Pittosporum rhytidocarpum*. (LT)

Fig. 331: Slash of the bark of *Pittosporum pickeringii*. (GK)

Fig. 332: Leaves of *Pittosporum pickeringii* arranged in successive whorls. (GK)

Fig. 333: Tip of a branchlet of *Pittosporum pickeringii*, showing the arrangement of developing leaves. (SPRH)

Fig. 334: Fruits of *Pittosporum rhytidocarpum*. (SPRH)



PODOCARPACEAE (Yaka family)

Worldwide: 18 genera; c. 174 spp., mostly in the Southern Hemisphere

Fiji: 5 indigenous genera.

Economic Importance: Timber and ornamentals.

Family Characteristics

Gymnosperms. Mostly dioecious, resinous trees. Leaves simple, entire, linear, often long-persistent, dimorphic in some species and either leaf-, scale or needle-like. Venation parallel with conspicuous midrib and inconspicuous secondary veins. Male cones catkin-like, solitary or clustered, cylindrical and with numerous spirally arranged scales. Female cones terminal or axillary, usually solitary and with a basal receptacle that may be dry or become fleshy after being pollinated. Mature cones with a single seed, protruding from a fleshy structure or drupe-like.

Indigenous Genera and Species

Acmopyle 1 edemic sp.

Dacrycarpus (**amunu**, **kautabua**) 1 sp, described

Dacrydium (**yaka**) 2 spp., 1 endemic, 1 described

Podocarpus (**kuasi**, **kasi**) 2 spp., 1 endemic, described

Retrophyllum (**dakuasalusalu**) 1 sp., described.

Key To Indigenous Genera

- | | |
|--|---------------------|
| 1a. Mature leaves small, scale- or awl-like, closely spaced and overlapping; juvenile leaves very different from adult leaves | |
| 2a. Juvenile leaves larger and distinctly flattened, distichous and appressed; adult leaves alternate | <i>Dacrycarpus</i> |
| 2b. Juvenile leaves needle-like, not flattened; adult leaves whorled | <i>Dacrydium</i> |
| 1b. Mature leaves wide, flattened, similar to juvenile leaves | |
| 3a. Leaves distichous or opposite; petiole inconspicuous | |
| 4a. Leaves opposite (but opposing sides of twig not mirror images as petioles of opposing leaves twist in opposite directions), linear-lanceolate to ovate with blunt apex | <i>Retrophyllum</i> |
| 4b. Leaves distichous, falcate, leaf apex acute, but deltoid and scale-like on non-foilage branches | <i>Acmopyle</i> |
| 3b. Leaves spirally arranged, midrib conspicuous, petiole distinctive | <i>Podocarpus</i> |



Fig. 335



Fig. 337



Fig. 336



Fig. 338

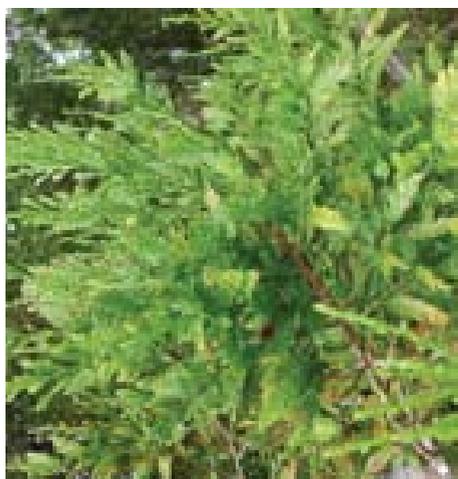


Fig. 339

Dacrycarpus imbricatus (Blume) de Laub.

Fijian names: *Kautabua*, *kausola*, *yaumunu*

Trade name: Amunu

Height: To 24m, sparingly branched with a light crown. Trunk to 1m in diameter.

Bark: Dark grey-brown, the lower trunk with longitudinal cracks.

Slash: Yellow-brown, exuding a clear resin that turns light yellow.

Leaves: Alternate, small, apex sharply acute; juvenile leaves flattened and distichous; adult leaves alternate.

Male & Female cones: Male and female cones borne on separate trees, on short branches present towards the ends of branches. Male cones cylindrical, solitary or in groups; female cones solitary, rounded, c. 7mm across, beaked at apex, green maturing orange-red or purple.

Flowering & Fruiting: September to March.

Habitat: Primary and secondary forests, from wet windward to dry leeward areas.

Altitude: Sea level to 1,100m.

Distribution: Recorded in Viti Levu and Vanua Levu. Found in Burma, SE China, Philippines and Vanuatu. The type variety occurs from SE Asia through to Malaysia.

Uses: An important timber tree.

Comments: The vernacular name *kautabua* comes from the colour of the wood, which is similar to that of a well-oiled whale's tooth, the *tabua*.

Diagnostic features: Large, sparingly branched tree with an open crown. Small distichous, "feathery" juvenile leaves.

Fig. 335: Habit of *Dacrycarpus imbricatus*. (RB)

Fig. 336: Bark of *Dacrycarpus imbricatus*. (LT)

Fig. 337: Slash of the bark of *Dacrycarpus imbricatus*. (GK)

Fig. 338: Leaves of *Dacrycarpus imbricatus*. (GK)

Fig. 339: Branch of *Dacrycarpus imbricatus*. (LT)

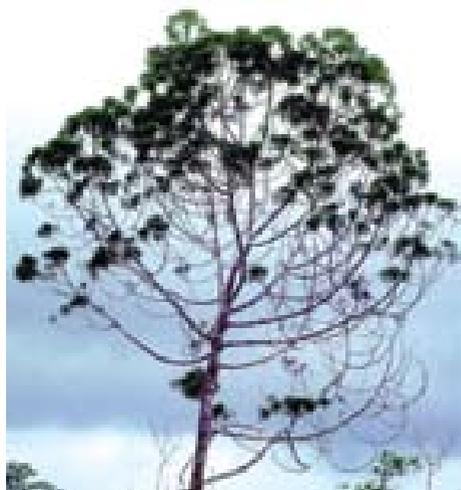


Fig. 340



Fig. 341



Fig. 343



Fig. 342



Fig. 344

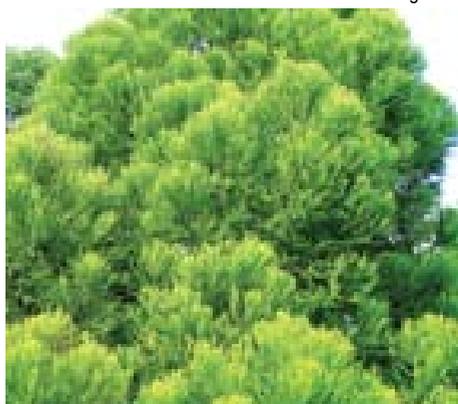


Fig. 345

Dacrydium nidulum de Laub.

Fijian names: Yaka, tagitagi

Height: Tall tree, up to 35m, branching at the top to form a rounded crown. Trunk 1-2m in diameter. Juvenile trees have a conical form with branches all along the main stem.

Bark: Grey-black, rough, with longitudinal fissures, regularly shedding in pieces.

Slash: Red-brown, darker on the outer layer, becoming lighter inside. Wood white outside with a red tinge inside.

Leaves: Small, juvenile leaves needle-like, not flattened; adult leaves pointed, scale-like, c. 4mm long whorled.

Male & Female cones: Male and female cones borne on separate trees, on short branches present towards the ends of branches. Male cones 9-12mm, cylindrical, solitary or in groups; female cones solitary, conical, c. 5mm, across, green maturing brown.

Flowering & Fruiting: March and April.

Habitat: Well-drained areas of dense windward forests to relatively open forests of drier locations, coastal forests.

Altitude: Sea level to 1,120m.

Distribution: Recorded from Viti Levu, Kadavu, Ovalau and Vanua Levu. Also occurs in Sulawesi and New Guinea.

Uses: An important timber tree, particularly for furniture making.

Comments: The second species of *Dacrydium*, *D. nausoriense* de Laub., is endemic to Fiji. It is restricted to the Nausori Highlands and Vanua Levu and can be differentiated by its smaller adult leaves (< 2mm) and smaller pollen cones (< 2.5mm).

Diagnostic features: Small, needle-like, closely overlapping leaves. Long bole with the tree only branching on top to form a rounded crown.

Fig. 340: Habit of *Dacrydium nidulum*.

Fig. 341: Slash of *Dacrydium nidulum*. (RB)

Fig. 342: Branchlet and scale-like leaves (adult-stage) of *Dacrydium nidulum*. (RB)

Fig. 343: Needle like leaves (*juvenile stage*) of *Dacrydium nidulum*. (LT)

Fig. 344: Whorl with scale-like leaved branchlets of *Dacrydium nidulum*.

Fig. 345: Canopy of *Dacrydium nidulum*. (RB)



Fig. 346



Fig. 347



Fig. 348



Fig. 350



Fig. 349

Podocarpus neriifolius D. Don.

Fijian names: Kuasi, gagali, gwali (Vuda, Ba), kwasi (Namosi, Nataisiri, Suva), bauwaqa (Bua)

Trade name: Kuasi

Height: 4-15m, with a freely branching crown. Trunk usually slender.

Bark: Grey, soft and crumbly with longitudinal cracks in the upper parts.

Slash: Pink over yellow-brown wood.

Leaves: Closely and spirally arranged on branches, 6-15 x 0.6-1.5cm, linear-lanceolate, thick and leathery, apex acute to acuminate, midrib prominent on the lower and upper leaf surfaces.

Male & Female cones: Male and female cones c. 1-1.5cm long and borne on separate trees, on short branches present towards the ends of branches. Male cones cylindrical, solitary or in groups; female cones solitary with a fleshy basal receptacle, green maturing brown or purple.

Flowering & Fruiting: October to November

Habitat: Various types of forest, rivers and streams, within or at the edge of forests, forest patches.

Altitude: Sea level to 1,100m.

Distribution: Found from India, China, Japan through SE Asia to the Solomon Islands, Vanuatu and Fiji. In Fiji recorded from Viti Levu, Vanua Levu, Kadavu, Ovalau, Taveuni, Vanuabalavu and Nayau.

Uses: A good timber tree, used for furniture and house interior finishing. Traditionally used by Fijians for making spears, poles and dugout canoes.

Comments: The second species of *Podocarpus* in Fiji, *P. affinis* Seem. is endemic and is restricted to high crests on Viti Levu. It is distinguished by its rounded or obtuse leaf apices.

Diagnostic features: Linear-lanceolate, spirally arranged leaves. Soft, grey bark.

Fig. 346: Habit of *Podocarpus neriifolius*. (GK)

Fig. 347: Slash of bark of *Podocarpus neriifolius*. (SPRH)

Fig. 348: Immature female cone and spirally arranged leaves of *Podocarpus neriifolius*. (GK)

Fig. 349: Female cone of *Podocarpus neriifolius*. Note that a red, fleshy receptacle subtends the single seed, giving the cone a fruit-like appearance. (GK)

Fig. 350: Male cones of *Podocarpus neriifolius*. (SPRH)



Fig. 351



Fig. 353



Fig. 352

Retrophyllum vitiense (Seem.) C.N. Page

Synonym: *Decussocarpus vitiensis* (Seem.) de Laub.

Fijian names: Dakuasalusalu, salusalu

Height: Tall tree, 10-30 (-43)m, with an open, lightly branched crown. Trunk columnar.

Bark: Dark brown to almost black, smooth.

Slash: Reddish-brown, over light coloured wood, exuding odoriferous resin.

Leaves: Opposite, in pairs, fresh green, each leaf with a prominent midrib; petioles of opposing leaves twist in opposite directions so that the opposing sides of a twig are not mirror images of each other.

Male & Female cones: Male and female cones borne on separate trees, on short branches present towards the ends of branches, c. 1-1.5cm long. Male cones cylindrical, solitary or in groups; female cones solitary with a fleshy receptacle that totally encloses the seed, green maturing brown or purple.

Flowering & Fruiting: Pollen cone: March to February; seed cone: June to February.

Habitat: Dense to ridge forest.

Altitude: Sea level to 915m.

Distribution: Common in Fiji, recorded from Viti Levu, Vanua Levu and Kadavu. Found also in Maluku, New Guinea, New Britain, Santa Cruz Islands.

Uses: Important timber tree, used for furniture and interiors. Resin is used to start fires.

Diagnostic features: Reduced leaves, petioles of opposing leaves twist in opposite directions so that the opposing sides of a twig are not mirror images of each other; leaf venation parallel.

Fig. 351: Habit of young tree of *Retrophyllum vitiense*.

Fig. 352: Bark of large tree of *Retrophyllum vitiense*. (GK)

Fig. 353: Leaves of *Retrophyllum vitiense*. Note that the opposing leaves are not mirror images of each other. (GK)



PROTEACEAE (Kauceuti family)

Worldwide: 75 genera; c. 1,350 species, tropical and subtropical, predominantly in dry regions of the Southern Hemisphere.

Fiji: 3 genera, 1 indigenous.

Economic Importance: Attractive ornamentals (species of *Banksia*, *Grevillea* and *Protea*), cut flowers, timbers and edible seeds (macadamia nuts)

Family Characteristics

Shrubs or trees. Bark furrowed at extremities. Lenticels elongate transversely. Leaves alternate (usually spirally arranged), entire, simple or imparipinnately or bipinnately (not in Fiji) compound and leathery. Leaflets opposite and asymmetric. Stipules lacking. Flowers 4-merous, bisexual and paired (indigenous Fijian species), borne on branches or the stem in simple racemose inflorescences that lack floral bracts. Fruit a follicle (Fijian species), nut, achene or drupe.

Indigenous Genera and Species

Turrillia (**kauceuti**) 2 endemic spp., 1 described.



Fig. 354

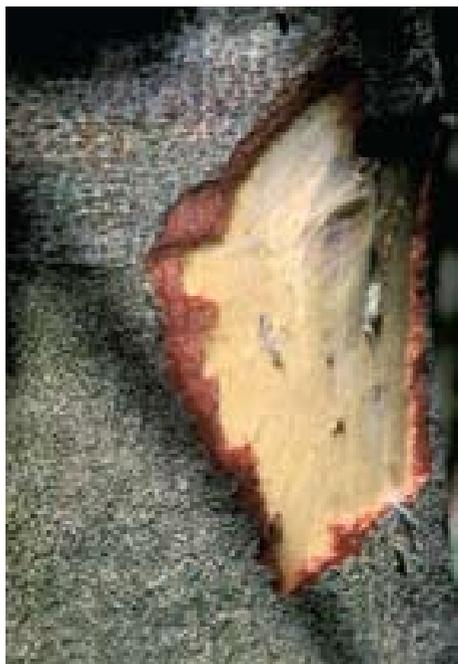


Fig. 355



Fig. 356



Fig. 357

Turillia vitiensis (Turrill) A.C. Sm.

Fijian name: **Kauceuti**

Height: Small to tall tree, 4-28m, sometimes shrubby, 1-2m tall. Trunk slender, up to 65cm in diameter.

Bark: Ash-grey to brown, spotted white-yellow, rough with small rash-like swellings and longitudinal fissures. Regular circular ridges that appear as nodes are present along the length of the trunk.

Slash: Red turning pink inside, inner layer yellow to white, transparent, with small elongated pits, bark when slashed like chicken wire mesh.

Leaves: Compound, pinnate with 3-9 leaflets; leaflets 2.5-12 x 1-8cm, ovate, the terminal leaflet largest and broadly elliptic.

Flowers: Small, bright-yellow to bright golden-yellow, in inflorescences (c. 20cm long) amongst the leaves or borne on the main trunk, petals reflexed.

Fruits: Follicles 1.8-3.6 x 1.4-3.1cm, narrow at the base, broadening above to a rounded tip with a small beak.

Flowering & Fruiting: Throughout the year.

Habitat: Dense and dry forest, including forest patches in grasslands, crest thickets. Often a shrub of upland ridges.

Altitude: Sea level to 1,155m.

Distribution: Endemic to Fiji. Recorded from Viti Levu, Vanua Levu, Kadavu, Ovalau.

Uses: A timber tree.

Comments: The Fijian name, **kauceuti**, refers to the pitted wood, meaning carved out wood (in small pits). The second endemic species, *Turillia ferruginea* (A.C. Sm) A.C. Sm shares the same Fijian name as *T. vitiensis* and is differentiated by its densely hairy young twigs and simple leaves.

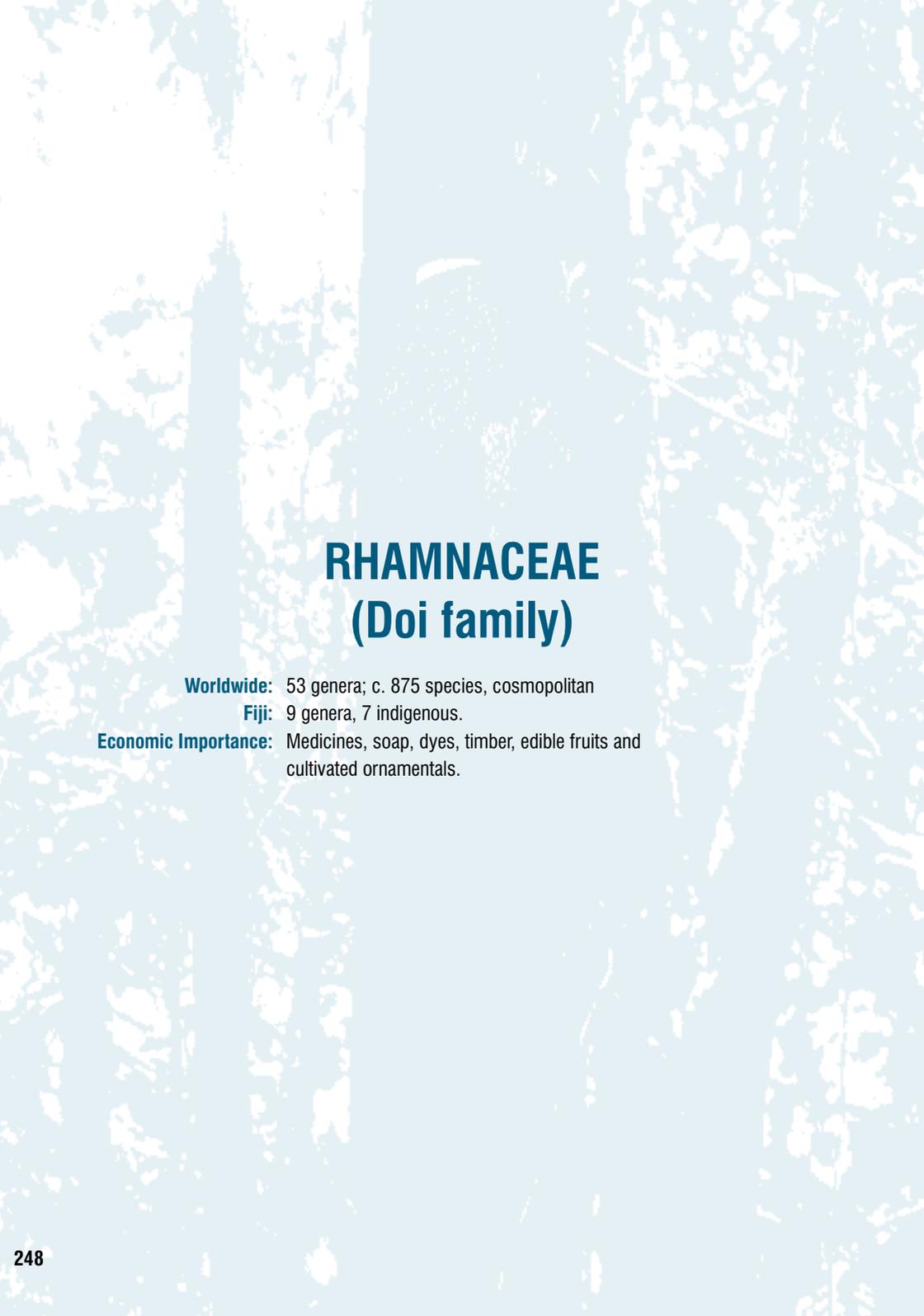
Diagnostic features: Pitted yellow wood; yellow flowers borne on small branches and on the trunk, bark like wire mesh.

Fig. 354: Habit of *Turillia vitiensis*.

Fig. 355: Slash of bark of *Turillia vitiensis*.

Fig. 356: Leaves of *Turillia vitiensis*.

Fig. 357: Inflorescence of *Turillia vitiensis*. (BT)



RHAMNACEAE (Doi family)

Worldwide: 53 genera; c. 875 species, cosmopolitan

Fiji: 9 genera, 7 indigenous.

Economic Importance: Medicines, soap, dyes, timber, edible fruits and cultivated ornamentals.

Family Characteristics

Trees, shrubs and lianas. Stipules small or lacking. Branches often (sometimes conspicuously) zigzagging near extremities. Leaves alternate (distichous) or opposite (not in Fijian species) and simple. Venation either pinnate or of several main veins from the base and scalariform. Flowers small, 5-merous, unisexual, usually borne in cymes. Fruit usually a drupe, sometimes a schizocarp or capsule.

Indigenous Genera and Species

Alphitonia (**doi**) 2 spp., 1 endemic, 1 described

Colubrina (**vere**) 1 sp. (shrub/ climber)

Emmenosperma (**tomanu**) 1 endemic sp., described

Gouania 1 endemic sp. (climber)

Rhamnella 1 sp. (climber)

Smythea 1 sp. (climber)

Ventilago 1 sp. (climber)

Key To Indigenous Tree Genera

- | | |
|---|---------------------|
| 1a. Leaf grey on the abaxial surface (beneath); 10 or more pairs of secondary veins present | <i>Alphitonia</i> |
| 1b. Leaf green on the abaxial surface (beneath); up to 5 pairs of secondary veins present | <i>Emmenosperma</i> |

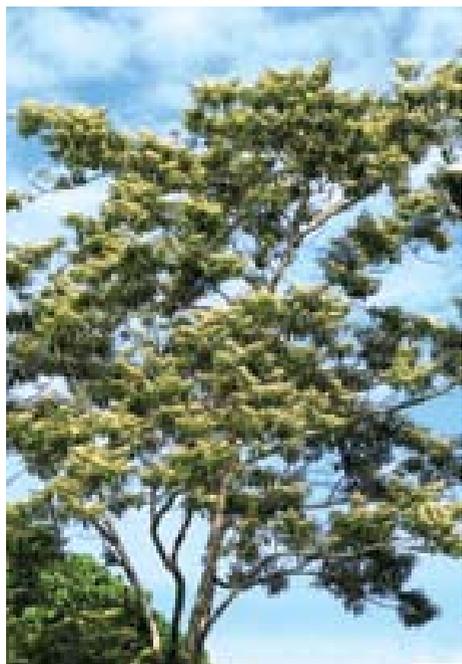


Fig. 358



Fig. 359



Fig. 360



Fig. 361



Fig. 362

Alphitonia zizyphoides (Spreng.) A. Gray

Fijian names: Doi, doidu (Waya), selavo (Macuata), selavo (Lau)

Height: Small to tall tree, 5-30m, with a spreading flat crown.

Bark: White with a greenish tinge, smelling of sandalwood when cut.

Slash: Thin green outer layer over a clay-brown inner layer, over white wood.

Leaves: Simple, alternate, arising in one plane, c. 13 x 3.5cm, oblong-ovate, margin entire, apex acute to obtuse, green above, pale green to grey-green beneath.

Flowers: Small, white, fragrant, in inflorescences amongst the leaves near the ends of branches.

Fruits: Small, c. 1cm, globose, green, maturing brown or black, with a distinct scar at the base.

Flowering & Fruiting: Throughout the year.

Habitat: Dry or wet dense forests, thickets and in grasslands.

Altitude: Sea level to 300m.

Distribution: Recorded from many islands in Fiji (Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau, Gau, Beqa, Vanuabalavu, Moala, Matuku, Lakeba, Totoya, Kabara, Vulaga). Elsewhere in the Pacific, occurring from Vanuatu through Fiji and eastwards to the Society Islands.

Uses: Limited use as timber and firewood. Parts of the tree are used in traditional herbal medicines.

Comments: The second indigenous species *Alphitonia fragulooides* A. Gray is endemic to Fiji. It is distinguished by its smaller leaves and flowers and by the lack of dense brown hair on new growth and young branches.

Diagnostic features: Light bark which when cut smells of sandalwood. Leaves alternate (distichous) grey-green beneath; young leaves and twigs densely covered in brown hairs.

Fig. 358: Habit of *Alphitonia zizyphoides*. (RB)

Fig. 359: Slash of *Alphitonia zizyphoides*. (GK)

Fig. 360: Alternately arranged leaves and flowers of *Alphitonia zizyphoides*. Note the greyish underside of the leaves. (GK)

Fig. 361: Fruit bearing branch of *Alphitonia zizyphoides*. (LT)

Fig. 362: Flowers of *Alphitonia zizyphoides*. (HB)



Fig. 363



Fig. 364



Fig. 365



Fig. 366

Emmenosperma micropetalum (A.C. Sm.) M. C. Johnst.

Fijian name: Tomanu

Height: Small tree or shrub, sometimes like a liana, 3-25m, with a spreading crown. Trunk slender, up to 45cm in diameter.

Bark: Longitudinally fissured, falling off in thin flakes, light brown when freshly exposed.

Slash: Thin dark brown outer layer, light brown middle layer and yellow inner layer, covering yellow wood.

Leaves: Alternate, to 18 x 8cm, ovate-elliptic, margin entire, apex acute to obtuse.

Flowers: Small (to 0.5cm across), fleshy, in clusters in axils of leaves.

Fruits: Globose, up to 18mm in diameter, yellow or orange, turning russet green or bright red at maturity.

Flowering & Fruiting: November to April; throughout the year.

Habitat: Dense, secondary or open forest or grasslands.

Altitude: Sea level to 900m.

Distribution: Endemic to Fiji. Recorded from Viti Levu and Vanua Levu.

Uses: Useful timber tree. Wood also used for making tool handles.

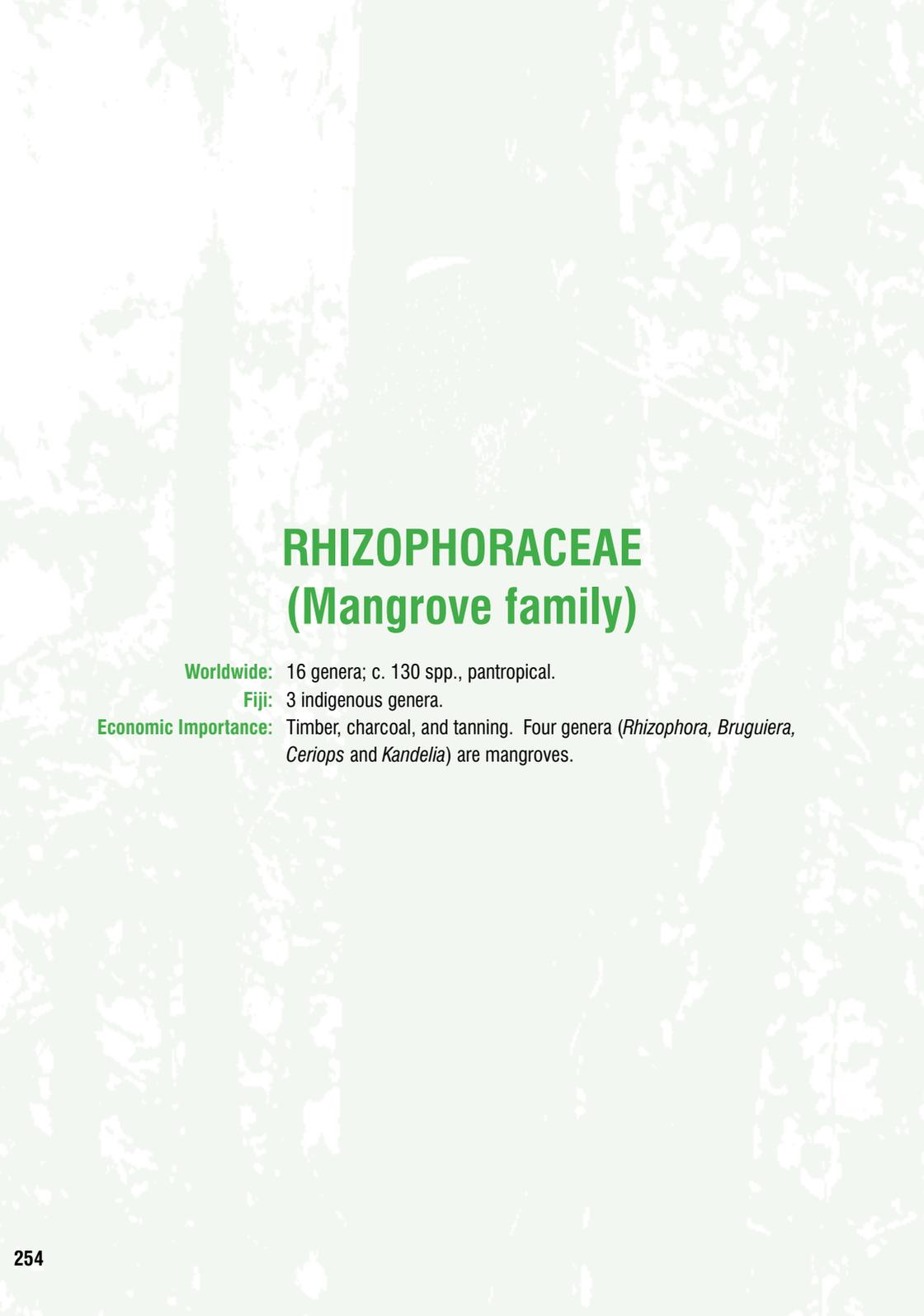
Diagnostic features: Brown, deeply fissured bark. Alternate leaves with ladder-like venation. Bright red fruits.

Fig. 363: Habit of *Emmenosperma micropetalum*.

Fig. 364: Slash of bark of *Emmenosperma micropetalum*. (SPRH)

Fig. 365: Leaves of *Emmenosperma micropetalum*. (SPRH)

Fig. 366: Leaves and fruits of *Emmenosperma micropetalum*.



RHIZOPHORACEAE (Mangrove family)

Worldwide: 16 genera; c. 130 spp., pantropical.

Fiji: 3 indigenous genera.

Economic Importance: Timber, charcoal, and tanning. Four genera (*Rhizophora*, *Bruguiera*, *Ceriops* and *Kandelia*) are mangroves.

Family Characteristics

Trees or shrubs with stilt roots or aerial roots and/or buttressed trunks. Stipules conspicuous, interpetiolar (leaving an interpetiolar ridge), and sheathing the terminal bud. Leaves entire, simple, leathery and opposite-decussate. Flowers bisexual, 4- or 5-merous, hypogynous or epigynous and aggregated into cymes or racemes. Fruit a 1-seeded berry, rarely a capsule.

Indigenous Genera and Species

Bruguiera (**dogo**) 1sp. described.

Crossostylis (**tirivanua**) 5 endemic spp., 1 described

Rhizophora (**tiri**) 2 spp. and 1 endemic sterile hybrid, 1 described

Key To Indigenous Genera

- | | |
|---|---------------------|
| 1a. Plants of mangrove swamps, occurring only at or near the sea; seeds germinate in fruit while still attached to parent plant | |
| 2a. Stems with numerous stilt roots; pneumatophores (breathing roots) lacking | <i>Rhizophora</i> |
| 2b. Stilt roots absent but pneumatophores (breathing roots) present | <i>Bruguiera</i> |
| 1b. Plants of inland forests; seeds not germinating while still attached to parent plant; stilt roots present | <i>Crossostylis</i> |

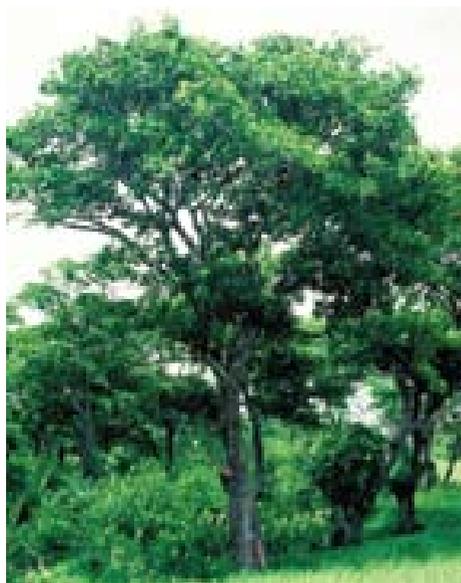


Fig. 367



Fig. 370



Fig. 368



Fig. 371



Fig. 369



Fig. 372

Bruguiera gymnorrhiza (L.) Sav.

Fijian names: **Dogo**, dogokana (Lau), dogofu (Vanua Levu, Totoya), lailai (Waya, Ba, Nadroga), soba (Vutia), tiri (Serua, Koro), togo (Vatulele, Kadavu), togokani (Gonedau)

Height: Low to medium sized tree, 4-15m, with a dense rounded crown. Roots growing up to 30cm above ground level and inverting, forming inverted-u-shaped aerial roots, called pneumatophores.

Bark: Dark brown, thick, rough with fissures.

Slash: Deep red-brown, exposing brown wood. Sap blood-red.

Leaves: Opposite and decussate, 4-15 x 2-7cm, leathery, elliptic, margin entire, apex acute.

Flowers: Sepals yellow or green or orange-red divided about half the length into 10-14 linear segments; petals white; about 3cm long.

Fruits: Rounded with the sepals persisting. Seed germinating while still attached to the tree, the root growing up to 30cm before falling (then being called a propagule). Fruits float long distances.

Flowering & Fruiting: Throughout the year.

Habitat: Landward edges of mangrove swamps.

Altitude: Sea level.

Distribution: In Fiji occurring on several island and island groups. Recorded from Viti Levu, Vanua Levu, Taveuni, Koro, Lau, Vanuabalavu, Lakeba and Vulaga. Found from Southern and Eastern Africa and Madagascar, to southeast Asia, Ryukyu Islands, through Malaysia to Micronesia, Australia and across the Pacific to Samoa and Tonga.

Uses: The bark is used for dyes, medicines and as a wood preservative. Wood is a source of fuel, and also used for general construction and house posts. The germinating seed has been used for food in times of scarcity.

Diagnostic features: Breathing roots or pneumatophores that are in the shape of an inverted “U” present at the base and extending around the tree. Opposite leaves with conspicuous stipules. Only found in brackish water near the ocean.

Fig. 367: Habit of *Bruguiera gymnorrhiza*.

Fig. 368: Leaves of *Bruguiera gymnorrhiza* (left) and *Rhizophora mangle* (right). (RB)

Fig. 369: Slash of bark of *Bruguiera gymnorrhiza*. (RB)

Fig. 370: Flower of *Bruguiera gymnorrhiza*. (RB)

Fig. 371: Young propagule of *Bruguiera gymnorrhiza*. (RB)

Fig. 372: Pneumatophores (knee roots) of *Bruguiera gymnorrhiza*. (GK)

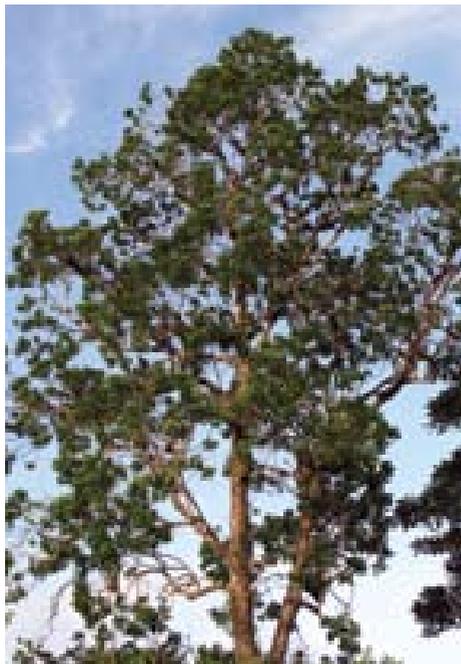


Fig. 373



Fig. 374



Fig. 375



Fig. 376



Fig. 377

Crossostylis seemannii (A. Gray) A.L. Schimper

Fijian name: Tirivanua

Height: Small tree, 2-10m, with aerial props or stilt roots at the base of the trunk.

Bark: Light grey, with prominent longitudinal fissures, flaking easily.

Slash: Outer layer flame orange, yellow inner layer, covering orange wood.

Leaves: Opposite and decussate (opposite pairs at right angle to each other above and below), 10-23 x 5-13cm, elliptic, margin entire, apex acute, leaves hairy underneath, brown. Stipules triangular, pointed, to 2cm long.

Flowers: Small globose, finely hairy, 6-11 striate, c. 1cm across.

Flowering & Fruiting: April to September; July to December.

Habitat: Dense or open forest, occasionally in wet or swampy places.

Altitude: Sea level to 70m.

Distribution: Endemic to Fiji. Recorded only from the southern parts of Viti Levu.

Uses: Stems and roots in traditional herbal medicines.

Comments: Four other species of *Crossostylis*, *C. parksii* (Gillespie) A.C. Sm., *C. pachyantha* A.C. Sm., *C. pedunculata* A.C. Sm. and *C. richii* (A. Gray) A.C. Sm. occur in Fiji, and are also endemic. *C. parksii* also has brown hair on the leaves but its leaves are slenderer (to 10 x 4cm) than *C. seemannii*. In the latter 3 species the leaves are glabrous on the undersurface. In *C. pachyantha* the young branchlets are also glabrous, while they are hairy in the other 2 species. The leaves of *C. pedunculata* have 8 or more secondary veins, while the leaves of *C. richii* have less than 8 secondary veins.

Diagnostic features: Stems with swollen nodes. Stilt roots present at the base of the tree. Leaves opposite, ovoid and with brown hair on the underside. Stipules often present at tips of branches. Hairy fruits.

Fig. 373: Habit of *Crossostylis richii*. (RB)

Fig. 374: Stilt roots of *Crossostylis seemannii*. (GK)

Fig. 375: Slash of *Crossostylis seemannii*. (GK)

Fig. 376: Opposite leaves and stipule of *Crossostylis seemannii*. (SPHR)

Fig. 377: Flowers of *Crossostylis seemannii*. (SPHR)



Fig. 378



Fig. 379



Fig. 381



Fig. 380



Fig. 382



Fig. 383

Rhizophora mangle L.

Synonym: *R. samoensis* (Hochr.) Salvoza

Fijian names: **Tiriwai**, dogoloa (Macuata), lo (Rewa), loa (Rewa), tiridina (Rewa), tirikeirakalavo (Verata), tiritiri (Waya)

Height: 2-7m with a spreading crown. Aerial roots arising from stems and sometimes branches, branching and anchoring to the ground.

Bark: Grey, thick

Slash: Outer layer pink, covering creamy wood.

Leaves: Simple, opposite, broadly elliptic, 6-12 x 2-5cm, margin entire, apex obtuse, slightly notched, lacking an apical mucro, glossy green. Lower surface with many black dots.

Flowers: Yellow to creamy-white, in groups of 3, amongst leaves, peduncles frequently 3-branched; petals hairy on the inner surface.

Fruits: Ovoid, 2-3cm, seed germinating while still attached to parent plant and producing a long root (called propagule; to 30cm long), remnants of the sepals present at the top of fruit.

Flowering & Fruiting: Throughout the year.

Habitat: Seaward and particularly landward margins of mangrove swamps.

Altitude: Sea level.

Distribution: Common on islands of Fiji with mangroves. Distributed throughout the Indo-Pacific region eastwards to Tonga and Samoa.

Uses: The wood is used in general construction, as firewood, and to make charcoal. The bark is used to obtain a black dye and to scent coconut oil. Bark, leaves and fruits are used in traditional herbal medicine.

Comments: This species occurs towards the seaward side where it stands most of the time half submerged in water. *R. stylosa* Grif. (**tiritabua**) differs from *R. mangle* in having a pointed, needle-like tip (called a mucro) and white flowers. In mangrove swamps, it usually forms the seaward zone, while *R. mangle* forms the adjacent zone further inland. The two species hybridise naturally to produce a sterile hybrid, *Rhizophora x selala* (Salvoza) Toml., which can be recognised by its taller stature and the lack of fruits on the trees. Either species can be the putative male parent. The vernacular name of the hybrid, **selala**, means empty flower, referring to the sterile flowers.

Diagnostic features: Mangrove tree with stilt roots. Leaves are opposite, leathery and notched at the apex. Conspicuous stipules.

Fig. 378: Habit of *Rhizophora mangle*. Note the stilt roots.

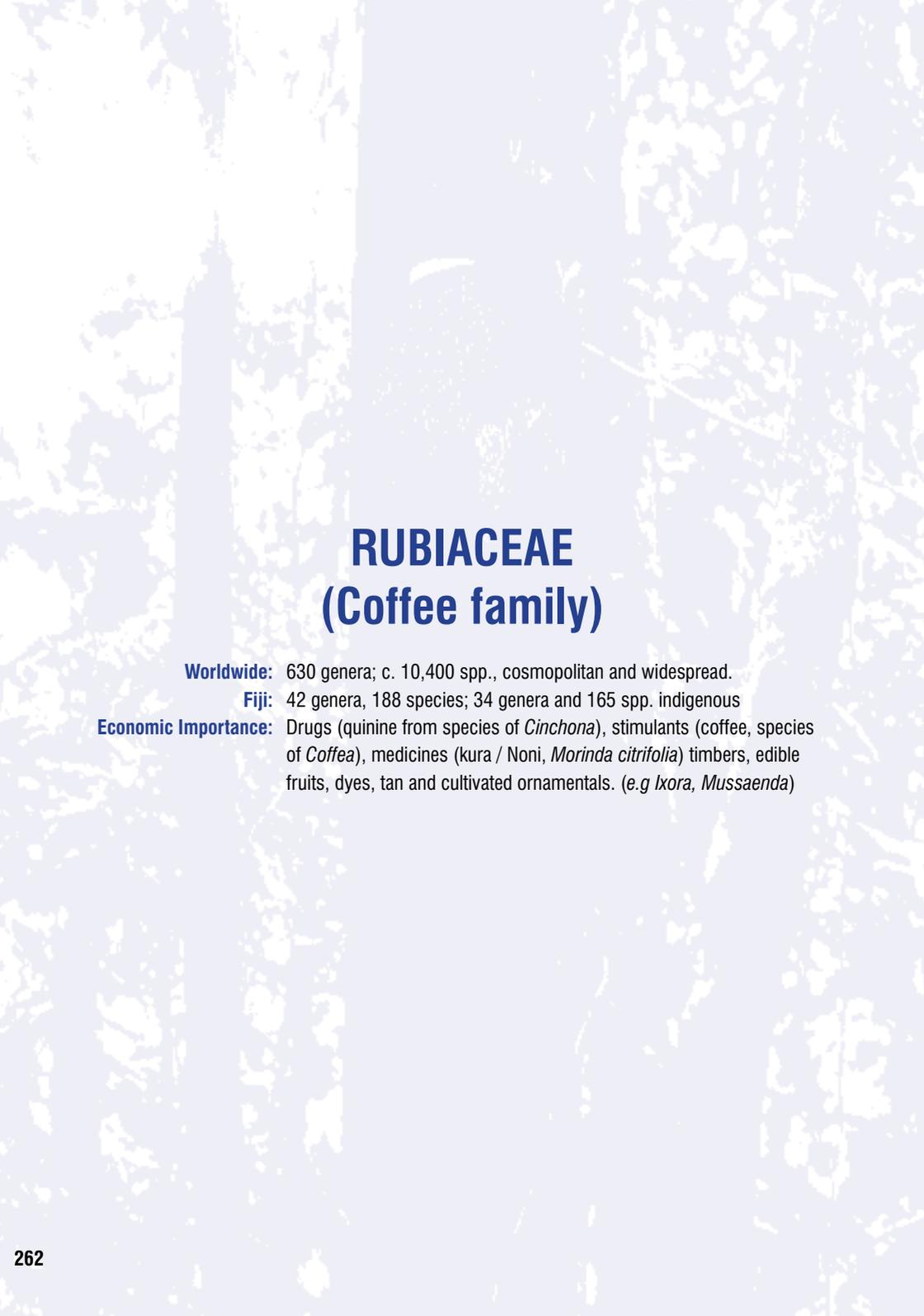
Fig. 379: Stilt roots of *Rhizophora mangle* (RB)

Fig. 380: Habit of *Rhizophora* × *selala* (hybrid), growing taller than the surrounding trees of *Rhizophora mangle*.

Fig. 381: Flowers of *Rhizophora mangle*. (RB)

Fig. 382: Leaves and propagule of *Rhizophora mangle*. (RB)

Fig. 383: Slash of *Rhizophora mangle*. (RB)



RUBIACEAE (Coffee family)

Worldwide: 630 genera; c. 10,400 spp., cosmopolitan and widespread.

Fiji: 42 genera, 188 species; 34 genera and 165 spp. indigenous

Economic Importance: Drugs (quinine from species of *Cinchona*), stimulants (coffee, species of *Coffea*), medicines (kura / Noni, *Morinda citrifolia*) timbers, edible fruits, dyes, tan and cultivated ornamentals. (e.g *Ixora*, *Mussaenda*)

Family Characteristics

Trees, shrubs, herbs, lianas or epiphytes. Branches more or less quadrangular near the extremities. Stipules various, often prominent, free from the petiole, often sheathing and leaving interpetiolar ridges. Leaves opposite (usually decussate), simple, generally simple and pinnately veined. Young leaves often red and emerging erect, opposing and symmetric. Flowers usually bisexual, 4- or 5-merous, epigynous. Fruit various, often a capsule, berry or schizocarp.

Indigenous Genera and Species

- Airosperma* 2 endemic spp.
Amaracarpus 1 endemic spp.
Antirhea 2 spp., 1 endemic
Badusa 1 sp.
Bikkia 1 sp.
Calycosia 4 endemic spp.
Coprosma 1 endemic sp.
Cyclophyllum 3 spp., 1 endemic
Dolicholobium (isosoniura) 3 endemic spp.
Gardenia (drega, bua, tiale) 9 spp., 8 endemic
Geophila 1 sp. (herb)
Gillespiea endemic genus, 1 sp.
Guettarda (buabua) 1 sp.
Gynochtodes 1 sp. (liana)
Hedstroemia (bulei) endemic genus, 1 sp.
Hedyotis 4 spp.
Hydnophytum (seke, ceke) 3 endemic spp. (epiphyte)
Ixora 22 spp., 21 endemic
- Lindenia (bore ni wai)* 1 endemic sp.
Mastixiodendron (duvula) 3 endemic spp., 1 described
Morinda 4 spp., 3 endemic
Mussaenda (bovo, vobo) 1 sp.
Neonauclea (vacea) 1 sp., described
Ophiorrhiza 3 spp., 2 endemic
Pelagodendron endemic genus, 1 sp.
Porterandia 1 endemic sp.
Psychoria 76 spp., 72 endemic
Psydrax 1 sp. endemic
Readea endemic genus, 1 sp.
Squamellaria endemic genus, 3 spp. (epiphytes)
Sukunia endemic genus, 2 spp.
Tarenna 3 spp., 2 endemic
Timonius (dogo ni vanua) 3 spp., 2 endemic
Xanthophytum 1 sp.

Key To Indigenous Genera

The Rubiaceae is the largest family of flowering plants in Fiji with 188 recorded species, 165 of which are indigenous (including 138 endemic species). Presence or absence of raphid crystals in plant parts has been used as a reliable character to identify two main groups in the family.

Based on this and several reproductive characters (petal arrangement in bud, number of ovules, number of locules in the ovary, seed characters) genera are grouped into tribes and then further grouped into species.

Because it is practically impossible to make a generic key without the use of floral and reproductive characters, we have not attempted to produce a key for this family. A key to the tribes in Rubiaceae occurring in Fiji and keys to the genera in each tribe are given in Smith (1988). This should be consulted for the identification of genera and species in this family.



Fig. 384



Fig. 385



Fig. 386



Fig. 387

Mastixiodendron robustum A.C. Sm.

Fijian names: Duvula, yaduva (Bua, Macuata)

Height: 6-25m with a dense rounded crown. Trunk up to 80cm in diameter with buttresses at the base.

Bark: Light brown, with longitudinal fissures.

Slash: Outer layer light, inner layer paler, can be peeled off in long fibres. Wood white.

Leaves: Opposite, 9-16 x 4-7cm, broadly elliptic, margin entire, apex acute, glabrous. Stipules overlap and are twisted, enclosing young leaves, falling after leaves mature.

Flowers: Small, up to 2mm across, white or yellow.

Fruits: Drupe, ovoid, c. 2cm in diameter, woody, with a fibrous outer covering, green maturing yellow to pale or dark brown, bearing a scar at the apex.

Flowering & Fruiting: September to December; October to June.

Habitat: Dense, dry or rocky forests, often along coasts.

Altitude: Sea level to 200m.

Distribution: Endemic to Fiji. Recorded from Viti Levu and Vanua Levu.

Uses: A useful timber tree.

Comments: Two other endemic species are present in Fiji, *M. pilosum* A.C. Sm. and *M. flavidum* (Seem.) A.C. Sm. These can be distinguished from *M. robustum* in leaf and fruit characters. The leaves of *M. pilosum* are hairy underneath and the fruits of *M. flavidum* are less than 15mm in diameter.

Diagnostic features: Inner bark can be peeled in long fibres. Leaves opposite and leathery. Stipules overlap and are twisted, enclosing the young leaves.

Fig. 384: Habit of *Mastixiodendron robustum*.

Fig. 385: Slash of bark of *Mastixiodendron robustum*. (SPRH)

Fig. 386: Oppositely arranged leaves and flowers of *Mastixiodendron robustum*. (GK)

Fig. 387: Budding flower and twisted stipule of *Mastixiodendron robustum*. (GK)



Fig. 389



Fig. 388



Fig. 390

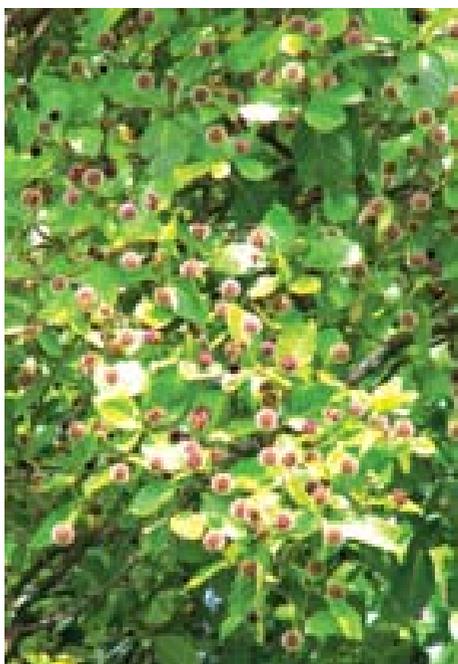


Fig. 391

Neonauclea forsteri (Seem. ex Havil.) Merr.

Fijian names: Vacea, bo, vutoro (Wainimala), yabo (Vuda, Ba)

Rotuman name: Aftea

Height: 3-25m with a spreading crown. Trunk up to 1.5 in diameter.

Bark: Dark brown, with longitudinal fissures.

Slash: Outer layer light yellow-olive, inner layer paler, can be peeled off in long fibres. Wood white.

Leaves: Opposite, c. 20 x 14cm, rounded, margin entire, tip pointed, glabrous. Stipules ovate, relatively large, strongly appressed in bud, falling soon after leaves mature.

Flowers: Flowers organised in heads (c. 2cm across) that appear yellowish white.

Fruits: Arranged in brownish heads c. 2cm across.

Flowering & Fruiting: December to June; April to December.

Habitat: Found in many different forest types but usually uncommon.

Altitude: Sea level to 1,000m.

Distribution: Solomon Islands to the Society Islands. In Fiji recorded from Viti Levu, Vanua Levu, Ovalau, Kadavu and Nayau.

Uses: Bark is medicinal and a timber tree.

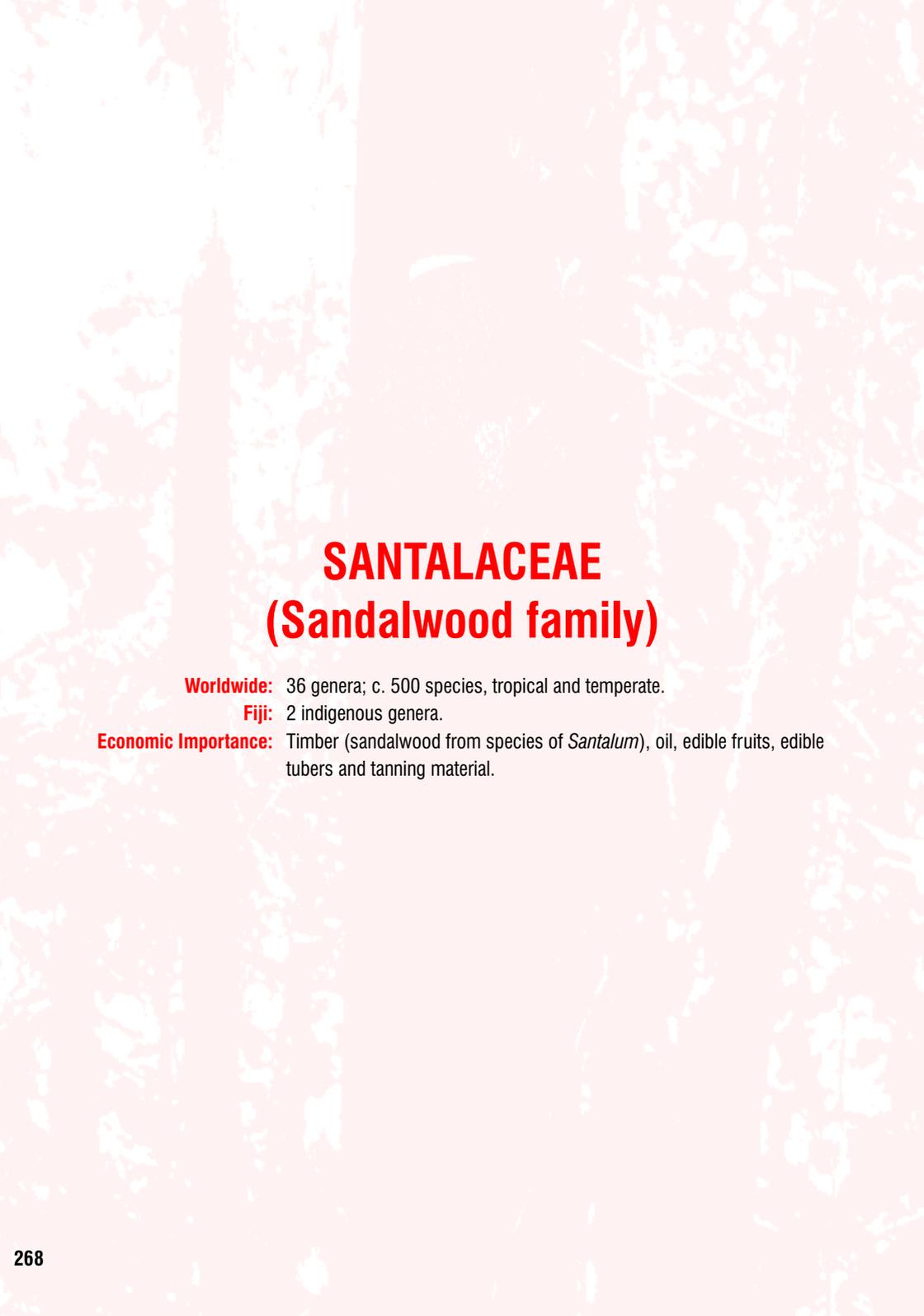
Diagnostic features: Dark brown bark. Large (to 20cm long), opposite, ovoid, dark green leaves. Stipules large and ovate.

Fig. 388: Slash of the bark of *Neonauclea forsteri*. (RB)

Fig. 389: Habit of *Neonauclea forsteri*. (RB)

Fig. 390: Opposite leaves, ovate stipules and head of flowers of *Neonauclea forsteri*. (SPRH)

Fig. 391: Flowering branch of *Neonauclea forsteri*. (RB)



SANTALACEAE (Sandalwood family)

Worldwide: 36 genera; c. 500 species, tropical and temperate.

Fiji: 2 indigenous genera.

Economic Importance: Timber (sandalwood from species of *Santalum*), oil, edible fruits, edible tubers and tanning material.

Family Characteristics

Semiparasitic trees or shrubs. Young branches longitudinally furrowed. Stipules lacking. Leaves simple, entire, opposite or alternate. Flowers small, hypogynous or epigynous, 4- to 6-merous, in racemes. Fruit a 1-seeded drupe (Fijian species) or nut.

Indigenous Genera and Species

Exocarpus 1 endemic sp.

Santalum (**yasi**) 1 sp., described

Key To Indigenous Genera

- | | |
|---|------------------|
| 1a. Leaves alternate; venation parallel | <i>Exocarpus</i> |
| 1b. Leaves opposite; venation pinnate | <i>Santalum</i> |



Fig. 392



Fig. 393



Fig. 394



Fig. 395

Santalum yasi Seem.

Fijian name: Yasi

Rotuman name: Asi

English name: Fijian sandalwood.

Height: Shrubby to a reasonably tall tree, 2-12m, with a branched crown. Trunk up to 30cm in diameter.

Bark: Grey, fragrant., longitudinal fissures

Slash: Outer layer pinkish-yellow, inner layer pale yellow. Wood yellowish white, fragrant

Leaves: Opposite, simple, pale green, 2.5-9.5 x 1-2.5cm, Narrow-elliptic, margin entire, apex acute.

Flowers: Cream, small (c. 5mm across), in short clusters in the axils of leaves. Flowers turning rich pink to purple-red as they grow old.

Fruits: Subglobose 1.5cm in diameter, green turning purple to red-purple to black and shiny and with sweet pulp when mature.

Flowering & Fruiting: More or less throughout the year.

Habitat: Open or dry forest, often in talasiga vegetation. Also cultivated in villages / gardens

Altitude: Sea level to 200m.

Distribution: Widespread in Fiji. Recorded from Viti Levu, Vanua Levu, Kadavu, Lakeba, Oneata and Ono-i-Lau. Elsewhere in the Pacific found in Vanuatu and Tonga.

Uses: The fragrant wood is used as incense in religious ceremonies and to make boxes and carved pieces, perfuming oils, for traditional herbal medicine, to scent coconut oil and in marriage ceremonies. It was also used as an insect fumigant, and to clear dandruff and head lice.

Comments: *Santalum yasi* is a root parasite during its early stages of growth. Fijian sandalwood was traded between Fijians and neighbouring Polynesian island states since early times. At the beginning of the 19th century exploitation of Fijian sandalwood lasted for about 10 years and resulted in the species becoming rare. From 1987-1990 sandalwood was harvested at Bua and other areas where it occurs naturally. It fetched high prices, but resources were exhausted once again in 1991. Recent cultivation and research programmes aim at regaining the niche-market.

Diagnostic features: Narrow, opposite, pale green leaves. Bark grey. Wood fragrant.

Fig. 392: Habit of *Santalum yasi*. (LT)

Fig. 393: Seedling of *Santalum yasi*. (LT)

Fig. 394: Flowers and fruit of *Santalum yasi*. (LT)

Fig. 395: Slash of the bark of *Santalum yasi*. (RB)

SAPINDACEAE

(Dawa family)

Worldwide: 144 genera; c. 1,325 species, tropical and subtropical.

Fiji: 15 genera, 13 indigenous

Economic Importance: Edible fruits (*Lychee*; rambutan, *Nephelium*), timber, oilseeds, beads, soap substitutes, fish poisons, stimulating drinks and ornamentals.

Family Characteristics

Dioecious or monoecious trees, shrubs or lianas (then with tendrils). Young branches angular and grooved. Stipules absent or small. Leaves alternate, simple, pinnate (and then with the rachis ending in a mucro) or bipinnate. Petioles decurrent and often swollen at base (as are petiolules). Petiolar scar shield-like. Flowers individually small, often bisexual, 5-merous and aggregated into cymose inflorescences. Fruit often a capsule or schizocarp. Seeds often partially or entirely enclosed in fleshy aril.

Indigenous Genera and Species

- Alectryon* (**dawadawa**) 2 spp., 1 endemic
Allophylus 2 spp., 1 endemic
Arytera 1 sp.
Cardiospermum (**wāniu**) 1 sp. (climber)
Cossignia 1 endemic sp.
Cupaniopsis 4 endemic sp.
Dodonaea (**usi**) 1 sp.
Elattostachys (**marasa**) 2 spp., 1 endemic, described
Guioa (**drausāsā**) 3 spp., 2 endemic
Harpullia (**vuvula**) 1 sp.
Koelreuteria (**manawī**) 1 endemic sp.
Pometia (**dawa**) 1 sp., described
Sapindus 1 sp.

Key To Indigenous Tree Genera

- 1a. Leaves simple, gland dotted; fruit with wings *Dodonaea*
 1b. Leaves compound, not gland-dotted; fruit not winged
 (wing-like projection present in *Guioa*)
 2a. Leaves bipinnate *Koelreuteria*
 2b. Leaves pinnate
 3a. Leaves 3-foliate, leaflets finely toothed *Allophylus*
 3b. Leaves usually with more than 3 entire leaflets
 4a. Leaves imparipinnate, rachis winged *Cossignia*
 4b. Leaves paripinnate, rachis not winged
 5a. Leaflets almost sessile *Pometia*
 5b. Leaflets with a distinct petiolule more than 1 cm long
 6a. Leaves falcate or with dense, dark brown hairs *Elattostachys*
 6b. Leaves not falcate and lack dark brown hairs
 7a. Rachis with sharp, projecting angles *Alectryon*
 7b. Rachis without sharp angles or wings
 8a. Fruit with wing-like projections *Guioa*
 8b. Fruit lacking “wings”
 9a. Leaflet blades about 2 times longer than wide *Harpullia*
 9b. Leaflet blades more than 2 times longer than wide
 10a. Fruit a fleshy schizocarp *Sapindus*
 10b. Fruit lobes not wing-like
 11a. Lower leaflet surfaces covered with scales *Arytera*
 11b. Lower leaflet surfaces covered with brown hairs or glabrous *Cupaniopsis*



Fig. 396



Fig. 398



Fig. 397



Fig. 399



Fig. 400

Elattostachys falcata (A. Gray) Radlk.

Fijian names: Marasa - I (Waya, Vuda, Ba, Wainibuka), marasa (Ovalau), masa (Lau), wewe (Kadavu, Cicia)

Height: 5-25m, spreading or slender roundish crown. Trunk to 60cm in diameter, often somewhat crooked or leaning.

Bark: Grey to grey brown, smooth with small, lighter coloured lenticels.

Slash: Inner bark orange brown, with darker streaks over white wood.

Leaves: Pinnately compound, spirally arranged, to 20cm long with a swollen base. Leaflets in up to 6 pairs, alternate or opposite, distinctly curved (falcate), glossy dark green above, lighter green below.

Flowers: Red, small (c. 5mm across), 5-merous, forming conspicuous, spike-like inflorescences that are to 10cm long.

Fruits: Dry capsules, rounded at first, developing 3 ridges, c. 1.5cm in diameter, with 3 compartments.

Flowering & Fruiting: More or less throughout the year.

Habitat: Many different forest types and also in grass- and shrubland.

Altitude: Sea level to 1,100m.

Distribution: Vanuatu, Fiji, Tonga, Samoa and Niue. Widespread in Fiji and recorded from several islands.

Uses: Timber is used for house building and as firewood, and was once used for making war clubs. The inflorescence is sometimes used for making necklaces.

Comments: The other species in the genus, *E. venosus* A.C. Sm., differs from *E. falcata* by having brown hair on twigs, petioles, rachis and leaves. This species shares the name marasa with *Storckiella vitiensis*, which it resembles in leaf and bark appearance from a distance.

Diagnostic features: Often dark-coloured bark. Leaves pinnate and spirally arranged. Leaflets distinctively curved (falcate).

Fig. 396: Habit (canopy) of *Elattostachys falcata*. (RB)

Fig. 397: Slash of the bark of *Elattostachys falcata*. (SPRH)

Fig. 398: Leaves and fruits of *Elattostachys falcata*. (GK)

Fig. 399: Close-up of the tip of a leaf of *Elattostachys falcata*, the rachis extends beyond the attachment point for the last leaflet. (GK)

Fig. 400: Red flowers of *Elattostachys falcata*. (LT)



Fig. 401



Fig. 402

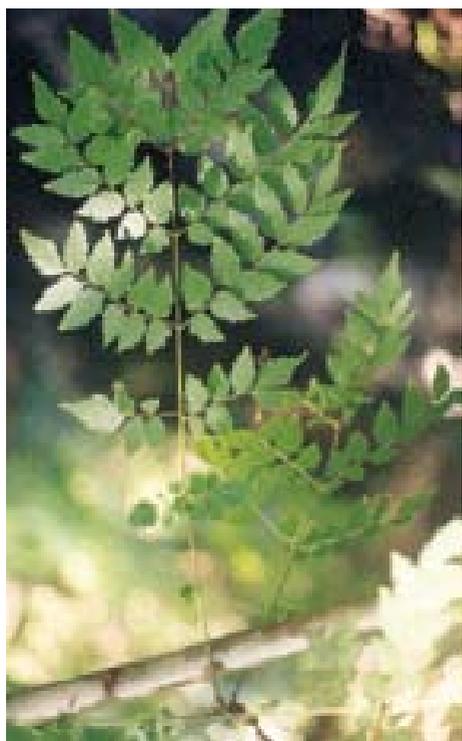


Fig. 403



Fig. 404

Koelreuteria elegans (Seem.) A.C. Sm.

Fijian names: Manawī, wīwī (Vuda, Ba)

Height: 4-25m. Trunk straight, with spreading crown.

Bark: Brown to dark brown.

Slash: Orange-red over light brown, covering cream to white wood.

Leaves: Bipinnately compound, spirally arranged, to 50cm long. Petioles and petiolules swollen at base. Leaflets usually less than 7cm long with toothed margins and a pointed apex.

Flowers: Monoecious (male and female flowers present on the same tree), yellow, assymetric, in paniculate inflorescences (more than 20cm long) at the end of branches.

Fruits: Globose c. 6cm in diameter, flattened, with a glutinous pulp (formed by the fleshy aril of the seed) and a single woody seed. Fruit reddish brown with black, shiny seeds.

Flowering & Fruiting: March to July.

Habitat: Dense and open forest, dry forest, dry hillsides and gullies.

Altitude: 50 to 825m.

Distribution: Endemic to Fiji and recorded only from Viti Levu, Vanua Levu and Gau.

Uses: A useful timber tree. Leaf extract used as a black hair dye.

Diagnostic features: Thick brown bark. Bipinnate leaves with small, toothed leaflets.

Fig. 401: Habit of *Koelreuteria elegans*. (GK)

Fig. 402: Slash of bark of *Koelreuteria elegans*. (GK)

Fig. 403: Bipinnate leaves of *Koelreuteria elegans*. (GK)

Fig. 404: Infrutescence of *Koelreuteria elegans*. (GK)

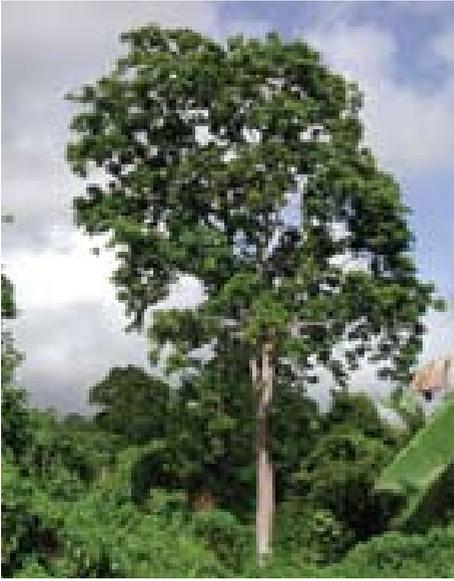


Fig. 405



Fig. 408



Fig. 409



Fig. 406



Fig. 407

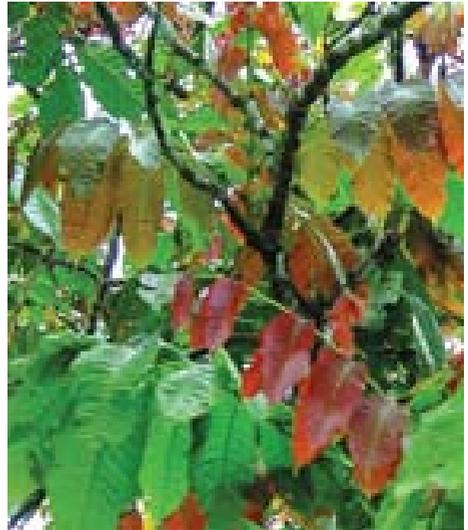


Fig. 410

Pometia pinnata J.R. Forst. & G. Forst.

Fijian names: Dawa, tawa (Yasayasaira, Kadavu)

Rotuman name: Fava

Height: 10-27m. Trunk straight, with buttresses at the base.

Bark: Grey, tinged pink, peeling off in large irregular scales.

Slash: Reddish brown over white wood.

Leaves: Pinnately compound, spirally arranged, c. 30cm long with a swollen base. Leaflets in 5-8 pairs, more or less opposite, oblong-ovate with dentate margin and an acute apex, the lowest leaflets are smallest with the lowest often appearing like stipules. Young leaves orange-pink.

Flowers: Unisexual, tree monoecious (male and female flowers on the same tree), green-yellow, in spicate inflorescences (to 20cm long) at the end of branches.

Fruits: Globose c. 6cm in diameter, with a glutinous pulp (formed by the fleshy aril of the seed) and a single woody seed. Fruit red (**dawa sere**) or green (**dawa** or **dawa moli**).

Flowering & Fruiting: December to March; March to May.

Habitat: Margins of dense forests, open country. Also cultivated near settlements.

Altitude: Sea level to 30m.

Distribution: Widespread. Recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Beqa, Ovalau, Vanuabalavu, Lakeba, Vulaga but occurring in other island as well. Outside Fiji distributed from the Philippines, Sulawesi and eastwards to Tonga, Samoa and Niue. Cultivated in the Marquesas, Tuamotus and Hawaii.

Uses: A useful timber tree, cultivated for its edible fruits sold in the local markets. The wood is used for firewood and the bark and leaves are said to be medicinal.

Diagnostic features: Buttressed trunks. Orange-pink juvenile leaves. Pinnately compound leaves with almost sessile leaflets, the lowest pair of which is the smallest, appears stipule-like and arises towards the base of the rachis. Edible fruit.

Fig. 405: Habit of *Pometia pinnata*. (LT)

Fig. 406: Slash of bark of *Pometia pinnata*. (GK)

Fig. 407: Compound leaf of *Pometia pinnata*. (GK)

Fig. 408: New leaf of *Pometia pinnata*.

Fig. 409: Fruits of *Pometia pinnata*. (LT)

Fig. 410: Flush of new leaves of *Pometia pinnata*. (RB)



SAPOTACEAE (Bau family)

Worldwide: 107 genera; c. 1,000 species, pantropical, lowland and lower montane rainforest, a few temperate.

Fiji: 7 genera, 4 indigenous

Economic Importance: Edible fruits, oils, timber, gutta-percha and sweeteners.

Family Characteristics

Tree and shrubs with white or yellowish latex and *Terminalia*-branching. Leaves simple, entire, spirally arranged, usually leathery and often dark green and crowded at tips of branches. Stipules lacking or soon dropping. New growth often covered with brownish hair or scales. Flowers bisexual, 5-merous, scented, often white or cream and often nocturnal and bat-pollinated. Fruit a fleshy berry.

Indigenous Genera and Species

Burckella (**bauloa, baumika**) 5 spp., 4 endemic, 1 described

Palaquium (**bauvudi, bau, sacau**) 4 endemic spp., 3 described

Pouteria (**qālaka, sarosaro**; synonym: *Planchonella*) 9 spp., 6 endemic

Manilkara 3 spp., 2 endemic

Key To Indigenous Genera

- | | |
|---|---|
| 1a. Conspicuous stipules protecting apical bud | |
| 2a. Leaves with an intramarginal vein | <i>Burckella</i> |
| 2b. Leaves lacking an intramarginal vein | <i>Pouteria</i> (<i>Planchonella</i>) |
| 1b. Stipules absent or minute | |
| 3a. Lateral veins more than 5mm apart and venation ladder-like | <i>Palaquium</i> |
| 3b. Lateral veins less than 5mm apart or venation not ladder-like | <i>Manilkara</i> |



Fig. 411



Fig. 412



Fig. 413

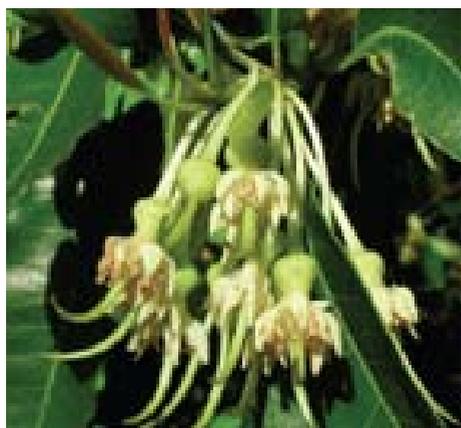


Fig. 415



Fig. 414

Burckella parviflora A.C. Sm. & S. P. Darwin

Fijian name: **Baumika**

Height: To 30m, with a large crown and *Terminalia*-branching. Trunk straight, more than 80cm in diameter.

Bark: Brown with a maroon tinge. Sap white, hardening soon after exposure.

Slash: Outer layer dark brown, inner layer pink, becoming lighter, over creamy wood.

Leaves: Simple, arranged spirally, 4-9cm x 1.5-3cm, elliptic to obovate, margins wavy, apex obtuse to acute.

Flowers: Small, arranged in whorls at the tips of branches.

Fruits: Ovoid, hanging on short stalks.

Flowering & Fruiting: August to December.

Habitat: Dense forest.

Altitude: 120m to 275m.

Distribution: Endemic to Fiji and recorded only from the coastal hills near the coast of south-eastern Viti Levu.

Uses: A potential timber tree, but the wood is so hard that it has been rejected by many sawmills.

Comments: The important *Burckella* timber trees in Fiji are: *B. fijiensis* (Hemsl.) A.C. Sm. & S. P. Darwin (**bau**), *B. richii* (A. Gray) H.J. Lam. (**bulu, bau**), *B. thurstonii* (Hemsl.) H.J. Lam (**buka, bauwaki, bauloa, bausa**). *B. thurstonii* and *B. fijiensis* have large leaves (12-37cm); in *B. thurstonii* the leaves are covered with rusty-brown hair on the undersurface while they are glabrous in *B. fijiensis*. The leaves of *B. richii* and *B. parviflora* (described above) are smaller.

Diagnostic features: *Terminalia*-branching. White sap. Small (up to 9cm), whorled leaves with wavy margins that are crowded at the apex of branches. Brown- maroon bark.

Fig. 411: Habit of *Burckella parviflora*.

Fig. 412: Slash of the bark of *Burckella parviflora*. (SPRH)

Fig. 413: Spirally arranged leaves of *Burckella parviflora*.

Fig. 414: Fruits of a *Burckella* species. (SPRH)

Fig. 415: Flowers of *Burckella richii*. (LT)



Fig. 416



Fig. 418



Fig. 417



Fig. 420



Fig. 419

Palaquium hornei (Hartog ex Baker) Dubard

Fijian name: Sacau

Height: 6-24m. Trunk up to 60cm in diameter. *Terminalia*-branching.

Bark: Grey-brown with longitudinal fissures.

Slash: Outer layer pink, over a light yellow inner layer, covering yellow wood. Latex white.

Leaves: Simple, 8-23 x 10cm, elliptic, margin entire, apex acute, crowded at the tips of branches.

Flowers: Small, white, crowded on branches below the leaves; pedicels recurved.

Fruits: Oval, 2.3 x 1.5cm, beaked at the apex.

Flowering & Fruiting: January to June; August to December

Habitat: Dense forest.

Altitude: 100m to 600m.

Distribution: Endemic to Fiji. So far recorded from Viti Levu, Vanua Levu, Kadavu.

Uses: A useful timber tree.

Comments: There are four species of *Palaquium* native to Fiji. *P. porphyreum* A.C.Sm. & S.P. Darwin (**bauvudi**, **bau**, **baumeirakaka**, described) is easily recognised by the orange brown hair on the underside of young leaves. *P. fidjense* Pierre ex Dubard (**bau**, **bausauwalu**) differs from the others in being relatively slender, with slender branches (< 5mm in diameter towards the apex) and petioles (< 2mm in diameter). *P. hornei* differs from *P. vitilevuensis* Gilly ex P. Royen (**bau**, described) with brown hair present on young leaves and branches.

Diagnostic features: Simple leaves, crowded at tips of branches, with the stipules protecting the apical bud. *Terminalia*-branching. White latex.

Fig. 416: Habit of *Palaquium hornei*.

Fig. 417: *Terminalia* - branching of *Palaquium hornei*. (RB)

Fig. 418: Slash of the bark of *Palaquium hornei*. (SPRH)

Fig. 419: Bark and slash of *Palaquium hornei*. (RB)

Fig. 420: Leaves of *Palaquium hornei*. (SPRH)



Fig. 421



Fig. 422



Fig. 423



Fig. 424

Palaquium porphyreum A.C. Smith & S. P. Darwin

Fijian name: Bauvudi

Height: 4-25m. *Terminalia*-branching. Trunk up to 80cm in diameter with buttresses at the base.

Bark: Mud-grey, with longitudinal fissures. Latex white.

Slash: Outer layer pink, covering white wood.

Leaves: Simple, 8-23 x 6-10cm, elliptic, margin entire, apex rounded or with an emarginate tip; leaves orange-brown underneath.

Flowers: Pale yellow or white, in clusters on the stem and amongst the leaves.

Fruits: Oblong, c. 3 x 1.5cm.

Flowering & Fruiting: December to September; October to November.

Habitat: Dense forests on well-drained areas such as ridges and slopes.

Altitude: 40m to 1,100m.

Distribution: Endemic to Fiji. Recorded only from Viti Levu and Vanua Levu.

Uses: Useful timber tree.

Diagnostic features: Fissured, mud-grey bark. White latex. Leaves orange-brown underneath and crowded at apex. *Terminalia*-branching.

Fig. 421: Habit of *Palaquium porphyreum*.

Fig. 422: Buttress roots of *Palaquium porphyreum*. (SPRH)

Fig. 423: Slash of *Palaquium porphyreum*. (SPRH)

Fig. 424: Leaves of *Palaquium porphyreum*. (SPRH)



Fig. 425



Fig. 427



Fig. 426

Palaquium vitilevuensis Gilly ex P. Royen

Fijian names: Bau, bauvudi, bulubau (Nadroga, Serua)

Height: 6-24m, with a fairly dense crown. Trunk straight and slender.

Bark: Red-brown. Latex white, hardening soon after exposure.

Slash: Outer bark pink over pale brown wood.

Leaves: Variable in size, shape and hairiness characters, 10-20 x 4-10cm, narrowly obovate or broadly elliptic, glabrous or hairy, hairs pale brown to pale yellow. Leaves narrowly obovate, glabrous in exposed locations, remaining densely hairy in dense forests.

Flowers: Small, white, in clusters amongst leaves, borne on hairy stems.

Fruits: Oblong, 0.2-1.5cm.

Flowering & Fruiting: February to July; May to September.

Habitat: Dense or open forests, along creeks in dry, hilly areas.

Altitude: 30m to 60m.

Distribution: Endemic to Fiji. So far recorded only from Viti Levu.

Uses: A useful timber tree. The latex is sometimes used as chewing gum by children.

Diagnostic features: Vegetative and floral parts covered with dense pale brown to pale yellow hair. Red-brown bark and white latex. *Terminalia*-branching. Leaves crowded at tips of branches.

Fig. 425: Habit of *Palaquium vitilevuensis*.

Fig. 426: Trunk and slash of bark of *Palaquium vitilevuensis*.

Fig. 427: Leaves and fruit of *Palaquium vitilevuensis*.



Fig. 428



Fig. 429



Fig. 430



Fig. 431

Pouteria vitiensis (Gillespie)

Synonym: *Planchonella vitiensis* (Gillespie)

Trade name: Sarosaro

Height: 5-25m. Trunk straight, up to 65cm in diameter.

Bark: Grey, smooth and thin.

Slash: Light brown over cream wood with colourless latex.

Leaves: Elongate (lanceolate to elliptic), rounded or pointed at apex, to 14 x 6cm, glabrous.

Flowers: Small, white.

Fruits: Mature from green to red to purple to dark brown, to 2 x 1.5cm.

Flowering & Fruiting: November to May; January to August.

Habitat: Dense or dry forests, along crests and ridges.

Altitude: 50m to 1,120m.

Distribution: Endemic to Fiji. So far recorded from Viti Levu, Vanua Levu, Kadavu and Ovalau.

Uses: A timber tree known for its hard and durable wood for building and making combs.

Comments: Nine species of *Pouteria* are indigenous to Fiji. *P. sessilis* (A.C. Sm. & S. P. Darwin) is the only species with sessile leaves and has so far only been found on Mt. Korobaba, near Suva. Another species, *P. brevipes* (Baker) Baehni, is another narrow endemic, being reported only from a mountain in Cakaudrove and can be distinguished by its petiole being narrowly winged along more than half of its length, *P. smithii* (P. Royen) by its young leaves having brownish to reddish hair on the underside. *P. grayana* (H. St. John Fosberg) (**qalaka**) is restricted to coastal locations and has thick, oval leaf blades. A very similar species, *P. membranaceae* (H. J. Lam) Baehni, differs in having very thin leaves. *P. pyrulifera* (A. Gray) can be distinguished by having ladder-like venation, while *P. umbonata* (P. Royen) differs from the remaining two species by having a rounded leaf tip. Fruit size can be used to distinguish *P. garberi* (Christophers.) Baehni (more than 2.5 x 1.5cm) from *P. vitiensis*.

Diagnostic features: Grey, smooth bark, cut bark exudes very slowly white sap. *Terminalia*-branching.

Fig. 428: Habit of *Pouteria grayana* (RB)

Fig. 429: Slash of the bark of *Pouteria vitiensis*. (GK)

Fig. 430: Leaves and fruits of *Pouteria grayana*, showing fruits that are typical for species of *Pouteria*. (GK)

Fig. 431: Leaves of *Pouteria vitiensis*. (GK)



SIMAROUBACEAE (Vasa ni veikau family)

Worldwide: 22 genera; c. 170 species, tropical and subtropical.

Fiji: 2 genera, 1 indigenous and endemic.

Economic Importance: Medicines, oils from the seeds, timber and ornamentals.

Family Characteristics

Trees (Fijian species) or shrubs. Stipules lacking (Fijian species) or interpetiolar. Leaves alternate, spirally arranged, pinnately compound or simple (Fijian species), entire and congested towards apices. Venation pinnate. Petiole long, swollen at the apex (our species). Flowers often numerous, small, hypogynous, 4- or 5-merous, borne in cymose spikes or dense panicles. Fruit a capsule, samara, rarely a berry or a drupe (Fijian species).

Indigenous Genera and Species

Amaroria (**vasa ni veikau**) endemic genus, 1 sp., described.



Fig. 432



Fig. 433



Fig. 434

Amaroria soulameoides A. Gray

Fijian name: *Vasa ni veikau*

Height: Small tree, 2-25m. Trunk slender, up to 25cm in diameter.

Bark: Light brown, thin, longitudinally fissured.

Slash: Khaki brown, turning cream on the inner side, over cream wood.

Leaves: Simple, 12.5-25 x 5-8.5cm, elliptic, leathery, margins entire, apex acute or obtuse. Petiole long, slender, yellow and with swellings at its base and top. Leaf scars shield-like. Young twigs and tips of branches covered with gold-brown hair.

Flowers: Unisexual, tree dioecious (male and female flowers on separate trees). Male flowers borne on long slender inflorescences; female flowers more closely arranged than the male inflorescences.

Fruits: Subglobose, c. 2cm in diameter, yellow to green-yellow, turning white or pink-tinged on maturity.

Flowering & Fruiting: September to November; December to March.

Habitat: An understorey tree of dense forest, and canopy tree of light open dry or secondary forest. Rarely coastal.

Altitude: Sea level to 1,100m.

Distribution: Monotypic and endemic to Fiji. Recorded from Viti Levu, Vanua Levu, Ovalau, Koro, Vanuabalavu and Moala.

Uses: Timber for house building. Also reported to be used medicinally.

Diagnostic features: Leaves with long, slender, yellow petioles swollen at the apex. Leaves crowded at the end of branches.

Fig. 432: Habit of *Amaroria soulameoides*.

Fig. 433: Slash of the bark of *Amaroria soulameoides*. (GK)

Fig. 434: Inflorescence, fruits and leaves of *Amaroria soulameoides*. Note the long, yellow petiole that is swollen where it attaches to the leaf blade. (GK)

A person wearing a wide-brimmed hat and a light-colored shirt is standing in a dense forest, looking towards the camera. The background is filled with tall trees and lush green foliage, creating a dappled light effect on the ground.

STERCULIACEAE (Rosarosa family)

Worldwide: 72 genera; c. 1,500 species, pantropical, extending into subtropics, a few temperate.

Fiji: 14 genera, 8 indigenous.

Economic Importance: Cocoa (*Theobroma cacao*), kola nuts (species of *Cola*), some timbers, medicinal and cultivated ornamentals.

Family Characteristics

Tree or shrubs, rarely (not Fijian species), herbs or lianas. Stipules lacking or small. Leaves alternate, simple or palmately compound, often with dense hairs underneath. Venation pinnate or palmate. Flowers usually bisexual, usually 5-merous, in complex cymes. Fruits dry, rarely a berry.

Indigenous Genera and Species

Commersonia (**sama**) 1 sp., described

Firmiana (**vau ceva**) 1 endemic sp.

Heritiera (**kedra ivi na yalewa kalou, rosarosa**) 2 spp., 1 described

Kleinhovia (**mamakara**) 1 sp.

Melochia 7 endemic spp.

Pimia endemic genus, 1 sp.

Pterocymbium (**ma**) 1 end. sp., described.

Sterculia (**waciwaci**) 1 endemic sp., described

Key To Indigenous Genera

1a. Leaves palmately compound	<i>Sterculia</i>
1b. Leaves simple	
2a. Leaves green beneath	
3a. Veins 3 or more arising from leaf base	
4a. Leaves entire or lobed (not toothed)	
5a. Fruit a follicle	
5b. Fruit an inflated 5-valved capsule	<i>Kleinhovia</i>
6a. Calyx persistent in fruit	<i>Pterocymbium</i>
6b. Calyx not persistent in fruit	<i>Firmiana</i>
4b. Leaves toothed	<i>Melochia</i>
3b. Venation pinnate	<i>Pimia</i>
2b. Leaves grey or brown beneath	
7a. Leaves glabrous underneath, base symmetric; fruit with ridges on one side	<i>Heritiera</i>
7b. Leaves hairy underneath, base oblique; fruit with soft spines	<i>Commersonia</i>



Fig. 435



Fig. 436



Fig. 437



Fig. 438

Commersonia bartramia (L.) Merr.

Fijian names: Sama, samadina

Height: Shrub or small sized tree, 0.5-18m, with a light spreading crown.

Bark: Brown, smooth.

Slash: Light brown over white wood, staining orange-brown on exposure to air.

Leaves: Alternate, simple, arranged in one plane, 5.5-18 x 2-8.5cm, ovate, margins toothed, apex acute; leaves grey-green beneath.

Flowers: Small, white to cream, in clusters in the axils of leaves throughout the length of the branches.

Fruits: Capsule, c. 2cm in diameter, hard, densely covered with soft hair.

Flowering & Fruiting: Throughout the year.

Habitat: Dry and secondary forests as well as patches of forests and thickets in grasslands. Common.

Altitude: Sea level to 500m.

Distribution: In Fiji occurring on most high islands (Viti Levu, Vanua Levu, Kadavu, Ovalau, Lakeba, Nairai, Taveuni, Vanuabalavu, Moala). Widespread throughout southeast Asia, Malaysia, Micronesia, eastern Australia and into the Pacific eastwards to the Society and Marquesas. Not recorded from Tonga, Niue or the Cook Islands.

Uses: Wood widely used for firewood. Parts are used in traditional herbal medicine.

Diagnostic features: Toothed leaves, grey-green beneath, arranged alternately in one plane. Fruits covered densely with soft spines.

Fig. 435: Habit of *Commersonia bartramia* in bloom.

Fig. 436: Slash of bark of *Commersonia bartramia*.

Fig. 437: Leaves, flowers and fruits of *Commersonia bartramia*. Note the grey colour of the underside of the leaves. (GK)

Fig. 438: Flower of *Commersonia bartramia*. (LT)



Fig. 439



Fig. 440

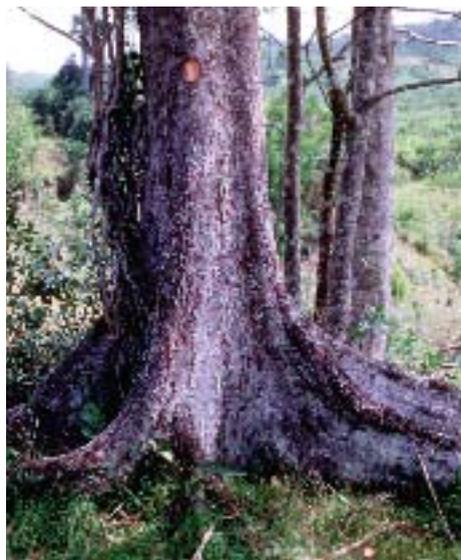


Fig. 441



Fig. 442



Fig. 443

Heritiera ornithocephala Kosterm.

Fijian names: Rogi, rugu (Kadavu), savai (Bua, Macuata)

Trade name: Rosarosa

Height: 10-35m with a large spreading crown. Trunk to 1m in diameter, and usually with buttresses at the base.

Bark: Light brown with longitudinal fissures.

Slash: Outer layer pink, over a pink inner layer, covering white wood.

Leaves: Alternate, simple, 6-15 x 3-7cm, ovate, margin entire, apex acute; leaves green above, densely covered with brown hairs beneath giving a brown colour.

Flowers: Unisexual, tree monoecious, flowers small, pale purple (buds greenish-yellow), axillary, towards the tips of branches.

Fruits: Hard, 2.5 x 2cm, with an obscure longitudinal ridge along the side, beaked at the apex.

Flowering & Fruiting: December to July; March to May.

Habitat: A common component of dense forest.

Altitude: 60m to 970m.

Distribution: Recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau and Nayau, found in Tonga, and Niue.

Uses: A common tree, with a hard wood used for making tool handles and house posts. Parts are used in traditional herbal medicine.

Comments: The other indigenous species, *Heritiera littoralis* Aiton. (**kedra ivi na yalewa kalou**), which is a mangrove associated species found in coastal habitats, is distinct in its silvery undersurface of the leaves.

Diagnostic features: Leaves are brown on the lower surface and alternately arranged. Woody fruit with a ridge on one side.

Fig. 439: Habit of *Heritiera ornithocephala*.

Fig. 440: Slash of the bark of *Heritiera ornithocephala*. (SPRH)

Fig. 441: Buttress roots of *Heritiera ornithocephala*.

Fig. 442: Alternately arranged leaves of *Heritiera ornithocephala*. Note the brown lower surface of the leaves.

Fig. 443: Distinct silvery undersurface of the leaves of *Heritiera littoralis*. (RB)



Fig. 444



Fig.445



Fig. 446

Pterocymbium oceanicum A.C. Sm.

Fijian name: Mā

Height: 15-30m, with widely spaced more or less horizontal branches forming a light crown. Bole to 20m or more. Trunk up to 1m in diameter.

Bark: Dark brown.

Slash: Outer layer thin, light green, covering a white to cream layer with brown streaks over white or cream wood.

Leaves: More or less heart-shaped, to 16x12cm, simple, spirally, arranged at the tips of branches. Venation palmate. Petioles usually 5-10cm long.

Flowers: Unisexual, tree monoecious, small, to 2x5cm wide, white, axillary, borne at the ends of branches. Petals absent.

Fruits: Follicle pouch-shaped at base with a dorsal, rudderlike keel. 1 seed per follicle located basally.

Flowering & Fruiting: September; October.

Habitat: Canopy or emergent tree in dense forests of the drier zones.

Altitude: 400-600m.

Distribution: Endemic to Fiji and recorded only from Viti Levu and Vanua Levu.

Uses: Timber.

Comments: *Pterocymbium oceanicum* flowers very briefly after the leaves have fallen.

Diagnostic features: Dark brown bark and often massive trunk. Palmately veined, deciduous leaves.

Fig. 444: Habit of *Pterocymbium oceanicum*. (GK)

Fig. 445: Slash of *Pterocymbium oceanicum*. (GK)

Fig. 446: Palmate leaves of *Pterocymbium oceanicum*. (GK)



Fig. 447

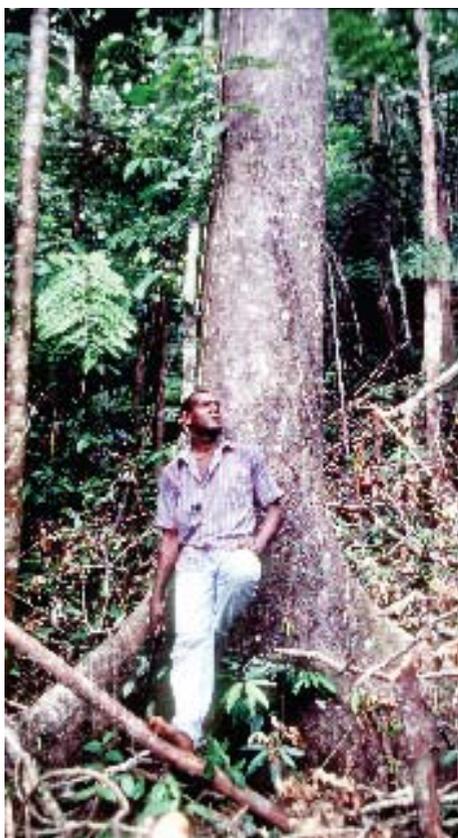


Fig. 448



Fig.449



Fig. 450

Sterculia vitiensis Seem.

Fijian name: Waciwaci

Rotuman name: vasvasi (*S. fanaiho*)

Height: 8-30m, with widely spaced more or less horizontal branches forming a light crown. Trunk up to 1.2m in diameter.

Bark: Grey-brown, smooth with vertical lines along the trunk.

Slash: White, exposing white wood. Sap colourless.

Leaves: Palmately compound with 9-10 leaflets arranged spirally at the tips of branches; petioles long, up to 40cm; leaflets up to 20 x 12cm, the basal ones smallest, the terminal ones largest, elliptic to ovate-lanceolate, margins entire, apex acute. Leaves hairy on the undersurface when young.

Flowers: Unisexual, tree monoecious, small, white, axillary, borne at the ends of branches. Petals absent.

Fruits: Follicle 9-18cm, boat-shaped, beaked, leathery, finely hairy, margins deep-red. Seeds up to 14 in each follicle.

Flowering & Fruiting: April to December; February to March, and July.

Habitat: Lowland forests in the transitional zone of the main islands.

Altitude: Sea level to 300m.

Distribution: In Fiji recorded only from Viti Levu and Vanua Levu. In the Pacific occurs in Vanuatu.

Uses: The wood is soft and seldom used for timber. Seeds are reported to be edible.

Comments: *Sterculia dasyphylla* A.C. Sm., endemic to Fiji, is recorded from the Natewa peninsula in Vanua Levu. It is distinguished by its dense indumentum on the vegetative parts of the plant.

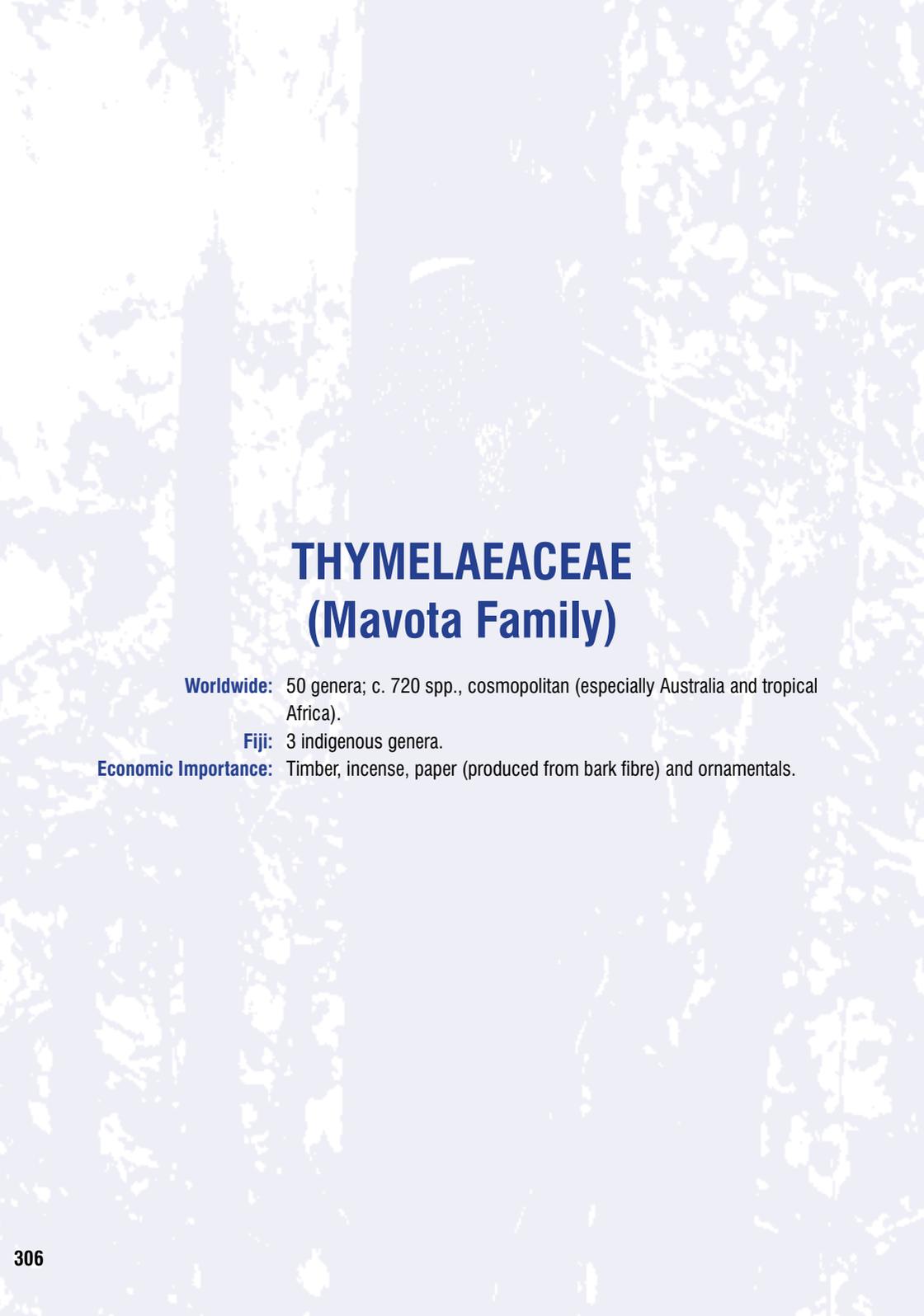
Diagnostic features: Large, digitately compound leaves. Large brown boat-shaped fruits.

Fig. 447: Habit of *Sterculia vitiense*.

Fig. 448: Bark and buttress roots of *Sterculia vitiense*.

Fig. 449: Palmately compound leaf of *Sterculia vitiense*.

Fig. 450: Large, boat-shaped fruits of *Sterculia vitiense*.



THYMELAEACEAE (Mavota Family)

Worldwide: 50 genera; c. 720 spp., cosmopolitan (especially Australia and tropical Africa).

Fiji: 3 indigenous genera.

Economic Importance: Timber, incense, paper (produced from bark fibre) and ornamentals.

Family Characteristics

Tree or shrubs, rarely herbs or lianas that often are highly poisonous. Inner bark fibrous, making branches difficult to break. Stipules lacking. Leaves alternate or opposite, entire and leathery. Venation pinnate. Flowers usually bisexual, 4- or 5-merous, grouped into racemes, spikes, capitula or fascicles. Fruit variable.

Indigenous Genera and Species

- Gonystylus* (**mavota**) 1 sp., described
- Phaleria* (**sinusalusalu**) 9 spp., 6 endemic
- Wikstroemia* (**matiavi**) 1 sp.

Key To Indigenous Genera

- 1a. Leaves opposite and not gland-dotted; lateral veins moderately spaced, intramarginal vein lacking; fruit a drupe or berry-like
 - 2a. Petiole swollen; fruit a drupe *Phaleria*
 - 2b. Petiole not swollen; fruit a 1-seeded berry *Wikstroemia*
- 1b. Leaves alternate and gland-dotted; lateral veins close and parallel, intramarginal vein present; fruit a woody capsule, valved *Gonystylus*

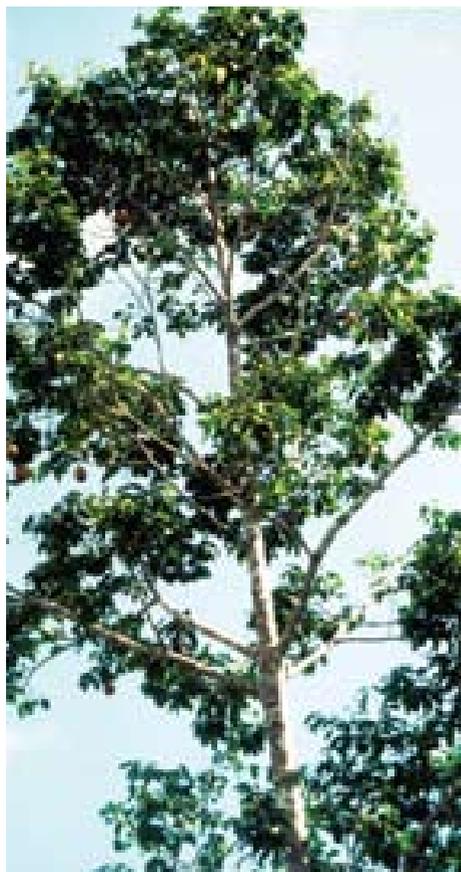


Fig. 451



Fig. 452



Fig. 454



Fig. 453

Gonystylus punctatus A.C. Sm.

Fijian name: Mavota

Height: Tall tree, 22m or more. Trunk up to 60cm or more in diameter.

Bark: Dark brown, with longitudinal fissures.

Slash: Not determined.

Leaves: Simple, alternate (arising in one plane), up to 23 x 9cm, oblong-ovate, with an intramarginal vein, margin entire, apex acute, glossy green. Petioles thick and bent.

Flowers: White, in clusters at the end of branches.

Fruits: Ellipsoid, 5-8cm in diameter, woody, splitting into 3 or 4 segments at maturity, exposing several smooth seeds.

Flowering & Fruiting: January to April; April to May.

Habitat: Dense and secondary forest.

Altitude: 120m to 900m.

Distribution: Endemic to Fiji. So far recorded only from Viti Levu, where it is relatively common on the southern coast.

Uses: A useful timber tree.

Diagnostic features: Thick, shiny leaves with intramarginal veins arising alternately in one plane. Petioles thick. Globose woody fruit, 3-4-valved.

Fig. 451: Habit of *Gonystylus punctatus*.

Fig. 452: Slash of *Gonystylus punctatus*. (RB)

Fig. 453: Leaves and fruits of *Gonystylus punctatus*.

Fig. 454: Mature, split fruits of *Gonystylus punctatus*. (RB)



TILIACEAE (Mako or Linden family)

Worldwide: 48 genera, 725 spp., predominantly tropical, a few temperate.

Fiji: 7 genera, 6 indigenous.

Economic Importance: Timber, fibres (jute from species of *Corchorus*), medicinal (species of *Tilia*) and ornamentals.

Family Characteristics

Trees or shrubs, rarely (not our species) herbs. Stipules present. Leaves alternate, simple, 3-veined, often toothed and hairy on the lower surface in some species. Petiole often swollen distally. Flowers small, green, yellow or white, 5-merous, usually bisexual, often fragrant, aggregated into complex cymes. Fruits several-seeded in various forms.

Indigenous Genera and Species

Berrya 1sp.

Corchorus 1 sp.

Grewia (**siti**) 2 spp., 1 endemic

Microcos 1 endemic sp.

Trichospermum (**mako**) 2 spp., 1 endemic, both described

Triumfetta 1 sp.

Key To Indigenous Genera

- | | |
|--|----------------------|
| 1a. Leaves hairy on one or both surfaces; coastal shrubs | |
| 2a. Leaf base cordate; fruit rounded, spiny | <i>Triumfetta</i> |
| 2b. Leaf base pointed or rounded; fruit elongate, hairy | <i>Corchorus</i> |
| 1b. Leaves glabrous at maturity | |
| 3a. Leaves with a conspicuous gland on each side at the tip of petiole | <i>Trichospermum</i> |
| 3b. Leaves without conspicuous glands at the tip of the petiole | |
| 4a. Leaf margin crenate or serrate | <i>Grewia</i> |
| 4b. Leaf margin entire | |
| 5a. Leaf base cordate. Flowers big (to 5cm across); fruit a capsule | <i>Berrya</i> |
| 5b. Leaf base rounded; flowers small (to 0.5cm across);
fruit a drupe | <i>Microcos</i> |

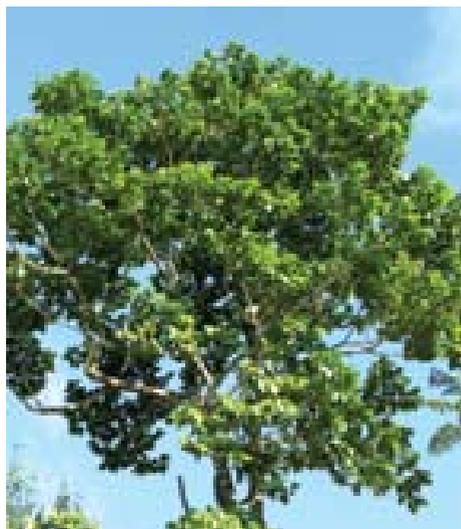


Fig. 455



Fig. 456



Fig. 457



Fig. 458



Fig. 459



Fig. 460

Trichospermum calyculatum (Seem.) Burret

Fijian name: **Makoloa**

Height: Medium sized tree, 2-16m, with a thin crown. Trunk slender, up to 60cm in diameter.

Bark: Dark brown, with thin ridges, covered with small rough outgrowths.

Slash: Outer layer light cream to pink, remaining pink on exposure. Wood white. The inner bark can be stripped off in long lengths of fibres.

Leaves: Simple, petioles 2-7cm; leaves 15-45 x 8.25cm, oblong-ovate to broadly ovate, leathery or stiff and papery; glandular thickenings present at the base of leaf.

Flowers: Small, in inflorescences in the axils of leaves towards the tips of branches, sepals pale green, petals white or yellow-white.

Fruits: Capsule, dry, flattened, 1.0-1.7 x 1.2-2.5cm, dehiscent apically. Seeds with a ring of long marginal hair.

Flowering & Fruiting: Throughout the year.

Habitat: Dense forest and forest margins.

Altitude: Sea level to 520m.

Distribution: Endemic to Fiji. So far recorded only from Viti Levu

Uses: Timber suitable for casing. The bark provides fibres used for binding and tying rafters in traditional houses.

Comments: The vernacular name, **makoloa**, refers to the dark brown bark and dark purple covering (sepals) of the flowers respectively. The other indigenous species, *Trichospermum richii* (A. Gray.) Seem., differs by having smaller leaves (to 20cm long).

Diagnostic features: Dark brown bark that sounds hollow when knocked on with knuckles. Glandular thickenings at the base of leaves. Stipules leaving a stipular scar on the stem at the base of the petiole. Ellipsoid fruits. Seeds with long marginal hairs.

Fig. 455: Habit of *Trichospermum calyculatum*. (RB)

Fig. 456: Slash of *Trichospermum calyculatum*.

Fig. 457: Leaves and inflorescence of *Trichospermum calyculatum*. (GK)

Fig. 458: Purple covering of flower bud (sepals) of *Trichospermum richii*, note glandular thickening of leaf base. (RB)

Fig. 459: Flower of *Trichospermum richii*. (RB)

Fig. 460: Fruits of *Trichospermum calyculatum*. (RB)



URTICACEAE (Salato or Nettle family)

Worldwide: 52 genera; c. 1,050 spp., tropical and temperate.

Fiji: 11 genera, 8 indigenous.

Economic Importance: *Boehmeria nivea* yields ramie fibre, other species are ornamentals and some are noxious weeds. (stinging nettle)

Family Characteristics

Dioecious or monoecious trees, shrubs, herbs or lianas. Stipules usually present. Leaves alternate or opposite, simple, usually serrate, often rough (like sandpaper), usually hairy and bearing conspicuous cystoliths (urticating hairs). Venation either 3-veined or pinnate, densely reticulate. Flowers small, greenish, unisexual, often axillary and borne in cymose inflorescences. Fruit a dry achene, fleshy drupe or nut.

Indigenous Genera and Species

Boehmeria (**kaulolo**) 1 sp.

Cypholophus (**rere**) 2 sp.

Dendrocnide (**salato**) 2 spp., 1 described

Elatostema (**beta, draidrai**) 14 endemic spp. (herbs, shrubs and climbers)

Leucosyke (**matadra**) 1 sp.

Maoutia (**dragasele**) 1 sp.

Pipturus (**roga**) 3 spp., 2 endemic

Procris 4 sp., 3 endemic (herbs, shrubs and climbers)

Key To Indigenous Tree Genera

- | | |
|---|--------------------|
| 1a. Venation pinnate; stinging or prurient hairs present | <i>Dendrocnide</i> |
| 1b. Venation 3-veined from base | |
| 2a. Leaves alternate (sometimes up to 3 of the youngest pairs of leaves opposite); leaves mostly hairy and white underneath | |
| 3a. Petiole short (up to 2cm long) | <i>Leucosyke</i> |
| 3b. Petiole more than 2cm long | |
| 4a. Petiole grooved towards base; stipules intrapetiolar and fused | <i>Pipturus</i> |
| 4b. Petiole not grooved towards the base stipules deeply bifid | <i>Maoutia</i> |
| 2b. All leaves opposite | |
| 5a. Branch tips zigzagging; interpetiolar ridge present; opposing leaves of equal size; leaf base oblique | <i>Cypholophus</i> |
| 5b. Branch tips not zigzagging; interpetiolar ridge lacking; opposing leaves of different size; leaf base symmetric | <i>Boehmeria</i> |



Fig. 462



Fig. 463



Fig. 461

Dendrocnide harveyi (Seem.) Chew

Fijian name: Salato

Rotuman name: 'aimamala, mamala

Height: 5-20m, with a light spreading crown.

Bark: Light grey, smooth, peeling off in thin scales.

Slash: Inner layer white, exposing white wood.

Leaves: Simple, alternate, petiolate; leaves up to 40 x 30cm, broadly ovate, margins finely serrate, sinuate, apex acute, base cordate; leaves with urticating (stinging) hair that cause a severe itch and pain on touch. Veins on the underside of young leaves purple or reddish.

Flowers: Unisexual, tree dioecious (male and female flowers on separate trees), green to pale green, small, axillary.

Fruits: Small (< 5cm), globose, white, thin-skinned, single-seeded.

Flowering & Fruiting: Throughout the year.

Habitat: Dense forest, forest margins, thickets and along creeks.

Altitude: Sea level to 1,150m.

Distribution: Recorded from Viti Levu, Vanua Levu, Taveuni, Kadavu, Ovalau, Vanuabalavu, Mago and Lakeba. Elsewhere in the Pacific occurring in Tonga, Niue and Samoa.

Uses: Roots of the tree are used in traditional herbal medicine.

Comments: The second indigenous species of the genus, *Dendrocnide vitiensis* (Seem.) Chew is differentiated by its narrower leaves (2-2.5 times as long as broad as compared to 1-1.5 times as long as broad in *D. harveyi*).

Diagnostic features: Leaves with serrated margins, provided with stinging hairs that cause severe pain. DO NOT TOUCH THE LEAVES! Leaves of juvenile plants with purple veins and purple petiole.

Fig. 461: Habit of *Dendrocnide harveyi*.

Fig. 462: Slash of the bark of *Dendrocnide harveyi*.

Fig. 463: Leaves and flowers of *Dendrocnide harveyi*.

VERBENACEAE (Teak family)

Worldwide: 91 genera; c. 1,900 spp., tropical and subtropical.

Fiji: 15 genera, 6 indigenous, some are now widespread weeds (fiddlewood, *Citharexylum spinosum*; lantana, *Lantana camara*; blue rat's tail, *Stachtarpheta uriticaefolia*; verbena, *Verbena bonariensis*).

Economic Importance: Timber, edible fruits, gums, tanning, flavourings, medicinal teas, ornamentals and mangroves (*Avicennia*).

Family Characteristics

Monoecious trees, shrubs, lianas and herbs. Young branches more or less quadrangular. Stipules lacking. Leaves opposite (usually decussate), simple or palmately or pinnately (not in Fijian species) compound, mostly entire and often hairy on the underside. Flowers bilaterally symmetrical, 5-merous, bisexual, in cymose (Fijian species), racemose or panicular inflorescences. Fruit a drupe (Fijian species), a cluster of nutlets or a valved capsule.

Indigenous Genera and Species

Clerodendron (**verevere**) 1 sp. (shrub)

Faradaya 5 spp., 4 endemic (climbers)

Gmelina (**rosawa**) 1 endemic sp., described

Premna (**yaro**) 2 spp., 1 endemic, described

Vitex (**dralakaka**) 1 sp.

Viticipremna (**bosawa**) 1 endemic sp.

Key To Indigenous Tree Genera

1a. Leaves simple

2a. Venation pinnate; conspicuous glands present at the leaf base

corolla usually 5-lobed

Gmelina

2b. Venation 3-veined. Glands at leaf base lacking

corolla usually 4-lobed

Premna

1b. Leaves palmately compound or trifoliate

3a. Leaves grey and hairy beneath, not glandular

Vitex

3b. Leaves green, glabrous and glandular beneath

Viticipremna

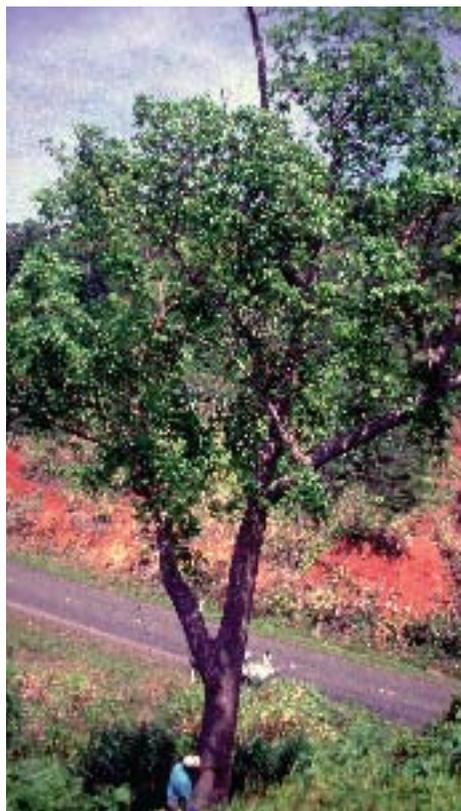


Fig. 464



Fig. 465



Fig. 466

Gmelina vitiensis (Seem.) A.C. Sm.

Fijian name: Rosawa

Height: To 27m tall. Trunk straight, up to 75cm in diameter.

Bark: Dark mud-grey, scaly with distinct longitudinal fissures.

Slash: Outer layer dark brown, over a yellow inner layer, covering white wood.

Leaves: Opposite, petiolate; leaves 7-15 x 4-10cm, ovate-lanceolate, margin entire, base rounded, apex obtuse. Leaves smooth above, granular beneath.

Flowers: Blue, in inflorescences of up to 60cm; flowers borne at the end of branches.

Fruits: Subglobose, c. 1cm in diameter, purple or pale purple, with a thin outer fleshy covering.

Flowering & Fruiting: More or less throughout the year.

Habitat: Dense forest.

Altitude: 90m to 900m

Distribution: Endemic to Fiji. So far recorded from Viti Levu, Vanua Levu, Kadavu and Gau.

Uses: A useful timber tree used for furniture.

Diagnostic features: Opposite leaves that are smooth above and granular beneath. Blue flowers. Pale purple fruits. Grey bark with longitudinal fissures.

Fig. 464: Habit of *Gmelina vitiensis*.

Fig. 465: Slash of the bark of *Gmelina vitiensis*.

Fig. 466: Opposite leaves of *Gmelina vitiensis*.



Fig. 467



Fig. 468



Fig. 469



Fig. 470

Premna protusa A.C.Sm. & S.P. Darwin

Fijian Names: Yaro, kaihawahawa (Nadroga), nici (Nadroga), tavotavo, tavovula (Beqa), waro (Lau), yararo (Waya, Vuda, Ba), yarovula (Bau)

Height: To 15m, with a light spreading crown, sometimes a shrub, to 60cm in diameter. (dbh)

Bark: Light grey, smooth.

Slash: Inner layer white, exposing white wood.

Leaves: Simple, opposite, glabrous; leaves up to 20x10cm, broadly ovate, margins sometimes finely toothed, apex acute, base acute or cordate.

Flowers: Many in dense panicles at the tips of branches, cream-coloured to yellow, bronze in cymose inflorescences. Corollas to 9mm long.

Fruits: Small (to 7mm), globose, black, 4-seeded, drupe.

Flowering & Fruiting: Throughout the year.

Habitat: Coastal vegetation, dry lowland forest, secondary and primary rainforest.

Altitude: Sea level to 900m,

Distribution: Endemic to Fiji and recorded from several islands.

Uses: Leaves and bark are medicinal, trunks used as posts, dried heartwood used to scent oil.

Comments: The second species of the genus in Fiji, *Premna serratifolia* L., is restricted to coastal areas and is differentiated by its smaller corollas (to 4mm long).

Diagnostic features: Leaves opposite. White flowers. Black fruits.

Fig. 467: Habit of *Premna protusa*. (GK)

Fig. 468: Slash of *Premna protusa*. (GK)

Fig. 469: Opposite leaves and inflorescence of *Premna protusa*. (GK)

Fig. 470: Flowers of *Premna protusa*. (GK)

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GLOSSARY OF BOTANICAL TERMS

Abaxial The side of the organ that faces away from the axis which bears it; eg. the lower surface of a leaf, opposite of adaxial.

Abscission Shedding of parts of the plant

Abscission Joint (of leaves) structure along which the leaf detaches when it is shed

Achene small, dry, one seeded, indehiscent fruit.

Actinomorphic (of flower) having several planes of symmetry

Acuminate (of apices) Tapering gradually to a sharp point

Acute (of apices) Pointed

Adaxial The side of an organ towards the axis in which it is inserted; e.g. the upper surface of a leaf; opposite of abaxial

Adnate United or grown together, refers to dissimilar parts

Adventitious roots Roots arising from the stem of the plant

Aerial roots Roots arising from the stems of the plant above the ground

Alternate An arrangement of leaves or other floral organs that is not opposite, but placed at different heights on the stem or axis

Anther The pollen-bearing part of the stamen

Apex (pl. apices) Tip of leaf, root or shoot.

Appressed lying flat and pressed closely against something

Aril An appendage or outgrowth of a seed, often gelatinous, spiny or coloured

Axil The angle which is formed at the attachment of the leaf to the stem

Axillary Organs in the axil such as buds, flowers or inflorescences

Beaked (of fruits) with a pointed extension that may be curved

Berry A fleshy, many-seeded, indehiscent fruit

Bilobed With 2 lobes (of leaf apex or petals)

Bipinnate Compound leaf, with each leaflet divided once again into leaflets

Bole Trunk or main stem of a tree, normally the part suitable for timber

Bisexual Having both the stamens and carpels on the same flowers

Bract Leafy appendage subtending a flower or an inflorescence in its axil

Bracteole Leafy appendage subtending an individual flower of an inflorescence; a secondary bract

Branchlet A small branch

Buoyant Able to float

Buttress An outward extension of the base of a trunk of a tree

Caducous Falling off early

Calyx The outer whorl of the flower (sepals)

Canopy A combination of branches and leaves, applied to the covering of a tree or the covering of a forest

Capsule (of fruit) Dry fruit resulting from several united carpels, splitting variously at maturity

Carpel A single unit of the pistil which consists of the ovary, style and stigma

Catkin A spike-like inflorescence, often pendulous

Cauliflory Production of flowers on the trunk and branches

Ciliate Provided with small hairs on the margins

Columnar Straight like a column

Compound (of leaves) Divided into 2 or more parts (leaflets)

Compressed Flattened lengthwise

Cordate Heart-shaped

Corymb racemose inflorescence with a flat-topped flower-cluster

Crenulate (of leaf margin) with rounded teeth

Crown Branches and leaves forming the top of the tree

Cupule, Cupular Cup-like

Cuspidate (of leaf apices) terminating in an abruptly pointed tip

Cylindrical Shaped like a cylinder

Cyme A branching inflorescence, the main axis terminating with a flower

Deciduous Not evergreen; leaves falling off seasonally

Decussate (of leaves) An opposite pairs at a node lying at right angles to the next

Dehiscent, dehiscence (of fruits) Splitting open at maturity to release seeds

Deltoid (of leaf shape) Triangular

Dentate (of leaf margin) Toothed

Digitate (of leaves) Arising from a common point at the end of the petiole

Dioecious With male and female flowers borne on separate plants; opp. monoecious

Distichous Arranged in two vertical rows

Drupe A fleshy fruit containing one or more seeds, each of which is surrounded by a stony layer

Elliptic(al) Shaped like an ellipse, narrow at both ends and widest in the middle

Ellipsoid Shaped like a rugby ball

Elongated Stretched lengthwise

Emarginate (of apices) Shallowly notched in the middle

Endemic (of species) Native to one region and not found native elsewhere

Entire (of leaf margin) Not divided or lobed

Epigynous (of flowers) When the position of the sepals, petals and stamens is above the ovary making the ovary inferior (below) to other floral parts; opp. hypogynous

Epiphyte (epiphytic) growing on top other plants (but no parasite)

Exudate Sap of tree

Exude (of sap of a tree) To flow out or bleed slowly

Falcate Sickle-shaped

Family A taxonomic unit of classification of plants comprising related genera

Fibrous Composed of, or including fibres

Fissure (of tree bark) Deep or shallow cracks on the surface of bark

Follicle A dry fruit derived from a single carpel and which splits along one side

Fragrant With a pleasant smell

Fruit The ripened ovary of a seed plant with all its contents

Gall Monstrous growth of part of the plant as a result of a parasitic attack by an insect

Genus (sing.) genera (pl.) A taxonomic unit of classification of plants containing related species

Glabrous Without hairs

Gland Special secreting cells, may be stalked or sessile

Glandular Provided with glands

Globose Spherical, like a globe

Gynoecium Female sex organs

Habit The characteristic mode of growth of a plant; the form and shape of a plant

Hybrid An individual produced from a cross between two different species

Hypanthium A cup-like structure enclosing the ovary, derived from the fusion of the receptacle and the outer floral parts

Hypogynous (of flowers) When the position of the sepals, petals and stamens is below the ovary making the ovary superior (above) to other floral parts; opp. epigynous

Imbricate (of flower parts) Overlapping

Imparipinnate A pinnately compound leaf with an unpaired terminal leaflet

Indehiscent (of fruits) Not opening at maturity to release seeds

Indumentum A covering, usually of hairs

Inflorescence Arrangement of flowers on the flowering stalk

Internode Portion of the branch between two nodes

Interpetiolar ridge A crest formed at the node of a stem by opposing leaf stipules

Interpetiolar scar A linear scar on branches on the joining the petioles of opposing leaves that is formed by abscising stipule(s)

Intramarginal vein (of leaves) A vein running parallel to the leaf margin

Juvenile Young, immature, not adult

Ladder-like venation (= scalariform venation) tertiary veins arising perpendicular to secondary veins, resulting in a ladder-like appearance

Lanceolate (of leaf) lance-shaped, broadest in the middle and tapering at both ends

Lateral On or at the side or margin

Latex Sap of a tree

Leaflet Single leafy part, or the smallest component of a compound leaf

Lenticels Corky spots on the bark of trees that allow gas exchange

Liana, liane A woody climber, supported by other vegetation

Ligule (of leaves in flowering plants) a distal projection from the base of the petiole, e.g. in grasses

Linear Long and narrow, with parallel sides

Littoral Growing along the sea or lake shore

Longitudinal Lengthwise

Margin (of leaves) The outer edge of the leaf blade

Midrib The middle and major vein of a leaf

Monocious Male and female flowers borne on the same plant

Monotypic A genus of family containing a single species

Mucro (of leaf) pointed, needle-like tip

Mucronate (of leaf apex) Leaf apex narrowing to a sharp point in the middle or with a soft or hard spine in the middle

Muricate

Nocturnal (of flowers) Open at night and close during the day

Node (of branch) Location at which leaves are attached

Nut (of fruit) A dry, usually one-seeded, indehiscent fruit with a woody fruit wall

Obanceolate (of leaf) Broadest towards the apex, tapering towards the base

Oblique (of leaf-base) Not straight or symmetrical, unequally sided

Oblong Longer than broad with parallel margins

Obovate (of leaf) Having the broadest part above the middle, opposite of ovate

Obtuse (of apices) Rounded

Opposite (of leaves) Borne in pairs at each node on opposite sides of the stem

Orbicular Circular in outline

Ovary Ovule bearing part of the gynoecium; superior – borne above the attachment of stamens and perianth; inferior – borne below the attachment of stamens and perianth

Ovate (of leaf) Egg-shaped in outline, with the broadest part below the middle, opp. obovate

Palmate (of leaves and venation) leaflets or leaf segments or veins arising from a single point on an axis

Panicle A branched inflorescence

Papilionaceous Butterfly-like (said of flowers of some of the pea-family)

Parasite A plant which lives and is dependent for its nutrition on another plant.

Paripinnate A pinnately compound leaf with an equal number of leaflets on either side of the axis, without the terminal leaflet

- Pedicel** Stalk of a single flower
- Peduncle** The stalk of an inflorescence
- Peltate** leaf blade with the petiole attached inside the leaf margin rather at the edge
- Pendulous** Hanging
- Perianth** Collective term for the sepals and corolla, or for the petals
- Persistent** Not falling off, remaining attached
- Petiolar scar** The mark left on the stem after abscission of the leaf
- Petals** Leaf-like parts of a flower surrounding the gynoecium
- Petiolate** (of leaves) With a leaf stalk
- Petiole** The stalk of a leaf attaching it to the stem
- Phyllode, Phylloclade** A modified stem, in form and function like a leaf
- Pilose** With long hairs
- Pinnate** (of compound leaves, also for venation) With leaflets (or veins) on either side of the leaf stalk (or midrib)
- Pioneer species** Fast growing species which colonise newly disturbed sites such as forest clearings
- Pitted** With little depressions or pits
- Pod** A dry fruit with usually more than a single seed; term used for the fruit of a legume
- Primary forest** A forest that has not previously been disturbed
- Primary species** Species, normally slow growing, which dominate an undisturbed forest
- Pubescent** Covered with soft hairs
-
- Raceme** An inflorescence of stalked flowers with the youngest at the top
- Rachis** The axis of a compound leaf or inflorescence
- Rachis** The axis of a compound leaf or inflorescence
- Raphid** Needle-shaped crystal
- Reflexed** Abruptly curved or turned backwards
- Resin** A sticky substance secreted by special cells in conifers
- Reticulate** Netted
- Retuse** rounded or obtuse apex with central shallow notch
-
- Samara** A dry indehiscent fruit with the fruit wall extended to form a flattened wing
- Scalariform venation** A pinnate venation where the lateral veins are joined by transverse intralateral veins
- Scandent** Climbing, but without tendrils
- Schizocarp** Fruit which splits at maturity into 1-seeded portions
- Secondary forest** A forest which has been disturbed through logging or clearing
- Semi-parasite** Plant living on another plant and deriving its nutrition from it, but not entirely dependent on it

Serrate (of leaf margin) Sharply-toothed

Sessile (of leaves, flowers, fruits) Without stalk

Sheathing (of leaves) With the base of leaf or petiole enveloping or enclosing the stem

Simple (of leaves) Not divided into leaflets

Spicate Like a spike

Spike A racemose inflorescence, with the flowers sessile along a common unbranched axis

Stamen The male sex organ of a plant consisting of the anther, connective and filament

Stellate Star-shaped

Sterile Not fertile, not able to reproduce sexually

Stigma The apical part of the style which receives the pollen

Stipules Paired, often leaf-like appendages, at the base of leaf (may be variously modified as tendrils, spines etc.)

Sub- Prefix meaning slightly less or not quite or somewhat

Succulent Fleshy and juicy

Talassiga Open, degraded land covered with grasses, ferns or reeds (occurring in the drier parts of Fiji), often burned.

Tendril Part or all of a stem, leaf or petiole modified to form a thin appendage with an ability to coil around objects, forming a climbing part of the plant

Terminal Situated at the apex

Terminal bud Undeveloped, condensed shoot at the apex of a stem

Terminalia-branching A branching pattern that is typical of the genus *Terminalia* with smaller branches curving upward from bigger branches

Thyrse Mixed inflorescence with the main axis a raceme and secondary axes in the form of cymes

Trifoliate Consisting of three leaflets

Umbel An inflorescence with pedicels arising from a common point, usually umbrella-shaped

Understorey A layer of small trees or shrubs in a tropical forest

Undulate (of leaf or petal margins) Wavy

Unisexual (of flowers) Of one sex, either with stamens or carpels

Valvate (of flowers) parts of the corolla or calyx meet exactly without overlapping

Variety A taxonomic unit within a species

Vein The visible conducting or strengthening tissue of a leaf

Velvet(y) hairy With smooth and soft hairs, like velvet

Venation The arrangement of veins of a leaf

INDEX OF FAMILIES, SPECIES AND VERNACULAR NAMES

<i>Abrus</i>	153	<i>Amaroria</i>	293
<i>Acacia mathuataensis</i>	203	<i>Amaroria soulameoides</i>	295
<i>Acacia</i>	201	amunu	235,237
<i>Acacia richii</i>	203	ANACARDIACEAE	24
<i>Acacia simplex</i>	203	<i>Annona glabra</i>	34
<i>Acalypha</i>	132	ANNONACEAE	34
<i>Acmopyle</i>	235	<i>Antidesma</i>	133,135
<i>Acsmithia</i>	113	<i>Antirhea</i>	263
<i>Adenanthera pavonia</i>	200	APOCYNACEAE	40
<i>Agathis macrophylla</i>	53,55	ARALIACEAE	48
<i>Agathis vitiensis</i>	55	ARAUCARIACEAE	53
<i>Aglai</i> a	189	<i>Argusia</i>	61
<i>Aglai</i> a <i>amplexicaulis</i>	191	<i>Artocarpus altilis</i>	208
<i>Aglai</i> a <i>archboldiana</i>	191	<i>Artocarpus heterophyllus</i>	208
<i>Aglai</i> a <i>basiphylla</i>	191	<i>Arytera</i>	273
<i>Aglai</i> a <i>elegans</i>	191	asi	271
<i>Aglai</i> a <i>evanensis</i>	191	<i>Atuna</i>	89
<i>Aglai</i> a <i>fragilis</i>	191	<i>Atuna elliptica</i>	91
<i>Aglai</i> a <i>gracilis</i>	191	<i>Atuna racemosa</i>	91
<i>Aglai</i> a <i>greenwoodii</i>	191	Australian umbrella tree	48,51
<i>Aglai</i> a <i>parksii</i>	191	<i>Austrobuxus</i>	19,133,135
<i>Aglai</i> a <i>saltatorum</i>	191	<i>Avicennia</i>	318
<i>Aglai</i> a <i>unifolia</i>	191	avocado	170
<i>Aglai</i> a <i>ventosa</i>	191	baba	127
<i>Aglai</i> a <i>vitiensis</i>	191	<i>Baccaurea</i>	133,134
<i>Airosperma</i>	263	<i>Badusa</i>	263
<i>Albizia</i>	200	baka	209,211
<i>Albizia lebbek</i>	200	baka ni Viti	211
<i>Alectryon</i>	273	<i>Banksia</i>	244
<i>Aleurites</i>	133,134	<i>Barringtonia</i>	179
<i>Aleurites moluccana</i>	137	<i>Barringtonia asiatica</i>	181
<i>Allamanda</i>	40	<i>Barringtonia edulis</i>	183
<i>Allophylus</i>	273	<i>Barringtonia racemosa</i>	181
<i>Alphitonia</i>	249	<i>Barringtonia seaturae</i>	183
<i>Alphitonia franguloides</i>	251	bau	27,47,87,163,280,281,283,285,289,323
<i>Alphitonia zizyphoides</i>	251	Bau family	280
<i>Alstonia</i>	41	<i>Bauhinia</i>	70
<i>Alstonia costata</i>	43	bauloa	281,283
<i>Alstonia montana</i>	43	baumeirakaka	285
<i>Alstonia pacifica</i>	43	baumika.....	281,283
<i>Alstonia vitiensis</i>	43	bausa	283
<i>Alstonia vitiensis forma glabra</i>	43	bausauwalu	285
<i>Alstonia vitiensis forma vitiensis</i>	43	bausomi	193
<i>Alyxia</i>	41	bauvudi	9, 281, 285, 287,289
<i>Amaracarpus</i>	263	bauwaki	283
		Bean family	152
		<i>Berrya</i>	311
		<i>Bertholletia excelsa</i>	178
		beta	315
		<i>Bikkia</i>	263
		<i>Bischofia</i>	18,133,134

<i>Bischofia javanica</i>	139	<i>Cananga odorata</i>	34,37
blue rat's tail	318	<i>Canarium</i>	65
bo	185, 267	<i>Canarium harveyi</i>	67
boiboida	185	<i>Canarium indicum</i>	67
<i>Boehmeria</i>	315	<i>Canarium vanikoroense</i>	67
<i>Boehmeria nivea</i>	314	<i>Canarium vitiense</i>	67
BORAGINACEAE	60	<i>Canavalia</i>	153
bore ni wai	263	candle nut tree	137
bosawa	319	<i>Cardiospermum</i>	273
<i>Boswellia sacra</i>	64	<i>Carruthersia</i>	41
<i>Boswellia carteri</i>	64	cashew	24
bovo	263	cassava	132
brazil nut	178	<i>Cassia fistula</i>	70
breadfruit	208	<i>Cassytha</i>	171
<i>Broussonetia papyrifera</i>	208	<i>Casuarina</i>	83
<i>Bruguiera</i>	254,255	CASUARINACEAE	82
<i>Bruguiera gymnorrhiza</i>	257	<i>Casuarina equisetifolia</i>	85
bua	187,263,265	cau	85
bua dina	187	caukuro	87
bua ni veikau	187	cauyalewa	85
bua ni Viti	185,187	cavucavu	191
buabua	184,185,187,263	ceke	263
<i>Buchanania</i>	25	<i>Cerbera</i>	41
<i>Buchnanania vitiense</i>	27	<i>Cerbera manghas</i>	45
<i>Buchnanania attenuate</i>	27	<i>Ceriops</i>	254
<i>Buddleja</i>	184	cevua	189,199
buka	283	<i>Chamaesyce</i>	133,134
bulei	43, 263	CHRYSOBALANACEAE	88
bullock's heart	34	cibicibi	71,73,79
bulu	103,283	<i>Cinchona</i>	262
bulu m.	105	<i>Cinnamomum</i>	170,171
bulubau	289	cinnamon	170
buluwai	95,103,105	<i>Citharexylum spinosum</i>	381
Burckella	281,283	<i>Claoxylon</i>	133,134
Burckella fijiensis	283	<i>Cleidion</i>	133,134
Burckella parviflora	283	<i>Cleistanthus</i>	135
Burckella richii	283	<i>Cleistocalyx</i>	10,221,227
Burckella thurstonii	283	<i>Cleistocalyx decussatus</i>	227
BURSERACEAE	64	<i>Cleistocalyx ellipticus</i>	227
butterfly tree	70	<i>Cleistocalyx seemannii</i>	227
<i>Caesalpinia</i>	71	<i>Clerodendron</i>	319
CAESALPINIACEAE	71	CLUSIACEAE	94
<i>Calophyllum</i>	95	cocoa	296
<i>Calophyllum cerasiferum</i>	99	<i>Codiaeum</i>	133,134
<i>Calophyllum inophyllum</i>	97	<i>Coffea</i>	262
<i>Calophyllum leptocladum</i>	99	coffee	262
<i>Calophyllum leucocarpum</i>	99	Coffee family	262
<i>Calophyllum vitiense</i>	101	cola	296
Calycosia	263	<i>Colubrina</i>	249
camphor	170	COMBRETACEAE	106
<i>Cananga</i>	35	<i>Commersonia</i>	297

<i>Commersonia bartramia</i>	299	<i>Decaspermum cryanthum</i>	223
<i>Commiphora</i>	64	<i>Decaspermum vitiense</i>	223
<i>Coprosma</i>	263	<i>Decussocarpus vitiensis</i>	243
<i>Corchorus</i>	310,311	<i>Degeneria</i>	117
<i>Cordia</i>	61	<i>Degeneria roseiflora</i>	119
<i>Cordia subcordata</i>	63	<i>Degeneria vitiensis</i>	119
corikula	131	DEGENERIACEAE	116
<i>Cossignia</i>	273	<i>Delonix regia</i>	70
<i>Crossostylis</i>	255	<i>Dendrocnide</i>	315
<i>Crossostylis harveyii</i>	259	<i>Dendrocnide harveyi</i>	317
<i>Crossostylis parksii</i>	259	<i>Dendrocnide vitiense</i>	317
<i>Crossostylis pedunculata</i>	259	<i>Dendrolobium</i>	153
<i>Crossostylis richii</i>	259	denimana	153
<i>Crossostylis seemannii</i>	259	<i>Derris</i>	153
<i>Croton</i>	132, 133, 134	dhal	152
<i>Cryptocarya</i>	171	<i>Dillenia</i>	21, 121
CUNONIACEAE	112	<i>Dillenia biflora</i>	1, 123
<i>Cupaniopsis</i>	273	DILLENIACEAE	120
custard apple	34	dilo	95, 97
<i>Cyathocalyx</i>	35	<i>Dioclea</i>	153
<i>Cyclophyllum</i>	263	<i>Diospyros</i>	124, 125
<i>Cynometra</i>	71	<i>Diospyros elliptica</i>	127
<i>Cynometra falcata</i>	73	<i>Diospyros gillespiei</i>	127
<i>Cynometra insularis</i>	73	<i>Diospyros major</i>	127
<i>Cypholophus</i>	315	<i>Diospyros samoensis</i>	127
dabi	189	<i>Dodonaea</i>	273
<i>Dacrycarpus</i>	235	dogo.....	255, 257
<i>Dacrycarpus imbricatus</i>	237	dogo kana	257
<i>Dacrydium</i>	235	doi	249, 251
<i>Dacrydium nausoriense</i>	239	doi family	248
<i>Dacrydium nidulum</i>	239	<i>Dolicholobium</i>	263
dakua	6, 9, 53, 55	<i>Dracontomelon</i>	25
dakua makadre	53, 55	dragasele	315
dakua salusalu	235, 243	draidrai	315
<i>Dalbergia</i>	153	drala	153, 155
dalovoci	165, 169	drala kaka	319
damabi	173	drausasa	273
damanu	27, 95, 99, 101	drega	43, 263
damanu dilodilo	99	drivi	131
Damanu drauililai	99	<i>Drypetes</i>	133, 134
Damanu family	94	dulewa	35, 39
Damanu ni yaqaqa	25, 27	duva	153, 233
danidani	48, 49	duva ni veikau	231, 233
date plum	124	Duva ni veikau family	230
davo	133, 149	duvula	263, 265
dawa	273, 279	<i>Dysoxylum</i>	189, 193
Dawa family	272	<i>Dysoxylum aliquantulum</i>	193
dawa moli	279	<i>Dysoxylum gillespieanum</i>	193
dawa sere	279	<i>Dysoxylum hornei</i>	193
dawadawa	273	<i>Dysoxylum lenticellare</i>	193
<i>Decaspermum</i>	221	<i>Dysoxylum myriandrum</i>	193

Dysoxylum quercifolium	195	false sandalwood	199
<i>Dysoxylum richii</i>	193,195	<i>Faradaya</i>	319
<i>Dysoxylum seemannii</i>	193	<i>Ficus</i>	209
<i>Dysoxylum tenuiflorum</i>	195	Fig family	208
EBENACEAE	124	<i>Ficus bambusifolia</i>	213
ebony	124	<i>Ficus obliqua</i>	211
Ebony family	124	<i>Ficus pritchardii</i>	213
ELAEOCARPACEAE	128	<i>Ficus prolixa</i>	211
<i>Elaeocarpus</i>	129	<i>Ficus theophrastoides</i>	213
<i>Elaeocarpus casinoides</i>	131	<i>Ficus tinctoria</i>	211
<i>Elaeocarpus chelonimorphus</i>	131	<i>Ficus smithii</i>	213
<i>Elaeocarpus graeffei</i>	131	<i>Ficus vitiensis</i>	213
<i>Elaeocarpus grandis</i>	131	fiddlewood	318
<i>Elaeocarpus kambi</i>	131	Fiji Christmas tree	223
<i>Elaeocarpus lepidus</i>	131	Fiji nutmeg	217
<i>Elaeocarpus pyriformis</i>	131	Fijian sandalwood	271
<i>Elaeocarpus storckii</i>	131	<i>Firmiana</i>	297
<i>Elaeocarpus subcapitatus</i>	131	flame tree	9,59,70
<i>Elaeocarpus vitiensis</i>	131	frangipani	40
<i>Elatostema</i>	315	frankincense	64
<i>Elattostachys</i>	273	gadoo	133,149
<i>Elattostachys falcata</i>	275	gagali	241
<i>Elattostachys venosus</i>	275	<i>Garcinia</i>	95
<i>Emmenosperma</i>	249	<i>Garcinia adiantha</i>	103
<i>Emmenosperma micropetalum</i>	253	<i>Garcinia myrtifolia</i>	103
<i>Endiandra</i>	171	<i>Garcinia pseudoguttifera</i>	103,105
<i>Endiandra elaeocarpa</i>	173	<i>Garcinia sessilis</i>	103
<i>Endiandra gillespiei</i>	175	<i>Garcinia vitiensis</i>	103
<i>Endiandra luteola</i>	173	<i>Gardenia</i>	263
<i>Endiandra monticola</i>	175	<i>Geissois</i>	113
<i>Endiandra trichotosa</i>	173	<i>Geissois imthurnii</i>	115
<i>Endiandra tryphera</i>	175	<i>Geissois stipularis</i>	115
<i>Endospermum</i>	133,134	<i>Geissois superba</i>	115
<i>Endospermum macrophyllum</i>	141	<i>Geissois ternata</i>	115
<i>Endospermum robbianum</i>	141	<i>Geniostoma</i>	185
<i>Entada</i>	201	<i>Geophila</i>	263
<i>Ervatamia</i>	41	<i>Gillespiea</i>	263
<i>Erythrina</i>	153	<i>Glochidion</i>	133
<i>Erythrina variegata</i>	155	<i>Glochidion amentuligerum</i>	145
<i>Eucalyptus</i>	220	<i>Glochidion anfractuosum</i>	143
<i>Eugenia</i>	221	<i>Glochidion atalotrichum</i>	143
<i>Euphoria</i>	133,134	<i>Glochidion atrovirens</i>	143
EUPHORBIACEAE	132	<i>Glochidion bracteatum</i>	143
evuevu	165,169	<i>Glochidion brunnescens</i>	143
Evuevu family	164	<i>Glochidion calciphilum</i>	143
<i>Excoecaria</i>	133,134	<i>Glochidion collinum</i>	143
<i>Exocarpus</i>	269	<i>Glochidion concolor</i>	143
FABACEAE	152	<i>Glochidion cordatum</i>	143
<i>Fagraea</i>	185	<i>Glochidion euryoides</i>	143
<i>Fagraea berteriana</i>	187	<i>Glochidion gillespiei</i>	145
<i>Fagraea gracilipes</i>	187	<i>Glochidion inusitatum</i>	143

<i>Glochidion melvilliorum</i>	143	jackfruit	208
<i>Glochidion multifolium</i>	145	Java cedar	139
<i>Glochidion podocarpum</i>	143	jute	310
<i>Glochidion seemannii</i>	143	kabi	129,131
<i>Glochidion vitiense</i>	143,145	Kabi family	128
<i>Glycine</i>	153	kalabuci	133
<i>Gmelina</i>	319	kalinimacou	171
<i>Gmelina vitiensis</i>	321	<i>Kandelia</i>	254
GNETACEAE	160	karawa	119
<i>Gnetum</i>	161	katakata	113
<i>Gnetum gnemon</i>	163	kau ni yalewa	153
golden shower	70	kau vulavula	141
<i>Gonystylus</i>	307	kauceuti	244,247
<i>Gonystylus punctatus</i>	309	Kauceuti family	244
<i>Gouania</i>	249	kaudamu	9,215,217
<i>Grevillea</i>	244	Kaudamu family	214
<i>Grewia</i>	311	kaukaro	25,31
guava	220	kauloa	125,127
<i>Guettarda</i>	263	kaulolo	315
<i>Guioa</i>	273	kaunicina	65,67,69
gunugunu	87	kaunigai	65,67,69
GUTTIFERAE	94	Kaunigai family	64
<i>Gymnostoma</i>	83	Kauri family	52
<i>Gynostoma vitiense</i>	87	kausola	237
<i>Gynochtodes</i>	263	kautabua	235,237
<i>Gyrocarpus</i>	165	kautoa	189,191
<i>Gyrocarpus americanus</i>	167	kauvula	133,141
<i>Haplolobus</i>	65	Kauvula family	132
<i>Haplolobus floribundus</i> subsp. <i>salomonensis</i>	69	kavika	220
<i>Harpullia</i>	273	kedra ivi na yalewa kalou	297,301
<i>Hedstroemia</i>	263	kesa	131
<i>Hedyotis</i>	263	King mahogany	189
<i>Heritiera</i>	297	<i>Kingiodendron</i>	71
<i>Heritiera littoralis</i>	301	<i>Kingiodendron platycarpum</i>	77
<i>Heritiera ornithocephala</i>	301	<i>Kleinhovia</i>	297
<i>Hernandia</i>	165	<i>Koelreuteria</i>	273
<i>Hernandia moerenhoutiana</i> subsp. <i>campanulata</i>	169	<i>Koelreuteria elegans</i>	277
<i>Hernandia nymphaeifolia</i>	169	koka	133,139
<i>Hernandia olivaceae</i>	169	kola nuts	296
HERNANDIACEAE	164	kolovesi	41
<i>Hibbertia</i>	121	kuasi	235,241
<i>Homalanthus</i>	133	kulukulu	123
<i>Homalanthus nutans</i>	147	kuluva	1,121,123
<i>Hydnophytum</i>	263	kuluva family	120
<i>Inocarpus</i>	153	kura	262
<i>Inocarpus fagifer</i>	157	Lagakali	189,191
<i>Intsia</i>	71	Lantana	318
<i>Intsia bijuga</i>	75	Lantana camara	318
iron wood	187	Laubu	95,103
ivi	153,157	Lauci	133,137
<i>Ixora</i>	262,263	LAURACEAE	170

Laurel family	170	mako	169,310,311
LECYTHIDACEAE	178	Mako family	310
Lecythis	178	makoloa	169,313
lekutu	141	makosoi	35,37
lera	200	makota	195
Leucaena leucocephala	200	makusui	37
Leucosyke	315	mala	91
lidi	171,177	Malaisia	209
lidiyaqo	189	malamala	189,193
Linden family	310	male	9,53
Lindenia	263	Mallotus	133,134
Litsea	119,171,177	Mallotus tilifolius	151
Litsea magnifolia	119,177	mama	133,149
Litsea mellifera	177	mamakara	297
Litsea palmatinervia	177	Mammea	95
Litsea pickeringii	177	manawi	25,29,273,277
Litsea seemannii	177	mango	24
Litsea vitiensis	177	Mango family	24
loaloa	203	Mangrove family	254
LOGANIACEAE	184	mangroves	8,63,109,157,181,187,195,199,255
lolo	213,203,209	Manihot	132
lolo tagane	213	Manilkara	281
loselose ni wai	213	Maniltoa	71
losilosi	209,213	Maniltoa floribunda	79
Lumnitzera	107	Maniltoa grandiflora	79
Lumnitzera littorea	109	Maniltoa minor	79
lutulutu	149	Maniltoa vestita	79
ma	297,303	manui	25,29
maba	127	Maoutia	315
macademia nuts	244	maqo ni veikau	27
Macaranga	133,134	marasa	71,81,273,275
Macaranga caesariata	149	masa	275
Macaranga graeffeana	149	masi	208
Macaranga harveyana	149	masiratu	117,119
Macaranga magna	149	Masiratu family	116
Macaranga marikoensis	149	Mastixiodendron	263
Macaranga membranacea	149	Mastixiodendron flavidum	265
Macaranga secunda	149	Mastixiodendron pilosum	265
Macaranga seemannii	149	Mastixiodendron robustum	265
Macaranga vitiensis	149	Matadra	315
mace	214	matiavi	307
macou	171	mavota	307,309
Macropsyчанthus	153	mavu	133,149
madora	167	MELIACEAE	188
Magnifera indica	24	Melochia	297
mahogany.....	188,197	Melodinus	41
Mahogany family	188	Meryta	49
makadre	55	Messerschmidia	61
makaloa	169	Metrosideros	221
makita	89,91	Metrosideros collina	225
Makita family	88	Metersideros collina var. fruticosa	225

<i>Meterosideros collina</i> var. <i>villosa</i>	225	<i>Palaquium</i>	281,285
<i>Meterosideros ochranthus</i>	225	<i>Palaquium fidjense</i>	285
Microcos	311	<i>Palaquium hornei</i>	285
midra	133	<i>Palaquium porphyreum</i>	285,287
midri	131	<i>Palaquium vitilevuensis</i>	285,289
Milletia	153,159	<i>Panax quinquefolia</i>	48
<i>Millettia pinnata</i>	159	paper mulberry tree	208
<i>Mimosa pudica</i>	200	<i>Parinari</i>	89
MIMOSACEAE	200	<i>Parinari insularum</i>	93
mocelolo	35	<i>Parkia</i>	201
moivi	71,77	<i>Parsonsia</i>	41
moivi levu	79	<i>Pelagodendron</i>	263
molau	133,143,145	<i>Persea americana</i>	170
molau tagane	145	persimmon	124
MORACEAE	208	<i>Phaleria</i>	307
<i>Morinda</i>	263	<i>Phyllanthus</i>	133,135
<i>Morinda citrifolia</i>	262	<i>Piliocalyx</i>	221
<i>Morus</i>	208	<i>Pimia</i>	297
<i>Mucuna</i>	153	<i>Pipturus</i>	315
mulberry	208	pistachio	24
<i>Mussaenda</i>	262,263	<i>Pittosporum</i>	231
<i>Myristica</i>	215,217	PITTOSPORACEAE	230
<i>Myristica castaneifolia</i>	217,219	<i>Pittosporum arborescens</i>	233
<i>Myristica chartacea</i>	217	<i>Pittosporum brackenridgei</i>	233
<i>Myristica fragrans</i>	214	<i>Pittosporum oligodontum</i>	233
<i>Myristica gillespieana</i>	217,219	<i>Pittosporum pickeringii</i>	233
<i>Myristica grandifolia</i>	217,219	<i>Pittosporum rhytidocarpum</i>	233
<i>Myristica macrantha</i>	217,219	<i>Planchonella</i>	281
MYRISTICACEAE	214	<i>Planchonella vitiensis</i>	291
myrrh	64	<i>Pleiogynium</i>	25
MYRTACEAE	220	<i>Pleiogynium hapalum</i>	29
namo	73,77,79	<i>Pleiogynium timoriense</i>	29
nawanawa	61,63	<i>Plerandra</i>	49,51
Nawanawa family	60	<i>Plerandra pickeringii</i>	51
<i>Neisosperma</i>	41	PODOCARPACEAE	234
<i>Neonauclea</i>	263	<i>Podocarpus</i>	235
<i>Neonauclea forsteri</i>	267	<i>Podocarpus affinis</i>	241
<i>Nephelium</i>	272	<i>Podocarpus neriiifolius</i>	241
<i>Neuburgia</i>	185	poisonwood	31
nokonoko	83,85	<i>Polyalthia</i>	35
Nokonoko family	82	<i>Polyscias</i>	48
nuu	209,213	<i>Pometia</i>	273
nuqa	223	<i>Pometia pinnate</i>	279
nuqanuqa	221,223	<i>Pongamia</i>	159
nutmeg	214	<i>Pongamia pinnata</i>	159
<i>Ochrosia</i>	41	<i>Pouteria</i>	281,291
<i>Ophiorrhiza</i>	263	<i>Pouteria brevipes</i>	291
<i>Ormocarpum</i>	153	<i>Pouteria garberi</i>	291
Pacific kauri	55	<i>Pouteria grayana</i>	291
<i>Pagiantha</i>	41	<i>Pouteria membranacea</i>	291
<i>Pagiantha thurstonii</i>	47	<i>Pouteria pyrulifera</i>	291

<i>Pouteria sessilis</i>	291	sa	89,93
<i>Pouteria smithii</i>	291	sa family	88
<i>Pouteria umbonata</i>	291	sacasaca	133
<i>Pouteria vitiensis</i>	291	sacau	281,285
<i>Porterandia</i>	263	sagale	107,109
<i>Premna</i>	319	sagali	109
<i>Premna protrusa</i>	323	salato	315,317
<i>Premna serratifolia</i>	323	Salato family	314
<i>Procris</i>	315	salusalu	243
PROTEACEAE	244	sama	297,299
<i>Psidium guajava</i>	220	samadina	299
<i>Psychoria</i>	263	<i>Samanea saman</i>	70,200,201,205
<i>Psydrax</i>	263	Sandalwood family	268
<i>Pterocymbium</i>	297	SANTALACEAE	268
<i>Pterocymbium oceanicum</i>	303	<i>Santalum</i>	268,269
<i>Pullea</i>	113	<i>Santalum yasi</i>	269,271
qaiqai	131	SAPINDACEAE	272
qalaka	281	<i>Sapindus</i>	273
qalo	145	SAPOTACEAE	280
qaro	85	sapucaia nuts	178
qeleqai	171,173	sarosaro	281,291
qereqere	137	sasawira	189,195
qetata	133,151	sawira	195
qumu	201,203	<i>Schefflera</i>	49,51
rain tree	200	<i>Schefflera actionophylla</i>	48,51
ramie fibre	314	<i>Schleinitzia</i>	201
<i>Readea</i>	263	sea	93
red bead tree	200	seke	263
rere	315	sekoula	70
<i>Retrophyllum</i>	235	sekula	225
<i>Retrophyllum vitiense</i>	243	selavo	251
rewa	41,45,261	<i>Semecarpus</i>	25
rambutan	272	<i>Semecarpus vitiensis</i>	31
RHAMNACEAE	248	<i>Senna</i>	71
<i>Rhamnella</i>	249	sensitive grass	200
<i>Rhizophora</i>	254,255	seremaia	34
<i>Rhizophora mangle</i>	261	<i>Serianthes</i>	201
<i>Rhizophora samoensis</i>	261	<i>Serianthes melanesica</i>	205,207
<i>Rhizophora stylosa</i>	261	<i>Serianthes melanesica</i> var. <i>meeboldii</i>	207
<i>Rhizophora x selala</i>	261	<i>Serianthes melanesica</i> var. <i>melanesica</i>	207
RHIZOPHORACEAE	254	<i>Serianthes vitiensis</i>	207
<i>Rhus</i>	25	<i>Sesbania</i>	153
<i>Richella</i>	35	sevua	189,199
<i>Ricinus</i>	132	sikau	163
roga	315	sikeci	133,137
rogi	301	SIMAROUBACEAE	292
roro ni bebe	61	sinu gaga	133
rosarosa	297,301	siti	311
Rosarosa family	296	sivia	131
rosawa	319,321	<i>Smythea</i>	249
RUBIACEAE	262	sole	49,51

Sole family	48	tarawau kei soqe	195
soni	71	<i>Tarena</i>	263
<i>Sophora</i>	153	tatagia	201,203
sorua	41,43	tautau	147
soso ni ura	263	tavola	107,111
soursop	34	tavola ni veikau	111
Soursop family	34	tavotavo	323
<i>Spathodea campanulata</i>	57,59	tawa	279
<i>Spiraeanthem</i>	113	Teak family	318
<i>Spondias</i>	25	<i>Tephrosia</i>	153
<i>Spondias dulcis</i>	33	<i>Terminalia</i>	107,111
<i>Squamellaria</i>	263	<i>Terminalia capitanea</i>	111
<i>Stachtarpheta urticaefolia</i>	318	<i>Terminalia catappa</i>	111
<i>Sterculia</i>	18,22,297	<i>Terminalia crebrifolia</i>	111
<i>Sterculia dasyphylla</i>	305	<i>Terminalia litoralis</i>	111
<i>Sterculia vitiensis</i>	305	<i>Terminalia luteola</i>	111
STERCULIACEAE	296	<i>Terminalia psilantha</i>	111
<i>Stilliga</i>	133,134	<i>Terminalia pterocarpa</i>	111
<i>Storckiella</i>	71	<i>Terminalia simulans</i>	111
<i>Storckiella vitiensis</i>	81,275	<i>Terminalia strigillosa</i>	111
strangler fig	211	<i>Terminalia vitiensis</i>	111
<i>Strebulus</i>	209	<i>Theobroma cacao</i>	296
<i>Strongylodon</i>	153	THYMELAEACEAE	306
<i>Strychnos</i>	184	tiale	263
sukau	9,161,163	TILIACEAE	310
Sukau family	160	<i>Timonius</i>	263
<i>Sukunia</i>	263	tiri	255,257
<i>Swietenia</i>	188	tiri dina	261
<i>Swietenia macrophlla</i>	189,197	tiri tabua	261
<i>Syzygium</i>	220,221,229	tiri vanua	255,259
<i>Syzygium decussatum</i>	1,227	tiri wai	261
<i>Syzygium effusum</i>	229	tivi	21,107,111
<i>Syzygium gillespiei</i>	229	Tivi family	106
<i>Syzygium fijjense</i>	229	tivi loa	111
<i>Syzygium malaccense</i>	220	tivi ni veikau	111
<i>Syzygium myrtilloides</i>	227	togo	139,257
<i>Syzygium nidie</i>	229	togotogo	139
<i>Syzygium purpureum</i>	229	tolo	29
<i>Syzygium rubescens</i> var. <i>rubescens</i>	229	tomanu	249,253
<i>Syzygium semannii</i>	227	tosiga	159
<i>Syzygium seemannianum</i>	229	toto	137
tabadamu	131,171,175	totowiwi	25
tabuarakalavi	47	<i>Tournefortia</i>	61
tadalo	41,47	toutou	167
tadano	133,147	towiwi	25
tagitagi	239	<i>Trichospermum</i>	169,311
tamarind	70,205	<i>Trichospermum calyculatum</i>	313
<i>Tamrindus indica</i>	70	<i>Trichospermum richii</i>	313
tapa	137,139,208	<i>Triumfetta</i>	311
tarawau	25	tuitui	137
tarawau kei rakaka	47,189,195	<i>Turillia</i>	245

<i>Turilla ferruginea</i>	247	<i>Viticipremna</i>	319
<i>Turillia vitiensis</i>	247	vobo	263
tuva	233	vueti ni naitasiri	41
tuva kalou	231,233	vuga	221,225
uko	27	vulavula	141
<i>Uraria</i>	153	vure	113,115
URTICACEAE	314	Vure family	112
usi	273	vutoro	267
uto ni bulumakau	34	vutu	10,179,181,183
vacea	263,267	Vutu family	178
vaivai	200,207	vutu kana	183
Vaivai family	200	vutu rakaraka	181
vaivai ni veikau	207	vutu wai	181
vaivai ni Viti	201,205,207	vuvula	273
vala	183	waciwaci	297,305
vao	41	wa lai	201
vasa	41,45,133	walutumailagi	171
Vasa family	40	wa niu	273
vasa ni veikau	293,295	waro	323
Vasa ni veikau family	292,293	<i>Weinmannia</i>	113
vau ceva	297	wewe	275
<i>Vavaea</i>	189	wi	25,33
<i>Vavaea amicorum</i>	199	Wikstroemia	307
<i>Vavaea degeneri</i>	199	wiriwiri	165,167
<i>Vavaea harveyi</i>	199	wiwi	277
<i>Vavaea megaphylla</i>	199	<i>Xanthophytum</i>	263
avaloa	117,119,169	<i>Xylocarpus</i>	189
velau	85,87	<i>Xylopi</i> a	35,39
<i>Ventilago</i>	249	<i>Xylopi</i> a <i>pacifica</i>	39
verbena	318	yaduva	265
<i>Verbena bonariensis</i>	318	yaka	9,235,239
VERBENACEAE	318	Yaka family	234
vere	249	yaro	319,323
verevere	319	yasi	269,271
vesi	71,75	yasidamu	229
Vesi family	70	yasidravu	229
vesida	81	yasiloa	227,229
vesivesi	159	yasimoli	1,227
vesivesiwai	159	yasivula	229
vesiwai	153,159	yasiwai	229
vetau	95	yasiyasi	9,10,221,227,229
<i>Vigna</i>	153	yasiyasi family	220
<i>Vitex</i>	319	ylang ylang	37

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