

FRUITS OF OCEANIA

Annie Walter and **Chanel Sam**

with collaboration from

Marie-Claire Bataille, Jean-Marie Bompard,
Pascale Bonnemère, Serge Tcherkesoff

FRUITS OF OCEANIA



English translation by
Paul Ferrar

with collaboration from
Christine Moulet, Harry Ferrar
and Klara Beresnikoff

First published in France by IRD Éditions as *Fruits d'Océanie*.
© IRD Éditions. ISBN 2-7099-1430-1.

ACIAR Monograph Series

This series contains the results of original research supported by ACIAR, or material deemed relevant to Australia's research and development objectives. The series is distributed internationally with an emphasis on developing countries.

This edition created in Australia with the express permission of IRD.

© Australian Centre for International Agricultural Research
(this edition)

Suggested citation:

Walter, Annie and Sam, Chanel. 2002. *Fruits of Oceania*. ACIAR Monograph No. 85. Canberra. [trs P. Ferrar from *Fruits d'Océanie*].


ISBN 1 86320 331 1

Design and layout: Catherine Plasse and Design One Solutions
Printed by: CanPrint Communications Pty Ltd - Canberra ACT



Contents

Acknowledgments	7
Presentation	11
Glossary of terms	13
The four study regions	21
Introduction	31
Traditional alimentation in Oceania	37
Traditional arboriculture in Oceania	65
Ethnobotanical inventory of fruiting species	79
Bibliography	261
Fruits and nuts eaten from New Guinea to the Cook Islands	277
Species names and main synonyms	285
Vernacular names in detail	289
Index of scientific names	299
Index of common names	311
List of herbarium specimens	315
Index of species distribution maps	321
Index of botanical illustrations	323
Index of photographic plates	324



Acknowledgments

French edition

Production of this book was made possible with the assistance of the Ministry of Foreign Affairs, which funded the research in Vanuatu, Papua New Guinea, Tonga and Samoa and also part of the cost of publication. From Melanesia to Polynesia men and women, heirs to and guardians of a long tradition of knowledge of the natural world, assisted our research and patiently passed on to us their comprehensive knowledge of these fruiting species, so poorly known by the scientific community and so full of potential for the future. It is to these people, working in government departments or belonging to rural communities somewhere in Oceania, that we convey our sincere thanks. It is to these people also that this book is dedicated, in the hope that this scientific presentation of their traditional knowledge has not in any way detracted from its reality.

Numerous colleagues and friends helped with production of this work. By name, for their time, their advice and their assistance, we thank particularly: M. Auffrey, linguist at the Institut des Langues Orientales, who during a two-month mission supervised and managed the entire linguistic part of the project; Alfreda Mabonlala, artist at ORSTOM in Port Vila, who with great talent and ability executed the majority of the botanical illustrations, and whose

drawings were complemented by those of F. Yoringmal and S. Seoule; B. Evans, who generously gave us the benefit of his knowledge of the nuts of Solomon Islands; P. Ferrar (ACIAR), for having funded chemical analyses of the fruiting species of Vanuatu; B. Aalbersberg (USP Suva), for having conducted the analyses and C. Dignan (SPC) for having initiated them; G. Philips and M. Alpers, respectively in charge of the laboratories and Director of the Papua New Guinea Institute of Medical Research, Goroka; Haniteli 'O Fa'anunu, Director of the Ministry of Agriculture of Tonga; D. Eastburn (Murray Darling Basin Commission, Canberra), for the very fine photographs that he kindly provided showing the preparation of highland pandanus (*Pandanus julianettii*); the botanists who identified our herbarium specimens: M. Jebb (*Barringtonia*), A. Kostermans (*Evia dulcis*), T. Pennington (Sapotaceae) and M. Coode (*Terminalia*). Final drafting and editing of this work was undertaken at the Research School of Pacific and Asian Studies at the Australian National University in Canberra. The discussions that we were able to have with the researchers of that institution, and the comments that they provided, substantially improved the earlier draft of the manuscript.

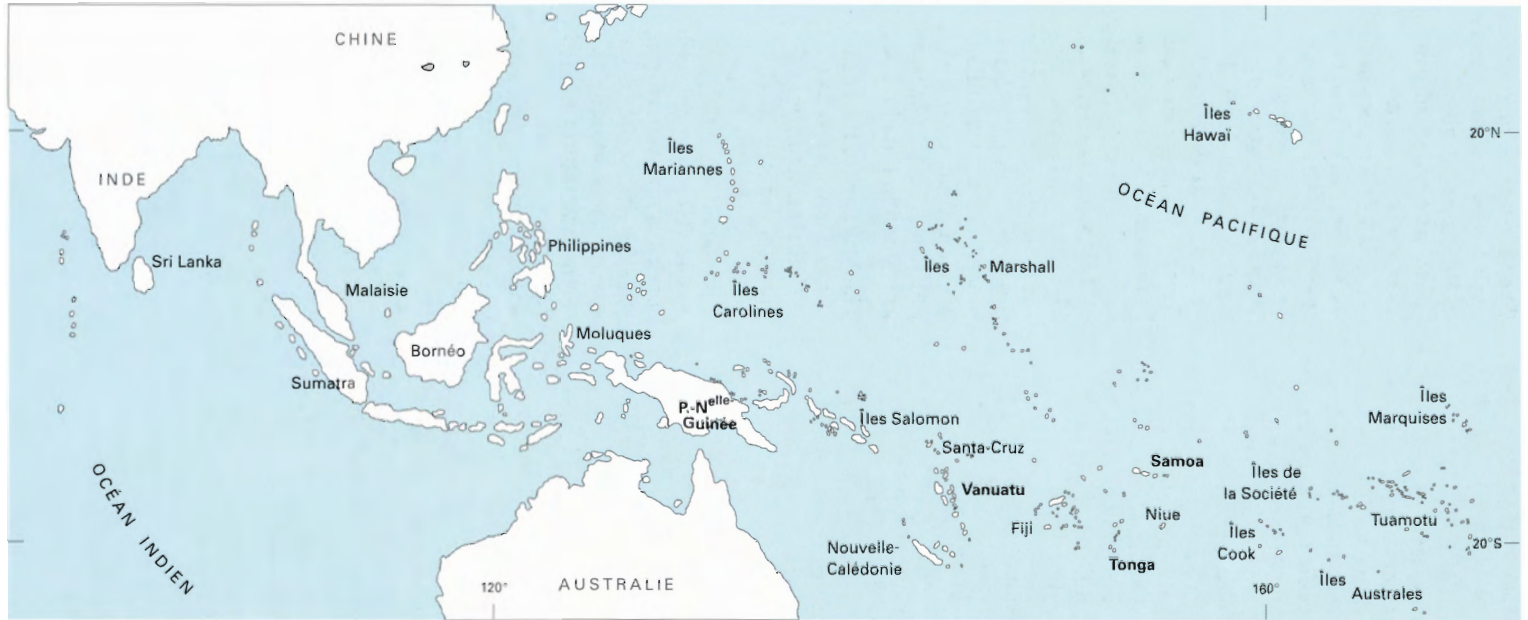
**Note on English edition
by translator**

I first learned of this work during a conference on Pacific nuts in Vanuatu, and it seemed highly desirable to have it available in English as well as French so that all countries of the Pacific could share its fascinating content. I undertook the translation as someone with training in Botany but with only a moderate knowledge of French. In this latter regard I was helped greatly by my colleague and friend Christine Moulet, whose assistance was talented and unstinting, and by my father Harry Ferrar, teacher of French and lexicographer. Klara Beresnikoff and

Christine Moore also provided valuable help and Annie Walter explained various points of Pacific culture and other aspects of the work. Nevertheless, any errors that remain are my responsibility.

IRD kindly made available a full electronic copy of the French text and all the illustrations, and permitted ACIAR to publish the English translation. I am also most grateful to my colleague Peter Lynch (Publications Manager of ACIAR) for his assistance with technical production of the work.

Paul Ferrar
ACIAR, Canberra



The South Pacific

For key to French names see map on p. 82



Presentation

The fruits and nuts of Oceania have been little studied to date. This book deals with those plants that are specifically Oceanian, i.e. were present in the region before the arrival of the first Europeans (in the 16th century). It covers the woody species which, cultivated or wild, produce the great majority of fleshy and non-fleshy fruits of the Pacific.

Four regions served as study areas for this work: Vanuatu (the reference country for the whole work), Papua New Guinea, Samoa and Tonga. These countries are introduced by capsule summaries of general information at the start of the work (p. 21).

The inventory of fruits that we have given here is not exhaustive; for Papua New Guinea, for example, it concentrates on fruits utilised by the Ankave, a people in the interior of the country whose nutrition depends largely on the resources of the forests. This society bears testimony to the wealth of the forest species in this part of the world, and to the nutritional and cultural importance of certain plants such as pandanus.

This reference work thus mainly covers the local fruiting species, and excludes those introduced after European contact, palms, shrubby plants and vines.

The first two sections of the book deal with alimentation¹ in Oceania and with traditional arboriculture; they provide evidence of the great differences in utilisation of the local fruit trees between Melanesia and Polynesia. While in Melanesia the strongly rural communities still grow and eat their local fruits to a great extent, in Polynesia these species are less utilised and are tending to disappear. The reasons, historical and social, and the practical details of this progressive loss of interest in traditional foodstuffs, which in time could lead to nutritional imbalances, are presented in broad terms.

The last part of the book, and the most important, is the ethnobotanical inventory of individual species, arranged in alphabetical order of genera. The entry for each species is introduced by: the scientific name of the species and its family, the common names in English, French and Bislama (the lingua franca of Vanuatu), its mode of consumption and its possible toxicity. This is then followed by: the botanical description and the morphological variability of the species, observations on the species, the alimentary usages and other usages, other edible species in the genus, and finally a list of references cited for that species. The geographical spread is indicated in the form of a distribution map. The

¹Alimentation is defined as the supplying of the necessities of life, including the processes of giving and receiving nutrition. It is therefore wider than just nutrition.

botanical description inevitably includes some technical terms, but a glossary provided immediately after the present section will help to understand the meanings of these terms.

The book concludes with a series of summaries to help the reader, whether amateur or specialist: a bibliography, a list of fruits eaten in the western Pacific, synonyms of species names,

a detailed listing of vernacular names, an index of scientific names, an index of common names, and a listing of herbarium specimens.

We hope that all who are interested in the natural resources of the Pacific, whether it be to know them better, to protect them or to develop them, will find the information that they need in this reference book.

Glossary of Terms

The glossary for the French text was taken mainly from Florence (1997)². The glossary for the English translation has also drawn extensively on Willis (1904)³. Some terms, already defined in the text, are repeated below for the sake of completeness.



Acumen – a narrow or tapering point, variable in shape, at the tip of a leaf.

Acuminate – ending in an acumen, tapering progressively to a long, fine point.

Acute – pointed (for example of a leaf tip).

Adventitious roots – root-like structures on a plant that perform the functions of roots but are derived from stem or leaf tissue, i.e. are not true roots.

Aerial roots – roots or root-like structures arising above ground.

Albumen – also called endosperm – the part of the seed which is filled with nutritive substances, and which surrounds the embryo which it nourishes.

Alternate – where leaves are attached alternately along a stem, not opposite

each other (the alternative condition to this is opposite).

Annular – banded or thickened in rings or circles.

Apex – the tip of a leaf, flower or fruit, away from the stalk or point of insertion.

Aril – an exterior covering or appendage of a seed as an outgrowth that envelops the seed to a greater or lesser extent.

Aspermic – without seeds, not bearing seeds. Used here particularly in relation to breadfruit, to indicate varieties that produce fruits without seeds, which are thus sterile and must be reproduced vegetatively.

Axil – the interior angle between a leaf and the branch from which it arises (or between a small branch and a larger branch from which it arises).

Axillary – situated in, or growing from, the axil of a leaf or bract.



Bifurcating – dividing into two.

Blade – the broad, flat part of a leaf.

Bract – a leaf in whose axil a flower arises.

Buttresses – broadened, basal expansions of a tree trunk, standing out as thickened supports.

²Florence, J., 1997. *Flore de la Polynésie française*, Vol. 1. Paris, ORSTOM, coll. Faune et Flore tropicales 34, 394 pp.

³Willis, J.C., 1904. *A Manual and Dictionary of the Flowering Plants and Ferns*. Cambridge, University Press, 2nd Edition, 670 pp.



Calyx – the outer envelope of the flower, comprising all the sepals either separate or joined.

Capitulum (plural capitula) – a group of sessile flowers clustered together into a single, tight head.

Carpel – the gynoecium (female component) of a flower, made up of a basal ovary containing the ovules, surmounted by a style and a stigma. Carpels may be separate, or fused into a syncarp.

Cauliflorous – (of flowers and fruits) – growing directly from the trunks or older branches of a tree (as opposed to growing out of leaf axils).

Compound – leaf in which the single leaf-stalk bears more than one separate leaflet (the opposite condition is simple).

Cordate – (of leaf) – about twice as long as broad, and heart-shaped at the base.

Coriaceous – leathery.

Corolla – the inner envelope of the flower, comprising all the petals either separate or joined.

Cotyledons – the “seed leaves” which become the first leaf or leaves arising when an embryo germinates. Angiosperm seed plants are divided into the Dicotyledones (with two cotyledons per seed) and Monocotyledones (with one cotyledon per seed).

Crenate – (of leaf margin) – with rounded teeth and sharp notches between the teeth.

Crown – the head of foliage of a tree or shrub.

Cuneiform – wedge-shaped.

Cupule – part of a plant formed into a small cup, either as a single piece or made up of small scales.



Deciduous – of a plant where all the leaves fall from the plant at a particular time of year (e.g. in the dry season or in winter).

Decurrent – where a leaf expansion is continued as a wing down the stem.

Dehiscent – (of a seed pod or container) – splitting open when ripe.

Dentate – (e.g. of leaf) with small teeth pointing outwards.

Dioecious – where male and female flowers are borne on separate plants (the opposite state is monoecious).

Drupe – a fleshy fruit containing one seed, the endocarp of which is hard (i.e. a nut).



Ellipsoidal – a solid object (e.g. a fruit) which is oval in cross-section when cut across any plane.

Elliptical – (of leaf) – tapering equally to base and tip, and somewhat narrow.

Emarginate – apex of leaf with a deep and marked notch.

Embossed – (of a surface) – having a raised design.

Endocarp – hard shell or stone inside a fruit and surrounding the seed (see also under pericarp).

Entire – (of leaf or leaflet) – without notches in the margin.

Epicarp – (also sometimes called exocarp) – the outer skin of a fruit (see also under pericarp).

Epidermis – the outer layer of cells or skin (e.g. of a fruit).

Epiphytic – growing on other plants rather than directly in soil, but not parasitic on those plants.

Ethnobotany – study of the complex relationships between humans and their plants. Classifications, usages and modes of cultivation are always studied from the point of view of those who utilise the plants and according to the particular cultural contexts.

Exocarp – see epicarp.



Fluted – (of a tree trunk) – having a series of vertical furrows or grooves.

Follicle – a dry, dehiscent fruit consisting of one carpel and dehiscent along the ventral side only.

Fusiform – spindle-shaped.



Glabrous – without hairs.

Globular – roughly spherical, having the shape of a globe or ball.

Gynoecium – the female part of a flower comprising ovary, style and stigma (see also carpel and pistil).



Hermaphrodite – (of flowers) – having both male and female structures within the same flower.





Imbricated – (of scales or bracts) – arranged in rows that partially overlap each other (e.g. like roof tiles).

Indehiscent – (of a seed pod or container) – not splitting open when ripe.

Inflorescence – a grouping of flowers on a plant.

Infrutescence – a grouping of fruits on a plant, deriving from an inflorescence.



Kava – a sedative, slightly intoxicating drink, obtained from the root of *Piper methysticum* and drunk by men at nightfall throughout the Pacific.



Lanceolate – (of leaf) – lance-shaped, about three times as long as broad, tapering gradually towards the tip.

Lap-lap – a type of thick cake made by cooking a puree of grated yam, taro, cassava, banana or breadfruit in leaves.

Latex – a milky, usually white and often sticky fluid that exudes from cut or damaged stems of leaves of a plant.

Leaflets – the individual leaf-like structures of a compound leaf.

Lenticels – small respiratory pores in the stems of woody plants, appearing as a series of dots on the bark surface.

Luau – coconut milk salted with seawater and cooked in young taro leaves.



Marcotting – a procedure for vegetative multiplication of plants in which part of a branch of the plant (usually a tree) is put into contact with soil (often the soil is bound to the branch surface with plastic), and the branch roots into the soil before being detached from the parent plant.

Mesocarp – the central fleshy tissue of a fruit, between the outer skin (epicarp) and the hard shell or stone around the seed (endocarp) (see also under pericarp).

Monoecious – where male and female flowers are borne on the same plant (the opposite state is dioecious).

Morphotype – refers to the external shape or appearance of a particular plant.





Nakamal – Bislama term indicating a building (clan hut) for men.

Nalots – small balls of breadfruit paste cooked in coconut milk.



Ob – (applied to an adjective, it reverses the direction of tapering – see definitions below).

Ob lanceolate – (of leaf) – about three times as long as broad, tapering gradually towards the base (in contrast to lanceolate, where the gradual tapering is towards the tip).

Oblong – (of leaf shape) – with sides parallel for some distance, the ends tapering rapidly.

Oboval – (of leaf) – egg-shaped, with the broader portion at the apex of the leaf (opposite condition is oval, where the broader part is at the base).

Obtuse – blunt, when applied to the shape of a leaf apex.

Opposite – where two leaves are attached opposite each other on a stem (the alternative condition to this is alternate).

Orbicular – (of leaf shape) – circular in outline.

Ostiole – a small aperture found on the fruit (fig) in the family Moraceae.

Oval – (of leaf) – egg-shaped, with the broader portion at the base of the leaf (opposite condition is oboval).

Ovoid – (of a fruit) – egg-shaped.



Palmate – a compound leaf in which all the leaflets arise from a single point of insertion (the opposite condition is pinnate).

Panicle – an inflorescence composed of clusters of flowers, themselves arranged in clusters on a central axis.

Paripinnate – a pinnate leaf with an equal number of leaflets on either side and without a single extra leaflet at the end.

Parthenocarpic – (of a fruit) – developing without needing to be fertilized.

Pedicel – the individual stalk of each flower of a group of flowers (see also peduncle).

Pedicellate – having a pedicel.

Pedunculate – having a peduncle (opposite: sessile).

Peduncle – the stalk of a solitary flower or fruit, or the single stalk of a group of flowers or fruits (see also pedicel).



Pendulous – hanging downwards.

Pericarp – the part of a fruit that covers the seed. May consist of an epicarp (outer skin), mesocarp (a fleshy mass of tissue under the outer skin) and an endocarp (a hard shell or stone around a seed).

Persistent – (of flowers or flower parts) – remaining unwithered on or around the fruit (as opposed to deciduous, where it shrivels and falls as the fruit develops).

Petals – the components of the corolla, or inner envelope of the flower; the petals may be either separate or joined.

Petiolate – having a petiole (opposite: sessile).

Petiole – a leaf stalk.

Petiolule – the stalk of a leaflet.

Pinnate – describing a compound leaf in which the leaflets arise from the sides of the central rachis (as in the leaf of a pea plant). The opposite condition is palmate.

Pistil – the female part of a flower comprising ovary, style and stigma (see also carpel and gynoecium).

Polymorphic – occurring in several distinct forms or shapes.

Pubescent – with fine, soft hairs.



Quadrangular – four-sided.



Raceme – inflorescence made up of pedicellate flowers on an unbranched axis.

Rachis – the elongated axis of an inflorescence, or the main axis of a composite leaf that bears the leaflets.

Rhizome – an underground stem or branch of a plant, often thickened and sometimes serving as a storage organ; looking like a root but distinguished from a true root by the presence of buds, nodes and often scale-like leaves.

Rosette – the shape in which a number of elements radiate symmetrically from a central point.

Rugose – ridged or wrinkled.



Sepals – the components of the calyx, or outer envelope of the flower; the sepals may be either separate or joined.

Sessile – without a stalk, attached directly at base (of leaf or fruit; opposite conditions are petiolate or pedunculate).

Simple – a leaf with only one leaf on the leaf stalk (opposite condition is compound, where there are several leaflets on each leaf stalk).

Spherical – shaped like a sphere or ball.

Stamen – the pollen-producing structure of a flower, usually comprising a filament bearing an anther.

Stigma – the part of the pistil of a flower that receives the pollen at fertilization.

Stipules – the pair of small leaflike appendages arising at the base of the leaf in many plants.

Style – the part of the female flower connecting the stigma to the ovary.

Sub – (as a prefix to any adjective) – nearly, e.g. subsessile = nearly sessile.

Subglobular – almost globular.

Sub-opposed – almost opposed.

Subsessile – nearly sessile (e.g. with a very short leaf or fruit stalk).

Syncarp – a fruit arising from a gynoeceium made up of fused carpels or a fruit made up of elements that are totally united into one.



Tapa – cloth made from tree bark beaten flat.

Tarodièrè – a taro garden, usually irrigated and comprising a series of small pits inside which flows water coming from a single source.

Terminal – at the furthest point away from the point of attachment of anything. In the case of the crown of a tree, the uppermost part of the tree.

Trilobate – having three lobes.

Tubular – (e.g. of a corolla) – with the separate petals joined together to form a tube-like structure.




Undulate – (of leaf margins) – wavy.



Whorl – a number of leaves or flowers arranged in a circle around the same point on a stem or axis.

Wing – lateral, flattened, somewhat leaf-like expansions on a stem or fruit.



The Four Study Regions

Reference country for
the study: Vanuatu

Papua New Guinea: the
territory of the Ankave

A kingdom of many
islands: Tonga

The archipelago of
Samoa: western Samoa

Reference country for the study:

Vanuatu

The chain of islands of Vanuatu, situated on the “belt of fire” (the chain of active volcanoes) of the Pacific, to the northeast of New Caledonia, stretches for close to 900 km. It is made up of about 68 islands, the surface areas of which vary from less than 1 km² up to about 4,000 km². The islands, which are recent and high, have an average altitude of 500-600 m, with the highest peak in the archipelago being Tabwamasana on Santo, which reaches 1,879 m. In fact, the complex geomorphology of the archipelago has produced quite a contrasting mixture of physical relief formations in the islands, sometimes changing markedly over quite short distances. This process of division of the archipelago is mirrored by a fragmentation of the human societies, isolated one from another by natural barriers which were often terrestrial rather than maritime. Together with Papua New Guinea, Vanuatu represents Melanesia in this study.

Total land area

12,189 km².

Climate

Tropical, with two seasons – hot and very wet in summer (from November to March), followed by a winter which is dry and cooler. The leeward sides of islands suffer severe droughts, and the zones above 500 m are cold and dry. Finally, cyclones occur more or less regularly between November and April, particularly affecting the centre of the archipelago and the south. Their consequences may be catastrophic, and the destruction of gardens may force the populations to have recourse to foraged foods to ensure their survival.

Vegetation

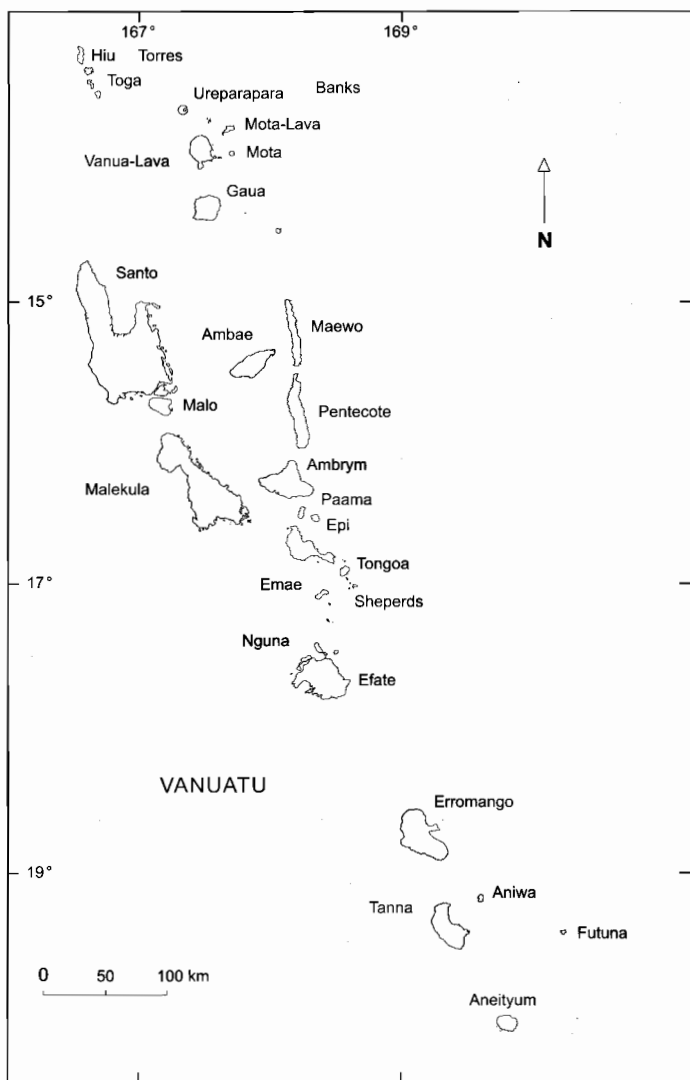
The flora of Vanuatu is young, relatively poor (about 1,500 species), with a rather low level of endemism. The north of the archipelago has received some contributions from the flora of Solomon Islands, while the south has received some from Fiji. The primary forest, terribly depleted by human activities, is mainly found above 500 m. The majority of forests in Vanuatu are secondary, containing gardens throughout and rich in species of practical use. Spread in a band down the length of the coastline there is a coastal forest made up of pan-Pacific species.

Population

The population of Vanuatu is estimated as 142,419 inhabitants, with an annual growth rate of 2.8%. It includes numerous groups of peoples speaking over 100 different languages. Discovered by Quiros in 1606, placed under Franco-British administration in 1906 (the Condominium of the New Hebrides), Vanuatu became independent in 1980. The isolated populations of the interior of the islands were encouraged to resettle closer to the coast, but 82% of the population lives in rural areas. Nowadays one can see a continuous increase in the populations of the two main towns, Luganville and particularly Port Vila (annual increase of 7.3% in the urban population).

Economy

The rural populations engage in subsistence agriculture augmented by fishing and rearing of livestock. Since the 19th century new cash crops have been introduced (cotton, cocoa, coffee, etc.), coconut plantations have been established, and small cash stores have been opened in all the villages. The main exports are copra, fish, beef and also cocoa and timber. Even though much transformed by modernisation, the main elements of the traditional horticulture are still in place. Territorial rights, passed down from father to son since the land was first cleared, may be exchanged or ceded, even given up altogether if there are no longer any descendants to claim them. This general statement, however, hides the fact that there are notable local differences in detail from one island to another or between one group and another. These distinctions serve also as defining characteristics of the separate society groups of Vanuatu, and as such have undoubtedly helped to preserve the diversity and the traditional customs and ways of life. Aware of the value of its natural resources, Vanuatu is trying nowadays to balance a policy of development with conservation of its environment.



The Territory of the Ankave Papua New Guinea:

Situated in the South Pacific, Papua New Guinea comprises the eastern part of the island of New Guinea (the largest non-continental island in the Pacific), the Bismarck Archipelago (New Britain, New Ireland, the Admiralty Islands), the northern Solomon Islands (Bougainville and Buka), the Trobriand and d'Entrecasteaux Islands, the Louisiade Archipelago and Woodlark Island. The capital is Port Moresby. Together with Vanuatu, Papua New Guinea represents Melanesia in this study.

Total land area

461,693 km².

Climate

Hot and humid, often cooler in mountainous areas. Average annual rainfall varies from 1,500 to 10,000 mm according to region.

Population

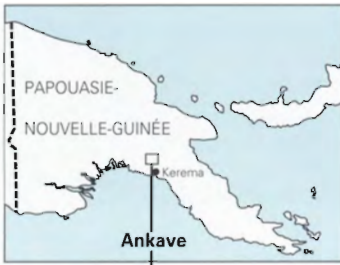
3.9 million people (1990 census). Annual rate of population increase: 2.5%. Percentage of population living in rural areas: 87%.

Main resources

Minerals (gold, copper) and oil.

The land of the Ankave

This is situated in Gulf Province, in the eastern central part of the independent nation of Papua New Guinea. It comprises three enclosed valleys covered in forest, in which dwell about a thousand people. A dense network of watercourses traverses the region. The year is divided into two seasons: the less humid from May to October, the rainier from November to April. The average annual rainfall is about 3,000 mm, which is intermediate between the drier region of Menyamya and the wetter one of Kerema. The temperature ranges between 15 and 25-30°C in January and between 25 and 28°C in July. It varies with altitude. The feeling of cold is always severe when it rains above 2,000 m. Between December and February, storms are very frequent on the ridges and peaks that separate the valleys. The long chain of ridges (between 2,200 and 2,800 m) which mark the easterly boundaries of the main valleys, separate the territory of the Ankave from that of other Anga groups to which they belong, but with the great majority of whom they were in former times in a semi-permanent state of war. Nowadays, this line of ridges also marks the boundary that separates the Ankave from the modern world.



The Ankave people

Isolated in the heart of Gulf Province, and among the poorest people in the country, the Ankave are neglected by the authorities in Kerema who have the responsibility for administering them. The nearest road stops at Menyamya, in Morobe Province, and to reach this from any of the valleys of the Ankave is a walk of two to four days. Independence (in 1975) marked the end of the temporary migration to the plantations that had begun in the mid-sixties. Nowadays the few Ankave who travel only leave their valleys to sell cloths of beaten bark to neighbouring communities, but scarcely ever reaching as far as the valley of Menyamya. They have very little contact with officialdom, missionaries or the market economy. In the complete absence of commercial production, their economy is scarcely monetarised and purchase of foodstuffs is rare. Nowadays there are still no schools, no hospitals and no market stalls in the valleys of the Ankave. In the valley of the Suwai – where the present study was carried out – the missionary presence has only been felt since the beginning of the 1990s. A census of the inhabitants of this valley was

taken for the first time in June 1990, which indicates just how isolated this population has been. The Ankave obtain from the forest most of their foodstuffs and the materials that they use for everyday living. They continue to utilise and to manage this environment in a way that is no different from when they first settled there, 150 to 200 years ago.

A kingdom of many islands:

Tonga

Archipelago situated in the South Pacific, made up of 170 islands of which 36 are inhabited nowadays. Physically, this region is a mixture of low coastal areas and raised, emergent land masses. Situated to the west of the International Date Line, the archipelago had the old name of the Friendly Islands, thus christened by Captain Cook because of the perceived friendliness of the inhabitants. The low coral islands and the high volcanic islands are divided into three groups, spread over 800 km from south to north: in the south, the main island of Tongatapu (260 km²), in which is situated the capital Nuku'alofa, and 'Eua Island; in the centre the Ha'apai Islands (120 km²); in the north, Vava'u (140 km²). There are also Niuatoputapu and Niuafu'ou (called the Niuas, 18 km² and 50 km²), which lie isolated to the north, and in the south of the archipelago the island of Ata, which has been uninhabited since 1910 because of its isolation and difficulty of access.

Total land area

670 km².

Exclusive economic zone

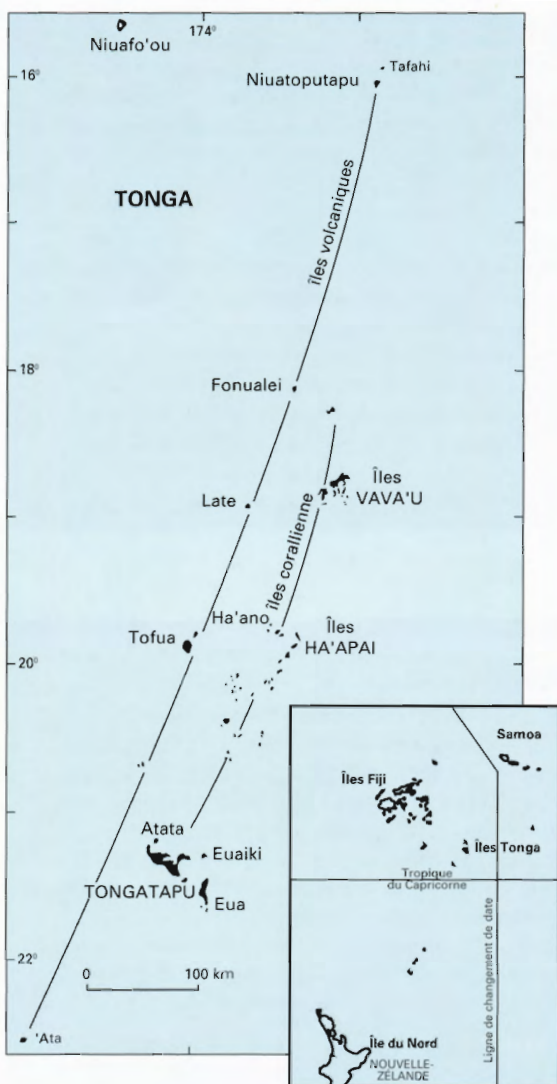
700,000 km².

Climate

Semi-tropical, with a wet season from November to April and a dry season from May to October. Cyclones occur between December and March. Median temperature of 23°C, with an average annual rainfall of 1,870 mm and 77% humidity.

Population

In 1921, 23,759 inhabitants of whom 43.5% were in Tongatapu and 'Eua; in 1986, 94,535 inhabitants of whom 67% were in Tongatapu (plus 35,000-50,000 who had emigrated to New Zealand, Australia and the United States of America). The population density is heterogeneous, with an average of 139 inhabitants/km² but a concentration of 230 inhabitants/km² in Tongatapu. In 1986, 63% of the population was under 24 years of age.



History

A Kingdom by divine authority since 950 AD, the monarchy acquired constitutional status in 1875 with King Tupou I. Tonga remains today the only kingdom in the Pacific where the sovereign Taufa a'hau Tupou IV exercises effective power, succeeding his mother Queen Salote Tupou III in 1967. The Kingdom, the only place in the Pacific to escape colonisation, was made a protectorate of Britain from 1900 to 1970.

Economy

Over 50% of the working population is engaged in agriculture. The economy of self-sufficiency is based on the growing of tuber crops, but this is giving way to a capitalist type of economy, and subsistence cropping is giving way more and more to commercial cropping for export. Successively, such developments have been: banana (since 1908, with a progression in fits and starts, and a renaissance in 1940), then watermelons, pineapples, vanilla, tomatoes, capsicum, peanuts. For about the last five years or so it is the growing of squash for export to Japan which has monopolised all the effort, to the detriment of subsistence production and of other cash cropping. Far behind the primary production sector of the economy is the service sector in which public servants (officials; civil servants) predominate, and a secondary manufacturing sector that is quite weak.

The archipelago of Samoa:

Western Samoa

The archipelago of Samoa includes the islands of what was formerly Western Samoa, now Samoa, which are part of the present study, and American Samoa. The western part comprises mainly the two large islands Savai'i and Upolu, in the latter of which is located the capital Apia and the main airport. The islands are high and volcanic (highest peak 1,858 m), with patches of thick forest (often damaged by cyclones and by cutting for domestic and industrial use), and coastal plains that are narrow except in a few places where the flat, fertile land broadens out. The mountainsides are steep and precipitous.

Total land area

2,935 km².

Exclusive economic zone

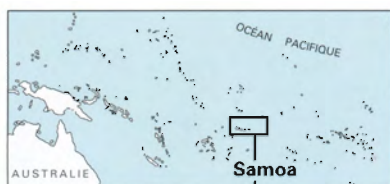
120,000 km².

Climate

Humid tropical, with a drier, cooler season between April and September. The climate becomes milder with altitude.

Population

In 1980 there were 156,000 inhabitants, of whom 110,000 were on the island of Upolu and 46,000 on Savai'i (plus 50,000 who had emigrated to New Zealand, American Samoa, the United States and Australia). The figure was the same in 1986 (the population increase having been balanced by emigration up to about 1992). The majority of villages are on the coast.



Ratio of rural to urban zones

Samoa has 350 villages and no real town. The capital Apia is administratively a conglomerate of villages each governed by its council of customary chiefs. There are 35,000 people overall in this urban cluster, plus another 40,000 in the villages along the 30 km of road between Apia and the main airport. More and more the populations of these villages are living in a cash economy, based on salaries earned by various members of the extended families. The remainder of the population (80,000 people) lives in a rural manner, dependent entirely on their crops.


History

Western Samoa was a German colony (1899-1914), then entrusted by the League of Nations to the guardianship of New Zealand. In 1962 it became the first independent nation of the Pacific and was endowed with a constitution based on the western parliamentary model. However, the members of parliament are chosen from among the chiefly families (*matai*) and are elected only by the latter. From within the parliament is chosen a cabinet and Prime Minister, by internal election. At Independence two heads of state, from the two highest families of the land, were installed for life: one has since died, the other has now remained in power for thirty-three years. On his death the new head of state will be elected from within the parliament, for a renewable term of five years. Since 1990 the parliamentarians have been elected by universal suffrage, but the eligibility to vote remains limited to the head of each family (about 15,000 people, of whom 90% are male).



Economy

Classed among the poorest countries because of its low income, little by way of exports, and the almost complete absence of local artisanal or industrial manufacturing, Samoa has nevertheless not starved. Until the most recent times, the country had a three-part economy: one third of resources came from cash remittances from expatriate Samoans, one third from international development assistance and one third from export crops. The main export commodities (copra, cocoa and banana) fell between 1980 and 1987. By 1990 exports of taro to expatriate Samoans in New Zealand were so profitable that they led to a diminution in fishing and a change in consumption habits of the population. Since 1990 this trend has been reversed, attributable to a 10-20% fall in employment for expatriate Samoans, two cyclones that devastated the country, and in 1994 an epidemic that destroyed 95% of the taro.



Introduction

What did they look like, the untouched islands that were discovered by the first human communities to land on Oceanian shores? Which species of plants were the newly arrived people able to eat? We will doubtless never know exactly, but it is likely that in these lands there were growing some food plants that were already known to the new migrants. Some fruit trees or littoral plants that are spread by marine currents, wind or birds would have been present in these islands, having arrived ahead of the first humans. Such virgin territory no longer exists, having been taken over by the peoples of the Pacific. But did it ever exist? Long before the arrival of Man these islands had been subject to indirect human influence, receiving seeds of new plants that were being utilised by Man in other distant lands. Plants with practical uses, especially food plants, preceded humans, then accompanied them and finally followed them. Humans planted species that they brought with them by canoe in the earliest voyages, those that they acquired in the course of subsequent journeys, and those that they exchanged with neighbouring communities; they also learnt to use other species, those that they already found *in situ*, and those that continued to arrive, spread by natural means. From one century to another human

communities grew and extended, and the land around them became changed by the human influence. Each new wave of migrants that arrived at an island of Oceania, each contact made between islands, brought with it knowledge of new edible species that were then on adopted and multiplied, though they may also sometimes have been abandoned or forgotten. Little by little the island communities, ever more settled into their new territories, developed the land, accumulated plants with practical uses, and developed eating habits that, despite the extreme ecological and cultural diversity of this part of the world, showed a certain homogeneity.

The arrival, from the 16th century onwards, of European explorers brought nothing that was really new, because other significant waves of migration had already spread across the islands. Nevertheless, it did intensify and speed up the processes that were already taking place. It brought about extensive and rapid movement of plant material throughout the Pacific, and led to enormous introduction of new species originating from other continents. Then followed the adoption of new agricultural practices, the introduction of commercialised products and of currencies, and above all a new philosophy, a new way of looking at the world. This caused a profound upheaval to the relationship between

humans and their environment, which had been based on mythology, lore and techniques that were now thrown into question.

All facets of this world, that while not necessarily harmonious was certainly in balance, but above all was different, were noted, described, evaluated and judged by the first Europeans and by those who followed them. The alimentation of the island peoples, the quality of their plant resources, their cuisine and their habits at the table, their knowledge and their myths were all sifted through the screens of western thought of the 18th century and later. The opinions that emerged from this evaluation were modified over time: sometimes favourably, more often unfavourably.

The first accounts of the travellers and the missionaries are themselves often contradictory. Some, like Tasman (Dumont d'Urville, 1989) or Cook (1777), were impressed by the quality of the agricultural practices and the "refinement of the culinary art" (Mariner, 1806 in Martin, 1817, 2: 333) which they observed in Tonga. Others, visiting the same places, took an opposite and bleak view of the alimentation of the indigenous peoples, whom they described as "bands of starving people, foraging for something to eat" (letter of Father Calinon, October 1845, in Duriez-Toutain, 1994: 411). This came about because each person saw just a snapshot portion of

a more complex whole. Feasts could be followed by periods of great scarcity; in some societies the food of the chiefs was not the same as that of the common people; a traveller passing through would thus not have the opportunity to see the whole picture, which would only be accessible to someone who stayed for a long time in the one place. The ideas that were formed about Oceanian societies, the judgements that were made on their practices and the level of sophistication of their knowledge, were also influenced by the development of European knowledge and thought. Only now are people reassessing the correctness and importance of the knowledge that had been developed by societies adapting to an environment that only they knew fully, and only now are we realising that the forests of Oceanian islands hold invaluable food resources for the peoples of the Pacific and for the whole world.

Even though some refused to credit Oceanian cuisine with much subtlety, and though others denied gustatory or nutritive merit in the foods of the Pacific, there is in fact an Oceanian alimentary style that is entirely original, and is based on a choice of particular plants, on modes of cooking, on tastes, on rules of hospitality, frequency of meals and an understanding of food needs. This is what is described by the term "traditional alimentation", this

combination of practices and behaviour, which is quoted as the general situation existing in pre-European times, but in fact only relates to a single point in time, namely that when the first travellers made the observations. Nowadays, this traditional alimentation still exists to an extent in societies that are in course of change in these countries. The changes that are happening have to do with the type of plant or food that is used as well as the mode of preparation or consumption. Traditional alimentation is adaptive, evolutive and creative. Adaptive, because it incorporates new plants and techniques into a combination of practices in a much wider cultural context, itself based on the myths and beliefs belonging to the particular society. Evolutive, because this cultural complex is not set in stone, but may be altered from contact with other cultures or in relation to changes in environment, resulting in different modes of alimentation. Creative, because of new ways to cultivate a plant, or to utilise it or prepare it, or even of seeing the world emerge in the course of these adaptations and evolutions, in response to practical problems and to an underlying and significant aesthetic sense.

It is relatively easy nowadays to list the fruits that have been introduced to the Pacific since the 16th century: fruits such as mango, pineapple, papaya,

lime, guava, custard apple, orange, grapefruit, mandarin, passionfruit, avocado or watermelon. However, it is much harder to define the centres of origin and original distributions of other fruiting species because they were spread more widely by humans during earlier aboriginal migrations.

Thus a large number of fruiting trees, to limit the scope of our study to this group of plants, are present over a vast area, from the Indo-Malayan Region to the eastern Pacific. This is the case with the sea almond (*Terminalia catappa*), Indian mulberry (*Morinda citrifolia*), Tahitian chestnut (*Inocarpus fagifer*) and candlenut (*Aleurites moluccana*). These species have on occasions spread even more widely, such as to the islands of the Indian Ocean or those of the Caribbean, where they have been flourishing for hundreds of years. Other species are found from western New Guinea to Vanuatu or Fiji: such is the case with canarium nut (*Canarium indicum*), the Melanesian fig (*Ficus wassa*) and *Gnetum gnemon*. Some species are distributed roughly from Vanuatu (or even Solomon Islands) to Samoa and Tonga. Among these are the dragon plum (*Dracontomelon vitiense*), the Oceanian fig (*Ficus scabra*) and *Garcinia pseudoguttifera*. Finally, some species are endemic to certain islands, such as the Vanuatu fig (*Ficus granatum*) in Vanuatu or



Pittosporum pullifolium in New Guinea. It therefore appears that in Solomon Islands and Vanuatu one finds both the western species and the eastern species, while the very rich flora of New Guinea contains a considerable number of species that are not found outside that island. The more easterly islands of Polynesia either never acquired or have lost a good number of fruiting species that are eaten in Melanesia. In this connection it should be borne in mind that the richness of individual floras decreases progressively from New Guinea to Polynesia.

This difference in geographical distribution of species is also evident at the end of this work, in the list of fruits eaten (p. 277), and in the ethnobotanical inventory of species (p. 79). It explains the fact that less information has been collected from Tonga and Samoa than from Vanuatu and Papua New Guinea, regions that are geographically and geologically different in nature, richer from the start in fruit and nut species, and less urbanised. This apparent imbalance of coverage in the text, in which there is almost constant reference to Melanesian distributions but much less to those in Polynesia, is thus only a reflection of the different situation between the geographical areas considered in this comparative approach.

In parallel with this, consumption of fruits and

nuts remains regular and abundant in the countries that are still mainly rural, such as Papua New Guinea, Solomon Islands and Vanuatu. For example the Ankave, who occupy an isolated area of forest in Gulf Province, throughout the year eat fruits and nuts collected from the forest or cultivated. Likewise the majority of societies in Vanuatu cultivate fruit trees and regularly eat fruits and nuts. But when one reaches the islands of Polynesia, the situation changes. Consumption of fruits and nuts is often replaced by consumption of other, more modern foods that are nibbled in the same manner during the day. It is noteworthy also that species introduced subsequent to contact with Europeans are becoming ever more dominant, to the detriment of the local species.

The Melanesian countries are thus the custodians of a heritage that is both unique and diversified in respect of plant species with fruits and nuts. As is well known, deforestation is occurring in a number of locations and is causing these native fruit and nut trees to disappear. It is therefore becoming urgent to learn how to know and protect these trees.

In this context of change, we may ask with some disquiet what the future will be for traditional arboriculture in the Pacific, and for the indigenous species that this involves. These practices and these species constitute a heritage of Oceanian societies. They are well

adapted to local conditions and represent resources that could be developed, improved and spread. They also provide an alternative to exploitation of the forests. We therefore hope that the peoples of the Pacific will continue to be able to exploit

this plant resource, which has been bequeathed to them by their ancestors, and that they will be able in the future to preserve and develop this resource for their profit, according to their proper cultural and aesthetic considerations.

Traditional Alimentation in Oceania





Alimentary plants of Oceania

Oceanian alimentation is based on root crops (roots or rhizomes) and on the starchy fruits of certain trees. These plants are for the most part cultivated in gardens in land that is newly cleared, sometimes by burning a patch of forest or secondary vegetation on an ancient fallow. These are vegetatively propagated plants, which are multiplied by cuttings or planting of suckers, and which are grown individually. Trees with starchy fruits are cultivated in villages or around gardens, and are multiplied either by vegetative means, as with breadfruit, or by sexual means as with Tahitian chestnut.

These staple foods are complemented by leafy green vegetables, cooked fruits, seeds or inflorescences, meat or fish and other marine organisms. Finally, fresh or dried fruits are eaten in season, outside normal mealtimes. Fruits and vegetables may be cultivated in gardens or around the villages. They are more often wild, and may be the object of organised foraging expeditions or may be gathered casually.

In addition to this alimentation, which is described as traditional, there are nowadays in most regions commercial

products such as sugar, flour, rice, canned fish or meat, even frozen products which sometimes – or in some places often – replace the natural products that were utilised in earlier times.

Root crops

The two main root crops that are characteristic of Oceanian diets are yams and taros. Later also came sweet potato and cassava. Each society favours the growing of one or two species of root crops, around which the calendar of cultivation is organised. There is a marked preference for one or other root crop, which depends above all on what can be grown in the particular environment, but also on cultural aspects of choice. The main root crop or crops are in general those that are the commodities of customary exchange and to which special status and prestige attach. They are symbols of the abundance and wealth, sometimes even of the virility, of those who grow them. Each one of them is diversified into numerous clones or cultivars, which have slightly different appearances or tastes or textures or nutritive qualities, or even usages.

Yams

Yams (*Dioscorea* spp.) are grown in the great majority of Oceanian gardens.

The most important is *D. alata*, the root crop preferred by Tongans, which is planted from



May to December and harvested from December to June. It is also preferred by certain societies in Vanuatu which possess a hundred or so different clones of it. The agricultural calendar of the majority of Oceanian societies is organised around this culture.

The yam *D. esculenta* is likewise cultivated throughout Oceania. It is predominant in certain parts of Papua New Guinea and the Loyalty Islands. The cultivars selected in the Loyalty Islands are moreover of such quality that they have partly replaced the older local cultivars in certain parts of Vanuatu.

D. nummularia, incorrectly called "wild yam" in Vanuatu, is an ancient yam which is grown in forest areas, at the foot of large trees on whose branches the yam vines can climb.

D. bulbifera, without doubt the oldest of all Oceanian yams, is a wild plant that is unfit to eat without careful preparation. However, certain edible cultivars have been selected and are grown in gardens.

D. pentaphylla is a wild-gathered yam that is little exploited.

Finally, *D. trifida* is sometimes encountered, known in Vanuatu as the African yam even though it originated in tropical America from where it was introduced to the Pacific.

Taros

Taros (*Colocasia*, *Alocasia*, *Xanthosoma* and *Cyrtosperma*) are grown with the same degree of importance as yams, and they assume prime importance in for example Samoa.

Far and away the most common is *Colocasia esculenta*, which is planted throughout the year in Melanesian and Polynesian gardens, sometimes in humid rainfed areas in humid forests and sometimes under irrigation. Cultivated amongst yams, or in special taro gardens or in a *tarodièrè*⁴, this is in Vanuatu the root crop of the peoples of inland areas.

Alocasia macrorrhiza is a hardier taro, the root and stalk of which are rich in crystals of oxalates that irritate mucous membranes, requiring the plant to be cooked for a long time before it is eaten. Its culture is important in western Polynesia (Samoa, Tonga, Wallis and Futuna), but it is little utilised elsewhere. In Tonga it is planted from July to October and harvested from August to December, in other words just before *Colocasia esculenta*.

Xanthosoma sagittifolium (or macabo, cocoyam, tannia), originating from America and introduced during the European era, is a large taro found throughout Melanesia and western Polynesia. It is grown in the lowlands of New Guinea (up to 1,500 m altitude among the Ankave) and in Vanuatu

⁴ A taro garden, usually irrigated and comprising a series of small pits inside which flows water coming from a single source.

where it is called "taro Fiji". In New Caledonia it is known as "New Hebrides taro", and in Fiji as "Tanna taro" (Barrau, 1962). In New Guinea it is called "taro kong-kong", thus indicating its origin as Hong Kong. Its cultivation is quite easy, and it is tending to replace *Colocasia* in many places.

Cyrtosperma is the largest of the taros, and can reach 4 metres in height. It is found mainly from the Philippines and Indonesia to Cook Islands, via Micronesia. It is less common in Melanesia where its importance in the subsistence economy is slight.

Sweet potato

Sweet potato (*Ipomoea batatas*) is grown throughout Oceania, but it is in New Guinea that its cultivation is most important because it is the staple food for the people of the Highlands. Elsewhere it is grown as a complement to yams or taros, being eaten in the period between the harvests of these two main root crops. Gardens in Vanuatu and Tonga contain on average ten or so cultivars of sweet potato, while the Ankave of Papua New Guinea cultivate twenty or so cultivars.

Cassava (manioc)

Cassava (*Manihot esculenta*) is a plant of American origin that was introduced to Oceania at the beginning of the 19th century. Planted throughout the year, it grows in five

months to one year and produces very good yields. However, its nutritional value is poor. Its cultivation is more developed in western Polynesia (Wallis and Futuna, Samoa, Tonga) than in island Melanesia (Vanuatu). In New Guinea cassava is grown as a supplementary food.

Wild gathered root crops

The forest also provides wild root crops, which it appears were eaten regularly in earlier times and are still used in times of food shortage. Alongside wild yams (*Dioscorea bulbifera*) one finds cordyline (*Cordyline fruticosa*) which is eaten in Polynesia, *Amorphophallus campanulatus*, common in New Guinea but rare to extremely rare elsewhere, and *Tacca leontopetaloides* whose tuber provides a starch that is used to make a porridge. Consumption of these wild-harvested root crops is tending to disappear nowadays. Cordyline, for example, is no longer eaten in Samoa and Tonga except in times of food scarcity.

Vegetables

The original stock of vegetables, the composition of which varies from one region of the Pacific to another, has been considerably enlarged since European contact which with better communications allowed an enormous introduction of new species such as maize, tomato, cucumber, onion and pumpkin. Along-



side a series of plants, too numerous to list, that are grown or cooked locally, there are some plants that are very widespread and are eaten in numerous areas.

Cultivated vegetables

Cultivated vegetables include *Abelmoschus manihot* (*aibika*, *bele*, edible hibiscus, *choux canaque*), the green leaves of which are eaten from Sulawesi to Fiji, and two species of pitpit (*Saccharum edule* for its inflorescence, and *Setaria palmifolia* for its heart), as well as sugar cane (*Saccharum officinarum*) which we include here although it is not a vegetable in the strict sense. These plants, grown since ancient times, show much diversity. The Ankave of Papua New Guinea, for example, distinguish 14 cultivars of *Saccharum edule*, 6 cultivars of *Setaria palmifolia* and over 30 varieties of sugar cane.

Wild-gathered vegetables

Oceanians gather from the forest the young fronds of various species of edible fern, and the young leaves of certain trees such as wild fig (*Ficus* spp.) and *Gnetum gnemon*. They also eat the young leaves of taro, cassava and sweet potato and the fruits of certain plants such as *Trichosanthes* spp. and *Melothria* spp.

Fruits and nuts

Fruiting trees may provide starchy fruits which may be used as the basic ingredient of a meal to replace root crops, or they may provide fresh fruits and dried fruits.

Breadfruit

Breadfruit (*Artocarpus altilis*), an Oceanian plant *par excellence*, is cultivated throughout the Pacific, generally by vegetative means except in Melanesia where sexual propagation is mostly used. Breadfruit is a very diverse species, with an average of 30 or so different cultivars in northern Vanuatu (with more than 100 occurring in the island of Malo alone) and 10 or so in Tonga.

In Melanesia the forms with seeds are very abundant, while the parthenocarpic clones (i.e. without seeds and multiplied by suckers) are rare. In Polynesia the situation is reversed, and the parthenocarpic clones predominate. The tree is extensively grown in villages and around gardens.

Breadfruit is an important food in Vanuatu, where it is eaten in the interval between two harvests of yams. In Samoa it complements a diet based on taro. In New Guinea the species is mainly used for its edible seeds. The fruits, produced abundantly and seasonally, were in earlier times preserved by fermentation in pits or by drying in many regions of the Pacific. These techniques have tended to disappear nowadays.



Bananas and plantains

Domesticated bananas of Oceania belong to two main groups: firstly *Eumusa* which comprises the common bananas, and secondly *Australimusa* which includes *fe'i* (or *feh'i*) bananas which have an erect inflorescence and are a characteristic type of Oceania.

The first are cultivated from suckers in all Oceanian islands and represent an important subsidiary food throughout the year. In Samoa and in certain parts of New Guinea, they are a supplementary staple food in an important subsistence culture. Bananas are hybrid plants which were greatly diversified by pre-European societies. European contact allowed introduction into Oceania of new species (for example *Musa nana*, originally from tropical Asia) and facilitated spread throughout the Pacific of numerous clones that were previously specific to just one region.

The *fe'i* banana (named by some authors as *Musa troglodytarum* and by others as *Musa feh'i*) is found from New Guinea to the Marquesas Islands. It is mainly multiplied from suckers, although fertile forms exist in New Guinea, Solomon Islands and Vanuatu. Its fruits are eaten cooked.

Tahitian chestnut

The Tahitian chestnut (*Inocarpus fagifer*) is present throughout the Pacific and produces large

seeds, which when cooked are eaten in season. It is a cultivated and diverse species, with from four to twenty different cultivars according to region. In Vanuatu the species is more abundant in the south of the archipelago than in the north. In earlier times it was used to a greater extent and was more abundant than it is today.

Pandanus

Species of pandanus with an edible pericarp or seeds are found in Oceania, particularly in New Guinea where two of them provide a seasonal staple food for the local populations. These are red pandanus (*P. conoideus*), from which a sauce is made that is spread on cooked root crops, and *karuka* (*P. julianettii*), the oily seeds of which are eaten fresh or smoked. Elsewhere, in Vanuatu for example, the islanders eat the small seeds of *P. dubius* and *P. tectorius*.

Coconut

Coconut (*Cocos nucifera*), which probably originated in Oceania and spread out widely from there, provides through its different varieties the staple edible fruit in the diet of Polynesians and of the coastal populations of Melanesia. Coconut water, which is always sterile, is contained within the nut and provides a fresh and much appreciated drink. The albumen in its different stages of maturity is a daily food, most often eaten in the form of a sauce. The milk,

creamy or more liquid, is a medium for cookery. Following European contact, coconut has become an export commodity.

Sago

We also make mention of the sago palm (*Metroxylon* spp.) even though it does not bear edible fruits, because it provides a starch (sago) obtained from the trunk of the tree. The sago palm grows wild or cultivated in New Guinea where it represents a staple food for people of the lowlands. Elsewhere the plant is grown for its starch or instead (as in Vanuatu where people no longer eat sago) for its leaves which are used for covering the roofs of houses.

Other fruits

Fleshy fruits and dried fruits are provided in abundance by assorted species, often localised and generally more numerous in Melanesia than in Polynesia. This book is dedicated to these species.

The fruit trees provide all manner of foods: starchy fruits rich in carbohydrates, fresh fruits that provide vitamins, nuts eaten raw or cooked that often contain protein (certain of which are sold commercially in local markets: *Canarium* nuts, sea almond and cut nut, for example), and finally young leaves that are eaten as vegetables.

One may consequently ask whether harvesting from these trees was not one of the main modes of subsistence for the first (aboriginal) colonisers of the Pacific. But whatever the situation, their exploitation in favoured places integrates nowadays with the growing of annual garden plants and their consumption makes complete an Oceanian meal.

The traditional Oceanian "meal"

In this work we use the term "meal", but it has a significance both qualitative and quantitative that is much greater than the same term when used by western societies or in urbanised areas. In the latter situations the term indicates food that is taken each day at regular hours, in a prescribed cultural context, and it excludes foods that may be eaten between times.

In Oceania, and especially in Polynesia, the tendency is generally to eat when hunger is felt, and after physical exertion, and when food is available. Moreover, food may never be refused when it is offered. Much may be eaten on festive or ceremonial occasions, multiplying the meals and then fasting on the days preceding or following the occasion. Furthermore



nibbling, or eating of food in small snack quantities, is an important part of overall nutrition.

The rhythm and composition of meals varies according to circumstances, seasons and years, but also according to the region. Food always has importance from the social point of view, but it may acquire a value beyond just the social worth because it becomes the object and focus of formal exchanges as part of social and ceremonial obligations within and between communities. In this way it comes to have great value to individuals and to communities in western Polynesia, where food plant resources were in earlier times more meagre than they were in Melanesia.

Rhythm and composition of everyday meals

The rhythms of meals fluctuate with the structure of the day of each society. The composition of the meal, its methods of preparation and its timing fit in with a particular way of life, and in their detail they are the best adapted to the particular human community, evolving progressively according to the influences that bear on the community.

In Oceania, starchy foods form the staple of the diet, since cereal crops are absent from the region. Their consumption is

culturally so important that in many societies the same word is used to indicate both the food and the meal itself. The starchy staple varies according to season, but also according to the particular society under consideration. For example, in Vanuatu taro is eaten more by inland communities than by those on the coast; it is the predominant staple in Samoa, while in Vanuatu it is eaten to about the same extent as yams. Between December and February breadfruit becomes the main food for coastal populations in Vanuatu.

Various dishes are served as accompaniments to this main staple, the abundance and diversity of which varies according to the day, the season and the occasion. They comprise various boiled leaves, fruits of certain trees or other plants, fish, shellfish or meat. None of these by themselves constitutes a meal, but they break the monotony of the staple food and above all provide a balanced diet. Each season brings its harvest of particular wild or cultivated plants, and the introduction of new species has allowed significant enlargement of this choice of foods.

The most important and the fullest meal, which may be the only meal of the day in some regions, is taken late in the afternoon, at nightfall or in the evening. It is hot, substantial and generally comprises several dishes. There is always a dish of a root crop, banana or sago, with one or more other dishes as accompaniments.



Vegetables are always served; fish and meat much less often. In Tonga, Samoa and Vanuatu, pork is served on Sundays or during feasts. Other meats or fish are eaten two or three times a week, in small amounts. In Tonga, fish and crustaceans are eaten on the spot, to an extent that is not quantifiable, by men as they fish and by women and children as they forage along the seashore.

Another meal, hot but less elaborately cooked, is eaten in the morning on getting up. It usually consists of a dish of a root crop or bananas, sometimes livened up with cold leftovers from the day before. There are, however, some dishes that are typically served in the morning, such as in Vanuatu certain *lap-lap*⁵ dishes of breadfruit.

At the end of the morning, labouring in gardens may be broken with a light snack, prepared and eaten on the spot or made up of cold leftovers from the morning. It may comprise a grilled root vegetable, roasted bananas, nuts for nibbling or freshly picked fruits, even just a coconut to slake the thirst and ease the pangs of hunger.

Finally, the day is punctuated by constant picking of fruits and nuts, or snacks of pieces of root crop that the eaters have brought with them.

This snacking provides an opportunity for short breaks in the labours of gardening, for chat with people encountered along the way, or for stops when returning home. These snack foods vary with season and with region; they provide individual intake that is hard to measure in amount, but that is important qualitatively as a complement to the starchy staple throughout the year.

Drinks are never taken during a meal, but a drink is often served at the end. It may be fresh water, sometimes livened up as in Tonga with the juice of a golden apple (*Spondias cytherea*), or coconut water or a tea made from orange leaves. Drinks, like fruits, are taken outside mealtimes and mainly comprise fresh water or coconut water.

The abundance and diversity of the diet varies according to the season. Monotonous during the period between the two yam harvests, it becomes gargantuan during major feasts. It may also come close to famine after a violent cyclone, or in earlier times during wars. Periods of abundance may be followed by periods of food scarcity, when collection of wild foods and eating of snacks (nibbling) predominates over consumption of prepared meals.

⁵ A type of thick cake made by cooking a puree of grated yam, taro, cassava, banana or breadfruit in leaves.

Feasts and meals in times of scarcity

Feasts

Feasts are characterised above all by an abundance of the staple food, which must be the most prestigious of the root crops, and by a diversity of accompanying dishes and the presence of meat or fish.

The social and other implications of the feast vary according to its duration and to the abundance of dishes that are prepared and brought along, then eaten and distributed. The feast always marks important social occasions and accompanies all ceremonies intended to maintain and reinforce the mutual relations between one community and another. It is planned for long in advance, by cultivation of a sufficient quantity of root crops, and is prepared over several days. It is never in itself the purpose of a social gathering, but it is the symbol of it and the achievement of it.

Certain meals, while not really falling under the definition of feasts, still have wide social implications and are organised to offer a dish that is special and much appreciated. Thus the Ankave families of Papua New Guinea take turns to organise collective meals during which are served the oily red sauce prepared from red pandanus or that obtained by macerating the fruits of *Pangium edule*, according to season.

In Polynesia, funeral ceremonies can last for several days and are accompanied by conspicuous consumption of food, much greater than that of normal days.

In Tonga, the meals of chiefs have particular importance and are outside the normal type. They are more frequent and more regular than those of the common people. Each of them is prepared by cooks whose status is among the lowest in the hierarchy. Each meal comprises a starchy food, together with a great diversity of accompanying dishes. They are regulated, moreover, by strict protocol.

In Melanesia, in contrast, there is no difference between the food of people of high rank and those who are commoners. Each person, whatever their status, eats in the same way. No member of the community may lay claim to the food for themselves, and there is in fact an obligation on all to see that the food is shared equitably. In the cuisine of Vanuatu there is always a pot filled with a cooked root crop that is intended to be nibbled during the day by children and by passing adults. Likewise, a gift of raw food, root crop, a packet of edible hibiscus leaves or a basket of fruits is always made to a chance visitor, who must always accept the gift.

In Samoa feasts centre around pork, taro and *luau*⁶. There is no special meal for chiefs as such. Status is indicated by being served ahead of others (each guest receives their food on a platter made by plaiting a

⁶ Coconut milk salted with seawater and cooked in young taro leaves.



coconut leaf). Young people do not have a place in the "circle of honour" of guests, but wait at the edges and receive the leftovers, which are often plentiful. In fact the platters for people of high status are quite conspicuously provided with a surfeit of food, but custom dictates that those of high status are given much but eat little, at least at the time. They continue eating after they have returned home, with food that has been brought back from the feast by younger members of the family.

Meals in times of shortage

Periods of fasting, the significance of which seems to be greater in western Polynesia than in Melanesia, follow feasts during which large quantities of food have been eaten. These periods of shortage are generally caused by natural disasters, the most frequent and regular of which are the advent of cyclones. In a few hours these can entirely destroy food gardens and ruin the harvests from fruiting trees. In earlier times wars, during which one group of people would destroy the gardens and fruit trees of another group, had the same effect.

In such situations human communities have had recourse either to products that could be foraged or to products that were preserved. Among the foraged products would be plants that are not very abundant or ones that are toxic and require a long

preparation before they can be eaten. They are utilised very little or not at all except during periods of shortage, but they are carefully conserved in the forests in anticipation of such times of scarcity. Among these may be listed *Pangium edule*, *Entada phaseoloides* and *Cycas rumphii* in Vanuatu.

In Tonga and in coastal villages of Samoa, in times of shortage the men turn towards the sea and there gather seaweeds, shellfish, fish and seabird eggs, by means of which they are able to survive. It is then that certain lesser plants, if they fruit at the right moment, may become important. Likewise, in earlier time the roots of cordyline were baked in ovens of hot stones.

The preserved products are fermented pastes of breadfruit or taro, salted or fermented pastes of banana, smoked nuts and dried breadfruit. These are prepared during times of plenty, when the harvest of seasonal fruits greatly exceeds the need of the community, or immediately after a cyclone in order to save some of the fruits that have fallen to the ground.

In fact the food shortage consequent upon a cyclone does not occur during the days or even the week immediately after the event. At that time the villagers have at their disposal the products of their gardens that have been able to be saved and an abundance of fruits that have been knocked to the ground,



many of which are not far off reaching maturity. Serious food shortages threaten a number of weeks later, when the plants in the gardens are dead and the fruits have rotted.

It is then that the salted banana pastes begin to be used, and later the fermented breadfruit pastes as well as products of foraging. The pits of fermented breadfruit, and the smoked nuts, keep for several years. While in Vanuatu a number of communities continue to prepare these preserved products in the traditional ways, in Samoa only some old people can still recall the times when breadfruit was fermented in pits.

Finally, nowadays in times of food scarcity the communities of the Pacific turn to imported products such as rice, tinned fish or meat, and even bread. In Samoa, perhaps through the influence of the Chinese community, rice has been present for a long time. It is also the commodity that international aid distributes as a priority to disaster-struck communities after a cyclone.

Social aspects of nutrition

Gastronomy or the art of food preparation

Oceanian cuisine is subject to two main imperatives: under normal circumstances and particularly at the time of feasts, it is necessary that large quantities of food can be prepared relatively quickly, capable of satisfying the appetite of a family that is often extended, or of honouring what may be more than a hundred guests; in times of scarcity, it must be capable of transforming foods that are often toxic or unpalatable into edible dishes. Oceanian food is not served in portions, but as a large spread of foods that can be divided satisfactorily among a variable and often unpredictable number of guests.

The daily cuisine is everywhere done by women, who often help one another in the preparation of the main meals. In contrast in Tonga and in Samoa the cuisine, at least nowadays that for feasts, is the responsibility of men. In Samoa the traditional cuisine (cooking in an earth oven) is always a male task. Only cooking in pots (boiling in water), an additional method introduced by missionaries, is a woman's job; before then



boiled dishes were cooked by placing a hot stone into a bowl, and that was men's work.

Preparation of foods

Root vegetables may be peeled, by a motion from the body outwards, then cut up into large pieces and carefully washed. They may also be grated; in this case the intact root crops are wiped clean. Large leaves of vegetables, such as those of cabbage and certain taros, are either cut into very thin strips, or are left whole in order to wrap a paste of banana or grated root vegetable. In every case they are examined one at a time, and every bit blemished or chewed by an insect is cut out. The fruits of Tahitian chestnut are sometimes peeled before being boiled. It is then necessary to extract the seed of each one to avoid any bitterness. Fruits that can be cooked, such as those of the dragon plum (*Dracontomelon vitiense*), have their stones removed. Small wild figs are washed carefully and picked over. All the products thus prepared are arranged on banana leaves or food-wrapping leaves (*Heliconia* spp.), and are covered to avoid spoilage while waiting to be cooked.

Modes of cooking

The mode of cooking that is best adapted to Oceanian cuisine is without doubt braising in an oven of hot stones, called an earth oven or a Polynesian oven, which is done in two steps. First of all a pit is filled with stones, usually of volcanic origin, and with wood which is burned in order to heat the stones. Later, the embers and some of the hot stones are quickly pulled out, then the pit is lined with leaves on which are spread the food items, themselves wrapped in leaves. The whole is then covered with the hot stones that had previously been removed, and finally some more leaves which seal the chamber completely. As they slowly cool, the stones give out a constant heat which allows the food to cook over a number of hours.

This mode of cooking is obligatory for feasts, because it permits the cooking of impressive amounts of food and allows the preparation of the traditional dishes served on such occasions: either a mixture of root crops, vegetables, and meat or fish, sprinkled with coconut milk (which is commonly called "*le four*"), or it may be large cakes of grated root crops, stuffed with leaves or meat and sprinkled with coconut milk (the *lap-lap* of Vanuatu).

In everyday cuisine this method of cooking is used once or twice a week to make "*fours*" or *lap-lap* that is smaller and less elaborate. In such cases the cook uses the pit and the stones that are present in all kitchens.



Nowadays in urban situations it is possible to use the oven of a gas stove to cook certain dishes that are traditionally cooked in an earth oven, provided that the recipe is simplified; the tastes of the dishes are accordingly also modified.

As kitchens are nowadays equipped with metal cooking pots, foods are boiled in fresh water, sometimes with the addition of some seawater or water flavoured with aromatic leaves. They are cooked on an open fire, or in urban areas on a gas cooker. This is the common mode of cooking for the preparation of everyday family meals.

Before the introduction of cooking pots, this mode of cooking was virtually absent from Oceanian cuisine. It was achieved with the help of hot stones put into the liquid held in wooden vessels, or by using small, cylindrical bamboo containers filled with water or coconut milk and put to heat over an open fire. This is not suitable for cooking large quantities of food and was thus used only for cooking vegetables or small amounts of root vegetables. This method of cooking in bamboo containers is still used daily by isolated communities whose kitchens are not equipped with metal cooking pots. This is the case among the Ankave, who cook unpeeled root crops beneath ashes, then scrape away the burnt skin and eat them, or they peel the root crops and cut them into pieces, place them in bamboo containers over a flame, and cook them together with leafy vegetables.

Fish and unpeeled root crops were, and still are, generally grilled over live coals. In this way the dishes are prepared for a family meal or, more often, a snack meal. This is the mode of cooking preferred by those working in gardens, by men in the *nakamal*⁷ or by women who chatter away as they weave mats.

Flavours and gastronomy

The flavour of meals seems insipid to the Western palate and few seasonings are used, apart from turmeric (*Curcuma longa*) and ginger (*Zingiber zerumbet*), or nowadays chilli in small amounts. Aromatic leaves are sometimes used to flavour the water for cooking root crops. Nevertheless, the creation of sauces allows the food dishes to be livened up. The main ones are (in all coastal areas of Oceania) coconut milk, and (in New Guinea) the sauce from red pandanus (*Pandanus conoideus*) and from *Pangium edule*.

However, among those for whom this is the normal food, the flavours are more varied than they might appear. Two different varieties of taro, or of yam or banana or breadfruit, do not have the same taste. Moreover, different varieties are subject to different methods of preparation. For example, the variety of breadfruit used for roasting is not the same as that used for the preparation of *lap-lap*. The time of cooking likewise differs for each variety.

⁷ Bislama term indicating a building (clan hut) for men.



Regional styles may be distinguished, based partly on different products but also on the combinations of foods and the differing methods of preparation. These come to modify the basic and relatively simple food. According to the society, the preference maybe for leaves of wild fig with yams or taros, leaves of cabbage with cassava or banana, chicken with this or that root crop. There are some regional cuisines that are quite dry, using very little by way of fatty ingredients, and others that use an abundance of coconut cream and are much oilier. In Vanuatu, the methods of preparation of *lap-lap* vary slightly from one island to another. Some basic recipes are utilised by the households of an entire region, while others are localised to a single society or even a single village. Even though westerners sometimes deny the existence of any sort of gastronomy in Oceania, the multitude of recipes that may be found in this part of the world truly bears witness to its existence.

Etiquette and customs at the table

In Vanuatu, chiefs and commoners eat in the same manner, without any great precedence during a family meal. There is no fixed time for the meal, which is not the object of any particular ceremony. When the dishes are ready they are served on banana leaves, and all members of the family, men and women, may come and help themselves.

Generally the women, seated with their legs folded to one side, eat apart with their children. During this time the men are in the *nakamal* and drink *kava*⁸. On returning home they quickly take their meal, which has been kept warm, and often an infusion or a weak tea which the women have prepared if the men wish. It is not uncommon for an unexpected guest to turn up at a mealtime, and they will join the family or simply share a yam before leaving again.

In earlier times in Tonga, food for chiefs was more abundant and comprised special dishes. For example, turtle was a chiefly food while commoners gladly ate rat and lizard.

Men, sitting cross-legged, eat before the women who take their meal with the children. In this strongly hierarchical society, the elder members also eat before the younger ones. There does not seem to be any particular conviviality

⁸ A sedative, slightly intoxicating drink, obtained from the root of *Piper methysticum* and drunk by men at nightfall throughout the Pacific.

in the act of eating, apart from feasts in the course of which the exchange and distribution of food, as well as the protocol, takes on a major importance. Each person eats quickly, without any conversation.

At the end of the meal, damp coconut fibre is passed around for cleaning the hands. The etiquette at the table is very strict for chiefs: a lesser person may neither drink nor eat before a superior one. Nobody may therefore eat before the chief, nor he before the elders of his family. Likewise, as a sister in this society is superior to her brother, the latter will never eat in her presence.

In Tonga, as in Vanuatu, everyone may join without invitation in a feast. The food is distributed by the chief or by the host family to all those invited. In Tonga the portions vary qualitatively according to the status of the person (member of the group or guest), but in Vanuatu the portions are more or less the same. However, food is never refused when offered. In Samoa, feasts relate to a community (family or village). Those of high status are said to receive more food than the others, but eat less there and then. The main attention is given to the order of seating within the dwelling (the important directions being opposite to the centre of the village and the forest), to the right to sit within the first circle that is formed and served, and very markedly to the order

in which the guests are served. Even within the inner circle each guest must be served in turn, following the hierarchy that is already shown by the seating position that each one occupies.

Exchange of foods

Food products, raw or cooked, form the basis of a network and system of exchange between individuals and groups. The giving and the distribution of these products is in most cases more important than their consumption, and they are symbols of wealth and even of hierarchy. The importance of the food is such "that it creates, maintains and directs the social relationships" (Young, 1971: 146).

Among the Ankave of Papua New Guinea, the sauces made from the fruits of red pandanus and *Pangium edule* are always eaten at the time of communal meals which each family organises in turn, and for which they cook large quantities of root crops in half-sunken ovens. Portions of cooked sweet potato and taro are placed in leaves of *Cominsia gigantea*, which are lined up on the ground so that a man can pour the sauce over them. Although this relates to items of plant origin, this method of distribution closely resembles the rules governing the ceremonial exchanges of pork in the Western Highlands of the country.



In Tonga, the sharing of a pig or the distribution of baskets of food give an indication of the social importance of each person in the group according to the pieces chosen or the size of the baskets, which are offered publicly.

New modes of nutrition

The factors relating to food and feeding are subject to adaptations and changes that may partly or even wholly obscure the original modes of nutrition, or the old and the new may coexist together. This diet of vegetable origin (80% of the foods are starchy and combined with fruits, nuts and seeds of plants) has a low content of protein in the form of feathered and furred game, poultry, pork, fish and shellfish. It can nowadays be seen to have transformed to varying degrees according to the region, the extent of western presence and the extent to which the process of monetarisation has advanced, which may range from the initial stage of non-monetary exchange and barter to capitalist type economies.

New products

The advent of new products, natural or processed, allowed considerable enlargement in the choice of vegetables and fruits and increased the variety of species available locally, as also in the variety of animal protein. When no equivalent traditional

product existed, the commercial products were rapidly adopted. This was the case with salt and with sugar. Other manufactured products such as canned fish or corned meat have taken their places in the ceremonies of exchange, insofar as they are now the products of value and status, and the symbols of a new wealth.

But soon these new products replaced the traditional products, because they were easier to prepare and better adapted to modern lifestyles. In Samoa canned fish and mutton flaps from New Zealand are found in all the small village stalls, even those furthest away from the capital, and they are what is eaten unless a chicken has been killed (which is done mainly for feasts) or someone has had time to catch a fish.

A widespread transformation of societies

A new range of foods based on preserved food, salted or frozen meat and fish, rice and bread, sugar and industrially made snack foods (cakes, sweets, fizzy sweetened drinks) have now made their appearance, mainly in urban areas. As the medium for cooking, butter and oil have at great expense replaced coconut milk. This is very often poor quality oil that is not good for high temperature cooking. Nevertheless, frying is developing as a new mode of cooking.



Mainly in Polynesia and in urban Melanesian areas, imported products were eaten at first out of "food snobbery" because they were scarce, expensive and had a status value. Little by little they spread into everyday cooking to the point where they supplanted traditional fresh products.

The major transformation of Oceanian nutrition does not rest entirely with the introduction of new types of food, but also in the excessive consumption of preserved products and snack foods. Nutritional imbalances have appeared, and local economies have become unbalanced through massive importation of manufactured foodstuffs.

The use of such foods nowadays has passed beyond simple food snobbery and seems connected with new lifestyles and economic conditions. Indeed, in urban areas and for those on fixed salaries working to set hours, the traditional snacking in the course of a day is no longer satisfied by fresh fruit but has been replaced by chips, soft drinks and chewing gum. It is nowadays much cheaper to eat rice than taro or yam, and a good number of town dwellers do not have access to a garden and must purchase almost all their food needs in groceries or in the market (apart from that brought to them by relatives living in rural areas or that exchanged between communities).

The changes to nutrition are founded on changes affecting societies throughout Oceania, which are as much economic or related to urbanisation as they are demographic.

In Tonga, a parcel of land was normally allocated as a garden to each young man at the age of sixteen years, according to the Constitution of 1875, but this has not been possible for a number of years now because of the population increase. This has mainly impacted on people in the main island of Tongatapu, where 60% of the entire population of the archipelago lives, following domestic migration from outer areas towards the centre. In many places land is increasingly reserved for cash crops (such as that of squashes in Tonga), to the detriment of traditional cultivation and the equilibrium of gardens in which the rotation of crops also included periods of fallow. Yams, taros and even sweet potato are no longer affordable by ordinary people and are replaced by rice, wheat flour, preserved foods and factory-made delicacies.

In many families, cooking in an oven of hot stones is reserved for Sundays; the little parcels of foodstuffs for braising are nowadays wrapped in aluminium foil rather than banana leaves which take too long to collect from gardens; corned beef often replaces the fish and the chicken that was formerly in the parcels prepared in this traditional method of cooking.

A different alimentary repetitiveness has arisen with these imported products, accompanied by greater regularity in the timing of meals, giving an impression of improvement which belies the loss of the original balanced diet for which the imported products are an inadequate substitute.

Parallel to this, efforts to improve the local species, if poorly executed, risk favouring species and varieties liked by western palates to the detriment of plants adapted to the tastes and needs of Oceanians. The inevitable loss of genetic diversity of these local species will increase alarmingly, and will progressively and insidiously suppress the elements that gave originality to Oceanian nutrition and permitted the survival of local communities. Certain small regional dishes, such as dragon plums (*tambol*) in coconut milk or papaya stuffed with canarium nuts, *lap-lap* filled with taro leaves or baked *poire-tortue* (the fruit of *Burckella fijiensis*) will no longer be able to be made because it will not be possible to obtain the ingredients. At the very most they will become in their turn luxury dishes for well-to-do families before they disappear altogether from the culinary repertoire of Oceania. They are still, however, treats for village families who thanks to them can have a slight break from the monotony of the daily diet.

It should not be thought that the peoples of Oceania are giving in passively to this slightly exaggerated situation that we have depicted. First and foremost, nutrition in rural areas (at least in Vanuatu and Papua New Guinea) remains largely based on traditional root crops, consumption of fruits and nuts and on local resources.

In other ways Oceanian societies are developing several strategies for adapting to the new conditions. For example, the recent construction of a covered market in Port Vila nowadays permits residents of Efate to obtain fresh produce every day of the week. It seems quite likely that this market, by offering the possibility of commercial sale of garden produce, has stimulated such fresh production both qualitatively and quantitatively. Increasingly products may be found there that are more varied, more abundant and more suited to the local purse: imported products, to be sure, but also plants of the forest whose attraction is so great that the local people and even expatriates will get up early in the morning to obtain them. Hot cooked dishes of the traditional cuisine sold at affordable prices may also be bought there, which stimulates the creativity of the cooks and also indirectly protects the local gastronomy from the complete abandonment that is feared.



For all that, the transformation of these subsistence economies towards the conditions of a capitalist economy produces an illusion of abundance, and leads to very real nutritional imbalances. This is why the products and the cuisine of the Pacific must be recognised, valued and protected. The nutrition

will inevitably be subject to evolution, like that which has already occurred in the past. The important thing is to enable the peoples of Oceania to let this evolution happen while fully preserving the equilibrium that has been characteristic until now, and the flavours that have given Oceanian food its distinctiveness.



People of Oceania



Above: Chief Joseph Vira (Malo, Vanuatu).
Below: Enock Saro (standing on left) and
the Informants of Maewo (Vanuatu).



Mela Ruigi (Erromango, Vanuatu).



Above: Jenny Vira (Malo, Vanuatu).
Below: Chanel Sam, curator of the
Herbarium in Port Vila.



Traditional alimentation in Oceania



(Photo: G. Bourdy)



(Photo: G. Bourdy)

Above centre: Nangai nuts (Canarium) are broken one at a time between two stones.
Above left: They may then be grated to obtain a powder that is sprinkled on lap-lap.



Arthur Kalokul (left) and Richard (right) (Efate, Vanuatu).

Ekimani Taufu (Tonga).



(Photo: M.-C. Bataille Benguigui)



(Photo: P. Bonnemère)

William (Ankave, Papua New Guinea).

The people of Oceania have excellent knowledge and understanding of their environment and of the plants that they utilise.



(Photo: M. Bourtie)

Above: Assorted food dishes



(Photo: J.M. Bompardi)

Above: In Solomon Islands and in Vanuatu, Canarium nuts are dried and packed in sachets (Solomons) or jars (Vanuatu), then sold in local cash stores.

Below: Children eating Canarium nuts on the Island of Vava'u (Tonga).



(Photo: J.M. Bompardi)



(Photo: B. Allen)

On the Island of Boisa (Papua New Guinea), galip nuts (*Canarium*) are broken open in large numbers before being taken to the mainland to be exchanged for sago.



(Photo: J.M. Bompard)

Assorted nuts. Port Vila Market.

Nuts traditionally cultivated in villages or fruits of the forest are sold, often on skewers, in urban markets.



(Photo: P. Bonnemère)

Above: Among the forest-dwelling Ankave, the sauce of red pandanus (*Pandanus conoideus*) is collected in a *Heliconia* leaf and then poured over pieces of root crop, usually during communal meals.

Right: Vertical skewers: skewers of Tahitian chestnuts (*Inocarpus*).

Far Right: In Gaua (Vanuatu), nangai nuts are dried in their shells and kept in special baskets for years.

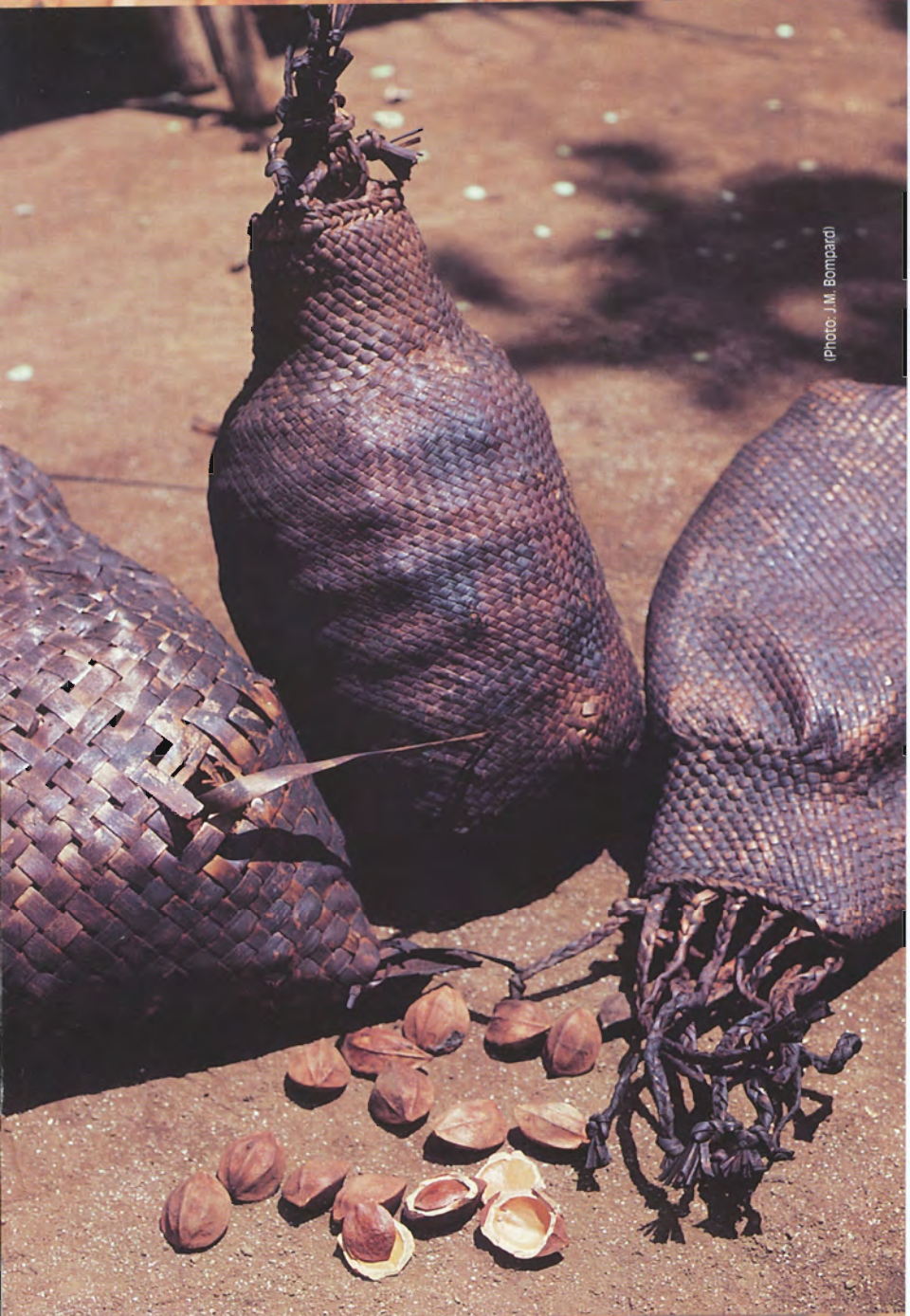


(Photo: J.M. Bompard)

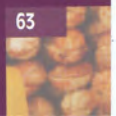


(Photo: C. Sam)

Horizontal skewers: skewers of fresh cut nuts (*Barringtonia*).



(Photo: J. M. Bompardi)





(Photo: M. Bourke)



(Photo: M. Bourke)

Above: Child breaking open sea almonds (*Terminalia catappa*) between two stones, Milne Bay (Papua New Guinea).

Below: In coastal regions, the sauce of red pandanus is prepared in a metal cooking pot and then spread over the root crops with the help of a spoon or ladle.



Traditional Arboriculture in Oceania





From the simple gathering of fruits in the forest to the planting of cash crop orchards, the exploitation of fruiting trees has undergone a slow intensification over the centuries, the consequences of which have borne at the same time on the progressive selection of certain species and on the modification of the landscape.

Traditional arboriculture is an important component of subsistence systems in Oceania, but this importance varies with time and according to geographical location.

The traces found today from archaeological excavations reveal ancient utilisation of fruits and nuts. In East Timor fragments of candle-nut⁹ have been found that date back to 3000 B.C. (Bellwood, 1985: 191). Excavations undertaken at Mussau have revealed an important assemblage of fruiting species (endocarp of candlenut, *Burckella*, *Canarium* nut, coconut, golden apple, sea almond; seeds of taun tree, pericarp of Tahitian chestnut, etc.) dating from 1200 to 1800 B.C. (Kirch, 1989). A complex of fruiting species, dating from a more recent period (from 50 B.C. to 1100 A.D.) have been brought to light on the southern coast of Viti Levu (Bellwood, 1979: 204).

If it is difficult from these traces to conclude the existence of a real cultivation of fruiting trees rather than a simple consumption of gathered fruits, it does seem clear that arboriculture has

been established in the whole of Oceania since the second millennium B.C. It widened out later on, as is shown for example by the great abundance of pits for fermentation of breadfruit found in the Marquesas Islands, an indirect sign of a major exploitation of breadfruit, from 1200 A.D. (Kirch, 1984).

It is quite difficult in the existing state of knowledge to define precisely when and where arboriculture began to appear. It was a progressive process, from simple picking of fruits in the forest, to protection of trees being utilised, then to their transplantation close to domestic areas, and finally their cultivation. In ancient times it was not an important component of food production, though it was practised even in ancient times in some areas such as the Santa Cruz Islands (Yen, 1974) and the islands surrounding Papua New Guinea. Arboriculture then intensified progressively, to the level seen nowadays where it is a major component of food production.

The development of these practices seems to have taken place very early in the islands situated around Papua New Guinea, in Solomon Islands and then in Vanuatu. In these island environments, less rich in food resources, with limited space and subject to the hazards of periodic droughts and cyclones, the communities were forced to develop, if not to invent,

⁹ The identification of the species cited here under their English names is given in the third part of this work (p. 79). An index of common names is also given at the end of the book (p. 311).



new practices for subsistence. It was then that arboriculture, as a system for exploitation of a natural resource, had to be developed. It is noticeable even today, throughout the islands of Melanesia, that the smaller the island the greater the density of fruiting trees and above all the better the quality of the cultivated fruits and nuts. Arboriculture is thus better developed in the islands of Vanuatu than among the forest-dwelling populations of Papua New Guinea (as among the Ankave). In Vanuatu, certain small islands situated opposite much larger islands (as with Lamén Island opposite Epi) have been transformed into veritable orchards.

It should likewise be noted that if the number of cultivated fruit trees decreases from west to east in the Pacific, so too does the number of different species involved in arboriculture. From prehistoric times one thus sees, from Papua New Guinea towards Polynesia, an impoverishment of the flora (since the beginning of human settlement), an intensification of arboriculture and a clear diminution in the number of species cultivated.

Everything has happened through the human communities progressively intensifying the care given to their trees, in order to increase the production of food resources which had become insufficient for reasons not yet determined: either because the available

species were less numerous, or because a given species no longer naturally produced enough food. Arboriculture thus became a more and more important component of subsistence systems.

Paradoxically, and doubtless for different reasons, arboriculture seems to have undergone a net decline later in the islands of Polynesia, so that nowadays it is less important there than in Melanesia.

The modes of utilisation of the land vary from one society to another, and their study is largely outside the scope of this book. We will give, however, by way of brief examples, the cases of two rural societies of Melanesia, the Apma of Vanuatu (central Pentecost) and the Ankave of Papua New Guinea, and then that of more urbanised societies of Tonga (in Polynesia), in order to illustrate the very different contexts within which arboriculture is practised nowadays. Then we will analyse the different aspects that this presents in Melanesia and more particularly in Vanuatu.

Not all fruit trees receive the same amount of attention and not all profit from the same degree of care. Some are scarcely protected at all, while others by contrast are cultivated and are concentrated near gardens or villages. The majority receive some sort of care and are the objects of various practices, which depend on the abundance of the species, its natural

habitat, the nature and degree of utilisation of the plant, and the strength of the attraction that it holds for an individual or for a society.

Modes of utilisation of the land

The case of the Apma

The territory of the Apma, like that of many societies in northern Vanuatu, is made up of juxtaposed pieces of land on which each member of the community has a right of use. The villages are small in size, rarely exceeding fifty inhabitants, and generally comprise one couple, their married sons, and the children of those sons. More or less at every generation one son will leave to found a new village, some distance from the first one, on a patch of virgin forest or more often on land previously the site of an ancient hamlet or an ancient garden. After that, each hamlet is only occupied for two or three generations and is then abandoned.

In addition, each family clears a patch of forest annually for cultivating yams. In the second year this garden diversifies, with taro, sugar cane, maize and edible hibiscus being planted in it. It is then cultivated for another

year or two before being abandoned. Each family thus cultivates two or three gardens per year, one of which is newly planted with yams. In general the piece of land cleared is larger than is used in the first year, so that the next year yams may be planted on the adjacent land that has already been prepared, and the crops in the garden can be diversified that year.

The gardens are thus most often situated close to one another. However, there comes a time when one will be further away. This is the case with rainfed (non-irrigated) taro gardens, placed at slightly higher altitude, or with certain strategic gardens opened up at the limits of the territory simply to claim the rights that are held over that land.

Thus the Apma horticulturists do not move far, and spend almost all their time in their villages, which they leave in the morning to go to the garden and to which they return in the evening to sleep there. The garden areas are situated an hour's walk away, rarely more. Foraging of fruits takes place in the area between the village and the garden. It may happen, however, that a temporary shelter is put up at a more distant yam garden, and this is then occupied during the period of harvest of these root crops. As for fruiting trees, they are generally transplanted or protected close to the domestic areas.

However, a continual rotation may be observed, over several generations, in the occupation of the land by the villages, the gardens and the fallows. Abandoned sites of settlement not more than a hundred years old are clearly marked by an assemblage of fruit trees which are occasionally harvested. It is there that one may find, for example, old *Canarium* nut trees (*Canarium* spp.), large taun trees (*Pometia pinnata*) or large cut nut trees (*Barringtonia* spp.).

The case of the Ankave

Among the Ankave, things are different. In establishing their hamlets and villages between 1,000 and 1,400 m in altitude, the Ankave are exploiting a series of ecological niches which are spread between 500 and 1,400 m, even in the hostile environments that are found at altitudes of 2,000 m. These different zones are regularly visited according to the rhythms of maturation and fruiting of the trees.

From October to December, the people move to the highest parts of their territory and they collect from the ground the fruits of the highland pandanus (*Pandanus julianettii*). From the months of April-May they install themselves for some weeks in the lower parts of the land where *Pangium edule* grows, in order to macerate the fruits of this tree. In June in the same areas they go to eat

breadfruits (*Artocarpus altilis*). As for the red pandanus (*Pandanus conoideus*), it grows at the higher altitudes, and it is this differential fruiting according to species and altitude that causes the people to have to move around.

In consequence, the Ankave spend half, even two thirds, of their time away from the hamlet that is their principal residence, even though these may be scarcely more than half an hour's walk away. With this is associated a marked wish among Ankave families for isolation, which wish they nevertheless breach on several occasions: the collective consumption of red pandanus or of *Pangium edule*, the occasion of *ad hoc* markets for selling of pork meat, the death of a near relative, an initiation ceremony or the conclusion of a period of mourning.

With this annual mobility is allied a second that corresponds to the cycle of the gardens and stretches over several years. When a family opens up a new garden, every two or three years, they frequently clear a portion of their land opposite the preceding site. It may even happen that an Ankave opens a garden solely for the purpose of affirming their right of usage over a portion of forest. But, while the Apma gardener truly does exploit the garden opened up in order to affirm the right of use, cultivating it like the others for three to four years, the Ankave gardener

encloses it poorly, thus allowing pigs to get into it. The garden, quickly ruined, is then abandoned without ever having been tended with any care.

The case of Tonga

In Tonga the first travellers from outside (Tasman in 1643, Cook in 1777, La Pérouse in 1787, Labillardière in 1793) all bore witness to a habitat scattered with a series of dwellings, mostly coastal, surrounded by lands cultivated in a manner that was "very dense and carefully looked after". At the beginning of the 19th century, civil strife forced the people to gather into villages to preserve and defend themselves. This tendency was further encouraged by the arrival of missionaries and the beginnings of education and of trade. In 1882 a subdivision of land was established in which every male at the age of sixteen was given a space in the village for building his dwelling (an *api kolo* of 0.125 ha) and a garden outside the village (an *api uta* of 3.34 ha) where he could grow root crops for food.

The traditional utilisation of land in these volcanic soils, or coralline soils enriched with volcanic ash, is as a mosaic of plots planted with a great diversity of species and associations of root crops. This cultivation is undertaken in an environment of secondary vegetation at various stages of regrowth, beneath the shade of a great variety of useful trees, protected or planted (Thaman, 1976). In these gardens the Tongans traditionally practise a rotation of crops over a ten-year period (in the order: yam, taro, sweet potato, cassava) and the alternating of cultivation on a third of the land and fallow on the rest. Each year they move the yam cultivation to a regenerated piece of fallow (reoccupied) and cleared by burning of the secondary vegetation that had grown back there (Crane, 1979).

Nowadays the massive increase in population (which has increased five-fold since 1920) and the development of cash cropping has meant that these periods of fallow have disappeared. This has led to intensive utilisation of fertilizers which, as is beginning to be evident, presents certain dangers.



Species foraged and species cultivated

Species foraged

The majority of plant species that produce edible fruits or nuts may be considered as species that are foraged. Thus in Vanuatu, where about forty species of edible fruits are known, about thirty species are never cultivated. Disseminated by ocean currents, by birds, by bats, these species reproduce spontaneously. Their growth is, however, protected by humans who leave in place the germinating seedlings and then the trees. These species are each designated by a particular name, with which a second term may sometimes also be associated that is intended to distinguish the different forms.

The territory exploited by each community is never very large, and each person knows the locations of all the useful trees and is thus able to harvest them according to their needs. In season the harvest may occupy the entire community. For most of the time it is opportunistic and occurs randomly as people walk in the forest or while they are out on a hunt. However, when a cyclone or a particularly serious drought has damaged or

even destroyed the gardens, the villagers need to have systematic recourse to the foraged species to ensure their subsistence. This is perhaps the main interest in this type of plant. They represent reserves on hand, an emergency nourishment however long they take to prepare but available during times of hardship. Thanks to these species the gardener can maintain relative nutritional independence, and likewise economic and political independence.

In the forests of the Ankave a number of trees with fruits or nuts grow spontaneously: *Finschia chloroxantha*, *Castanopsis acuminatissima*, *Gnetum gnemon*, *Sterculia*, and also *Ficus* and *Elaeocarpus*. Each species is only represented by a small number of individuals, for which most Ankave know the location but without giving any special care to the trees. Their fruits are eaten, raw or cooked according to the sort, in an opportunistic manner as the people move through the forest, and are only exceptionally picked to be taken back to the village.

Species protected

The fruits and nuts of certain species are gathered in abundance and eaten regularly. However, they are not the objects of real cultivation. In Vanuatu, for example, the majority of sea almonds (*Terminalia catappa*), *Burckella*

(*Burckella obovata*) and dragon plums (*Dracontomelon vitiense*) grow spontaneously in their natural environment. The sea almonds are situated in open spaces on the shore, which is generally where the villages are established, while the *Burckella* are found in forest up to 300 m altitude.

These two species reproduce very well spontaneously, and provide fruits that are destined to be eaten on the spot. The children from the villages gather sea almonds in abundance, while the hunters in the forest regale themselves with *Burckella*. However, gardeners transplant seedlings closer to domestic areas, or to an altitude where the species is less frequent or absent altogether, thus extending its distribution. One may therefore encounter a *Burckella* in a village, or a sea almond above 400 m altitude.

The main species exploited in semi-cultivation by the Ankave is *Pangium edule*. Each season, after treatment of the fruits on the spot, some seeds remain at the foot of the trees and give rise to young trees, and in time to little orchards which are then looked after.

Species cultivated

Finally, certain species are regularly cultivated. These are the ones that are eaten most of all, that produce the most abundant harvests and for which the availability is

widest. The majority among them have a wide geographical distribution: the Canarium nuts (*Canarium* spp.) are present (all species considered together) from Indonesia to western Polynesia; breadfruit is cultivated throughout the Pacific to Southeast Asia; the Tahitian chestnut is found from Malaysia to the Marquesas Islands.

These fruits are staple foods for Oceanians, and it is probable that their distribution actually reflects the geographical regions in which the ancestors of the island peoples of the Pacific dwelt in earlier times. Their spread results, at least for the most part, from human activity. These are generally coastal species, which are scarcely found above 1,000 m, even 600 m. They are ten in number: *Artocarpus altilis*, *Barringtonia edulis*, *B. novae-hiberniae*, *B. procera*, *Canarium harveyi*, *C. indicum*, *Spondias cytherea*, *Inocarpus fagifer*, *Pometia pinnata* and *Syzygium malaccense*. In Vanuatu all are found in the villages or close to domestic areas.

Through the centuries the cultivators have progressively gathered together the better forms of these species, on which they have exerted a gentle but continuous selection pressure. Multiplication, even though it can occur spontaneously, is assured by the planting of ripe fruits or of germinated seeds, or by transplanting young seedlings of sufficient vigour. In the end the



care given to these trees is minimal: the young seedlings are however protected from the sun, and weeds are eliminated. Dead or damaged branches are cut off, and the tree is pruned in order to reduce its height. When a tree is no longer productive it may be felled, or it may be kept to attract flying foxes¹⁰ which are then captured more easily, except in Tonga where their consumption is banned by tradition.

The Ankave of New Guinea really only cultivate two species: red pandanus and *Terminalia kaernbachii* which fruit poorly in the high areas and are found mostly in the eastern valley of the territory, below 800 m altitude.

The fifteen cultivars of red pandanus fruit at intervals of several weeks apart, during the period of heavy rains from September to April-May. In the overall diet their consumption proves important because of their content of protein and fats. It is a very much appreciated food to which the Ankave attribute the property of regeneration of the blood.

As for the nuts of *Terminalia kaernbachii*, they are in general eaten grilled, but may be prepared like the kernels of *Pangium edule* when the harvest is particularly abundant and the fruits are at risk of rotting before they can be eaten.

Selection pressure

Intraspecific diversity of cultivated species

All the cultivated species comprise several forms to which the gardeners give particular names, which is not the case with foraged species. The number of cultivars varies from one species to another, and from one region to another. Certain communities in Vanuatu distinguish up to a hundred different cultivars of breadfruit, twenty cultivars of canarium nut and nineteen cultivars of Tahitian chestnut. The Ankave distinguish fifteen varieties of red pandanus according to the shape of the fruit and the period of fruiting, while the Wola of the Western Highlands of Papua New Guinea only distinguish four (Sillitoe, 1983).

Because reproduction is sexual, there is systematic redistribution of genes in each generation of trees, which makes it difficult to get identical multiplication of these forms. Only breadfruit and to a lesser degree the golden apple, which may be propagated by asexual means, provide cultivars with stable names.

¹⁰ A type of fruit-eating bat common in Oceania.

However, it is undeniable that repeated selection of the same forms, generation after generation, has resulted in production of particular cultivars, clearly identifiable by name and recognisable by the colour of their fruits, the shape of their nuts and all other morphological characters. In the absence of any genetic study, we ignore the correlation between the genetic pool of these cultivars and their rich diversity of form. Since the trees have a long life-span, generally exceeding a human lifetime, it is quite difficult to determine the genealogical complexity of such vegetative forms. Certain trees with fruits of particular characteristics will nevermore provide exactly the same form and, in the absence of vegetative multiplication, their names will disappear with them.

Management of diversity

However it has happened, the repeated and continuous selection of the largest, sweetest, least fibrous fruits, the nuts that are largest or have the softest shells, the trees with abundant production or those that fruit a little before or a little after the main season, has led to the improvement and diversification of these species.

Generally the gardeners, aware of slight variations

in form, taste, colour and size of fruits that they are utilising, have a tendency to conserve each distinct cultivar, from preference, necessity or prudence. From preference because some individuals like to build collections that include cultivars not known to other people. From necessity because the different cultivars of a single species are not all eaten in exactly the same manner: certain cultivars of breadfruit cook more quickly than others, all Tahitian chestnuts do not have the same taste, each among them is therefore a slightly different food. Finally from prudence because certain cultivars are available before or after the others, or are more resistant to problems than the others.

The most popular cultivars are, however, propagated more frequently than the others and are therefore more abundant. If circumstances require it (most often through lack of available land), the least utilised cultivars are cut out. There is therefore an ongoing erosion of the genetic stock in favour of cultivars that correspond best to the tastes and the needs of the gardeners. Beyond the results provided by agronomic research, it is these tastes and these requirements that need also to be taken into account if the multiplication of certain cultivars is undertaken.



Modification of landscapes

A place for each species

These practices of selecting and assembling the better forms have resulted, over time, in a profound transformation of the landscape. The fruiting trees are found mainly in or near villages, gathered into small plantations, near the gardens whose boundaries they mark, along frequently used footpaths, or in some cases in the forests where they are dispersed.

The trees in the villages are those that are used the most. The smallest, like the cut nut, are planted close to dwellings and are regularly collected by children. So too breadfruit trees, whose dark foliage adorns the village, and some sea almonds planted for the shade afforded by their large crowns of horizontal branches. There is always a patch of land reserved for fruiting trees, at the edge of the village. There one finds, among the coconut palms, the cut nuts, the breadfruit trees, the Tahitian chestnuts, the golden apples, as well as species relatively recently introduced such as grapefruit and oranges.

The fruit trees are also planted around the gardens. The midday meal, a simple snack eaten on the spot, often comprises fruits eaten raw or, in season, a breadfruit quickly grilled.

Nowadays, because the pressure on land is becoming ever greater from the population explosion, these trees, spread between the cultivated plots, are often felled. The gardeners tend increasingly to concentrate their fruit trees into plots reserved for that purpose.

In the forest, apart from the spontaneous species, one also finds habitually cultivated species that have reproduced spontaneously or that are evidence of an ancient place of settlement. It is there that new cultivars may often be discovered. The forest trees generally possess fruits of poorer quality, and they are mainly utilised for their wood.

Each individual only plants a certain number of trees in their lifetime, but more than half the fruit trees counted in a village will have been planted by the current generation or the preceding ones. It is the cumulative effect over time of these small individual actions that progressively modifies the environment and results in creation of the existing landscapes.

Long term management of land

In reality, arboriculture is only one aspect of the considered management of the whole territory. The domestic zones, the cultivated spaces, the assemblages of useful species which stand out in the landscape and are

in harmony one with another in the exploited territory are not fixed and may be abruptly modified.

For example, the communities living on small islets opposite much larger islands may decide to open almost the whole of their gardens on the large island, following agreements with the communities of the main island or in order to affirm their right of usage over the land on which they are situated. In this case the islet is transformed into a huge orchard, over the span of a single generation. This situation must have occurred quite often in the past since one can see that these islets are often veritable reservoirs of improved fruiting trees. One illustration of such happenings is provided by the archipelago of Tonga of which the oceanic islands, denuded of populations, were planted in the last century with coconuts exploited for copra.

The migration of a community from the interior to the coast is accompanied by increased planting of fruiting trees in the new site of habitation and the progressive and partial abandonment of the genetic stock patiently built up in the course of preceding generations. In this case, the trees at the ancient site of settlement are used as a source of living material for replanting, and clearance of new domestic land combines with protection of every useful tree that is found there, which

may have been planted by an ancient community.

Arboriculture is thus bound up with the fundamental history of each community, and with the historical events that the community has been obliged to face.

Conclusion

Arboriculture is a fragile activity, because it is split into a great number of small operations occurring over a long period, and because it is protected solely by the wisdom and knowledge that go with it. It is also made fragile by virtue of the changes in usages linked to outside pressures (changes to modes of nutrition, impact of the cash economy).

Several thousand years old, it must nowadays adapt to new economic circumstances. Among the species wisely conserved by successive generations of gardeners, among the cultivars slowly selected by the ancestors, which are the ones that will survive the current day transformations of agriculture?

Which are the places where this rescue is still possible? Melanesia, and particularly island Melanesia, still possesses a living arboriculture. Western Polynesia, which already started with a more limited, less diverse inheritance of species and cultivars, seems by comparison to have temporarily forsaken the traditional cultivation of the local species. Melanesia thus appears to be the



holder of an important genetic stock, and the Melanesians are owners of precious knowledge. This biodiversity and this knowledge must be protected and utilised for reintroduction into other islands of the Pacific, such as Samoa and Tonga, of fruiting species of good quality, ideally adapted to local conditions.

At the same time, certain species such as canarium nut, cut nut, sea almond, *Burckella obovata*, golden apple, Tahitian chestnut, even *Burckella fijiensis* and *Finschia*, have some economic potential. Many among these are actually produced in sufficient quantities for commercialisation, at least locally, and could therefore provide supplementary incomes to local growers. It is not desirable at this stage to increase the planting of these species greatly, particularly while their agronomic characteristics are still not well investigated; however, even now it would be possible to utilise the

existing surpluses in a commercially viable way, by processing them and selling them in local markets. Demand from consumers is strong, and the first attempts at commercialisation that were started in Solomon Islands and Vanuatu have proved clearly that they can succeed. The local fruiting species of Oceania cannot by themselves alone improve the economies of the countries of the western Pacific. Nevertheless they are part of the local heritage, and if rapid attention is not paid to them they are destined to disappear, when they could, by their diversity and their good adaptation to local conditions, contribute to diversifying the crops and improving the standard of living of rural communities. We now describe these species one by one, while recommending that the necessary research for their protection and their development be undertaken without delay.

Ethnobotanical Inventory of Fruiting Species





The fruits (fresh or dried) which we present here comprise the great majority of species utilised in the western Pacific. Each species is treated in a separate entry, listed in alphabetical order of genus. Each entry starts with a box giving the name of the species, its botanical family, common names in English and French, the name in Bislama (the lingua franca of Vanuatu), the nature of consumption of the species, the part eaten, and whether there is any toxicity known.

This is followed by: the botanical description¹¹, any morphological variability, ecology and modes of exploitation, alimentary usage and other uses, other edible species in the genus, and bibliographic references. Geographical distribution is presented by a series of maps. Below are explanatory notes on these categories of information.

Common names:

Common names given to species are so numerous that it is impossible to list all. We indicate in bold type the names (in English and French) that are best established in the literature, and after them the names that are also quite often used. With the French names, the name of the fruit is given first followed by the name of the tree in brackets (Bizet & Walter, 1996). Some species do not have common names.

Vernacular names:

A multitude of vernacular names exist, thanks to the variety of languages that occur in Oceania, especially in Melanesia. In the box entry for each species we quote (if it exists) the name in Bislama, the lingua franca of Vanuatu which is the reference country for the whole of the present work. A list of the most commonly used vernacular names in Papua New Guinea, Solomon Islands, Vanuatu, Fiji, Samoa and Tonga is given at the end of the work (p. 289).

Botanical description:

The descriptions given are based for the most part on observation of living material studied in Vanuatu (not just on herbarium specimens).

Altitude

The range of altitude given for each species is that within which it is normally found. Additional figures in brackets are extremes of altitude recorded.

Geographical description:

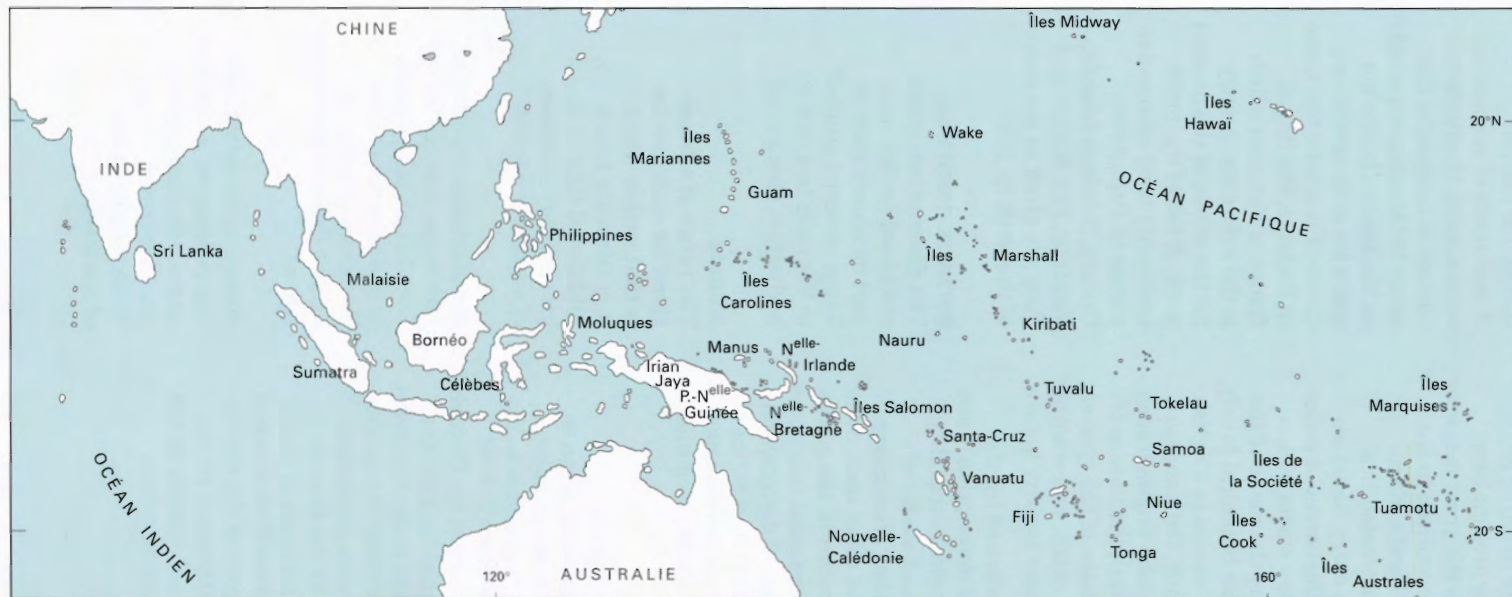
The maps indicate the distribution of the species at the moment of first European contact; the arrows indicate subsequent spread.

Bibliographic references:

The references, given in the shortened form of author(s) plus date, refer to the Bibliography at the end of the work (p. 261).

¹¹ The botanical descriptions unavoidably use technical botanical terms, but a Glossary near the start of this work (p. 13) should allow the terms to be easily understood.





The South Pacific

Key to French names:

Australie = Australia

Célèbes = Sulawesi

Chine = China

Îles = Islands (Austral, Caroline, Cook, Marshall, Midway)

Îles de la Société = Society Islands

Îles Hawaï = Hawaii

Îles Mariannes = Mariana Islands

Îles Marquises = Marquesas Islands

Îles Salomon = Solomon Islands

Inde = India

Malaisie = Malaysia

Moluques = Maluku

N^{elle} Bretagne = New BritainN^{elle} Irlande = New Ireland

Nouvelle Calédonie = New Caledonia

P.-N^{elle} Guinée = Papua New Guinea

Species

Aceratium oppositifolium D.C.

Family

Elaeocarpaceae

Consumption

In times of food scarcity.

Part eaten

Fruits.

Toxicity

None.

Description

Small tree (6-15 m) with a straight trunk. Leaves simple, lanceolate (6-11 x 2.5-3.5 cm), base rounded, margins undulate; 6-11 pairs of secondary veins; petiole 0.5 cm long. Flowers arranged in a pendulous raceme; calyx yellow-green, pubescent (2 cm); corolla yellow and as long as the calyx. Fruits green, then dark red when mature, oval (3-5 x 2-3.5 cm), with 3-5 more or less distinct faces.

Morphological variability

Wheatley (1992) indicated the existence of trees with white flowers, and Borrell (1989) noted trees with rose-coloured flowers.

Geographical distribution

Indonesia, Papua New Guinea, Solomon Islands, Vanuatu.

Alimentary uses

In Vanuatu the fruits are eaten cooked in times of food shortage. In Indonesia they are eaten raw or cooked.

References

Backer & Bakhuizen van den Brinke (1963), Borrell (1989), Wheatley (1992).

Species

Adenanthera pavonina Linnaeus

Family

Fabaceae

Common names (English and French)

Coral pea

Red sandalwood

Red bead tree

La cardinale (cardinalier)

Name in Bislama

bisa

Consumption

None in Vanuatu; occasional in Tonga; more regular in Samoa, as in India.

Part eaten

Seeds.

Toxicity

Considered to be toxic in some places, but regularly eaten in others.

Description

Tree of medium height (6-20 m), crown not very dense. Leaves compound, long (15-40 cm), made up of 3 to 6 opposite pinnate leaves (7-16 cm long); petiole 5-8 cm long; each pinnate leaf with 5-10 leaflets, alternate or sub-opposite, dark green, slightly glossy, elliptical (2-4 x 1.1-2.2 cm), base asymmetrical; veins invisible. Flowers grouped in dense spirals on an elongate axillary raceme; calyx minute; 5 bright yellow petals, lanceolate (4-5 mm); numerous stamens. The fruit is a brown pod, narrow and long, swollen at the parts where the seeds are, coiling round on itself when ripening and then opening to liberate the seeds; seeds bright red

and glossy, round or very slightly cordate (0.8 cm in diameter), flattened (0.5 cm thick) and hard.



Adenanthera pavonina.



Adenanthera pavonina: species indigenous to India, Sri Lanka, Burma, Malaysia, Indonesia including the islands of Indonesia to the Moluccas (Maluku). Also found as far as southern China, Vietnam, Cambodia, the Philippines and north-east Queensland in Australia. Probably introduced in ancient times to all the islands of Melanesia as far as Fiji, from the Indo-Malayan Region (Smith, 1985). Later aboriginal or European introduction to Fiji; European introduction further eastwards (as far as the Marquesas) and to Micronesia (Marianas and Caroline Islands). Introduced to New Caledonia at a date unknown.

Morphological variability

Nielsen (1983) recognised two varieties. The first, var. *pavonina*, is native to India, Sri Lanka and Myanmar. The second, ar. *microperma* (T. & B.) Nielsen, grows in South East Asia and in western Malaysia. Backer & Bakhuizen van den Brinke (1963) regarded this latter variety to be a distinct species (*Adenanthera microperma* T. & B.). The existence of these two species or varieties explains the different alimentary uses from one Pacific island to another.

Ecology and exploitation

In Vanuatu the tree, although not very abundant, is found in all the islands, from sea level to 400 m. It thrives in places that are somewhat dry, in calcareous soils, in open woodlands and in places disturbed by human activity. It is much rarer in the south than in the north. It is a naturalised tree that is neither main-

tained nor transplanted.

Its multiplication occurs through seeds dispersed by birds, though germination is slow. It fruits at the height of the dry season (June to August). Flowering occurs three to four months earlier, from February to April. Outside Vanuatu, the tree is generally naturalised in all Pacific islands, as in Fiji where it occurs from sea level to 600 m altitude (Smith, 1985). It is cultivated (from seeds or by cuttings) in India, in Guam and doubtless in other tropical regions. In northern India it may be found up to 1,200 m altitude.

Alimentary uses

In Vanuatu the seeds are not eaten except in certain villages on Santo. In Australia they are said to be toxic (Cooper & Cooper, 1994). The roasted seeds are eaten in India, in Wallis and above all in Samoa where they are sold in markets. Finally in Tonga children nibble them raw.

Other uses

The shiny red seeds of the red bead tree are used everywhere for making necklaces and bracelets that are nowadays sold to tourists.

In Guam, in southern India and in Sri Lanka the seeds are also used as weights, being very uniform in size and weight (0.26 g).

The timber is used for making paddles and for above-ground frameworks of houses. It is used for making artisanal objects such as kava bowls (Tonga), or when cut into boards for carved furniture (Wallis). The red wood is sometimes used as a substitute for red sandalwood (*Pterocarpus santalinus*), which doubtless accounts for its English name of red sandalwood tree. In India it is used

as a dye, and all parts of the plant (seeds, roots, leaves, bark) are used in traditional medicine (The Wealth of India, 1985).

Other edible species

The genus *Adenanthera*, distributed from southern China to the Indo-Malayan Region and Australia, comprises 12 species.

A. pavonina is the most widely distributed species, and is the only one that is eaten.

References

Backer & Bakhuizen van den Brincke (1963), Cooper & Cooper (1994), Corner (1988), Dupuy & Guiot (1992), Nielsen (1983), Parham (1972), Peekel (1984), Smith (1985), Stone (1970), *The Wealth of India* (1985), Whistler (1991), Yuncker (1971).

Species

Aleurites moluccana (L.) Willdenow

Family

Euphorbiaceae

Common names (English and French)

Candlenut

Candleberry tree

La noix de Bancoul (bancoulier)

Name in Bislama

Kandeltri

Consumption

Two to three kernels at the most.

Part eaten

Kernels.

Toxicity

Causes nausea and vomiting if consumption is more than two to three kernels. Cooking reduces or eliminates the toxic effect.

Description

Tree of variable height according to region (10-35 m). Leaves simple, alternate, furnished with a fine whitish covering that gives the foliage a pale green appearance; oval or trilobate (8-22 x 3-10 cm), base cordate; petiole 5-16 cm long. Flowers numerous, grouped in terminal bunches, greenish, small in size. Fruits green, then chestnut-brown at maturity, rounded (3-7 cm in diameter); peduncle less than 1 cm; containing one to two rounded nuts (2 cm in diameter), slightly flattened, furnished with grooves and very hard; the nut encloses an oily, white, rounded kernel.

Morphological variability

The size of the nut contained within the fruit varies from one region to another, and may reach up to 4 cm in diameter. A variety of *Aleurites moluccana* is found in Vanuatu (Maewo), introduced from Solomon Islands, of which many seeds can be eaten without any problem. It is therefore likely that several varieties of candlenut occur that are toxic to greater or lesser extents. Montrouzier (quoted by MacKee, 1994) distinguished three varieties, two of which contained a purgative oil and one of which had seeds that were edible and non-toxic. According to Brown



Aleurites moluccana: species present from India to the Marquesas Islands and from Guam to Australia. Wild in southern India, naturalised in the remaining countries. Undoubtedly introduced in very early times to Pakistan, China, north-eastern Australia, the Philippines, Malaysia, and all the islands from Sumatra to Tonga, including New Caledonia to where some authors believe that it could have been indigenous. Introduced by aboriginal peoples to the Society Islands, the Marquesas and Hawaii, and then by Europeans to Guam (from the Caroline Islands), to East Africa and more recently to America.

(1935), the inhabitants of Hivaoa and Fatuhiva also distinguish two forms of candlenut tree according to the shape of the leaf. Finally, Cooper & Cooper (1994) described the occurrence in Australia (Queensland) of two varieties of candlenut: *A. moluccana* var. *moluccana* and *A. moluccana* var. *rockinghamensis*. The latter variety is distinguished by the presence of 3 to 4 nuts in the fruit. Both varieties are toxic, but a small number of nuts may be eaten after being grilled.

Ecology and exploitation

Present in all the islands of Vanuatu, the species is quite common. It grows spontaneously from sea level to 200 m altitude, on calcareous soil or damp ground. The tree is not planted because seed germination is poor, but seedlings are protected. The flowering and fruiting seasons are difficult to define precisely. In Papua New Guinea the species is found from 0-1,800 (2,160) m

altitude (Bourke, personal communication); in Fiji it is found from sea level to 825 m altitude. The species is abundant and cultivated in the Indo-Malayan Region, in Polynesia and in Hawaii. In the Pacific islands the culture of this species was more important in earlier times than nowadays, and it is more important in Polynesia and in Hawaii than in Melanesia. In Fiji it is not found in forests, but occurs close to villages or at sites of ancient settlement; in Samoa it is not common except at particular spots; in Tonga it is common; in New Caledonia it is protected or planted; in Guam it is rare.

Alimentary uses

The seeds may be eaten raw in very small quantities (2-3 seeds). More than that causes nausea, and even vomiting and abdominal pains. The seeds may be roasted, which renders them less toxic. In Vanuatu, consumption of these toxic seeds is infrequent. In Java, on the other hand, they are

Plant part	Method of preparation	Utilisation	Location
Nut	Burnt to produce soot Soot mixed with bark of <i>Bischofia javanica</i>	<i>tapa</i> tattoos	Samoa Samoa- Marquesas Malaysia
		cosmetic for eye-lashes <i>tapa</i> tattoos	Tonga
Pulp	Juice pressed from pulp	dyestuff	Fiji
Internal bark	Juice pressed from bark (brown-red)	<i>tapa</i>	Austral Is – Cook Is, Marquesas Hawaii
		fishing nets	
Seeds	Ground and made into an ink	<i>tapa</i>	Wallis
Roots	Ground and made into a brown dye	<i>tapa</i> dyestuff	Fiji Java

Table 1. Different methods of preparing colouring agents from parts of candlenut tree

crushed and made into a sauce to accompany vegetable and rice dishes. Likewise they are used as a condiment in Hawaii and in Malaysia, after being roasted, crushed and mixed with salt and chilli. These seeds have a delicious flavour, but need to be eaten with caution.

Other uses

This species is greatly utilised in many regions, though not much in Vanuatu. In earlier times the nuts were threaded on to the midrib of a coconut palm leaf and lit. They burned slowly one after another, producing a feeble light. This usage, which has nowadays largely disappeared, was well known in many regions where the species was found, and gave the popular name of candlenut to the plant.

A brown or black dye may be obtained from the fruits, the bark or the roots. It is mainly used for producing designs on materials and on beaten bark (*tapa* cloth), but may also be used to colour fishing nets and tattoos or as a cosmetic (Table 1).

The oil extracted from the seeds was used in Fiji for polishing wood, in Tonga for making paints and varnish then used for *tapa* cloths, and in the Philippines for making soap, and paints for boats and artisanal objects. This oil is extracted in large quantities in the Philippines and in China. Fijians use the oil as a cosmetic for the hair and skin. Similar usage is found in Tonga, where the crushed nuts also provide a substitute for soap, and in Wallis where the crushed seeds are used for softening and scenting the hair. Medicinal uses are numerous throughout the area where this species is found. In Fiji, for example, an infusion of leaves or bark is used to treat mouth ulcers, crushed seeds to treat skin lesions and wounds, an infusion of bark to treat fevers and diarrhoea (O'Rourke, 1995). The fruit also plays an important role during childbirth (Seemann, 1862): it is placed in the mouth of the newborn child so that the juice cleans the throat of the child and helps it to cry. The seeds are laxative, and the fruit is an expectorant, and

the leaves, bark and roots are used in many medicinal preparations.

The wood is used in Rapa and the Austral Islands for making canoes.

In Hawaii the shell of the nut, which may be attractively polished, is used for making necklaces and jewellery (Neal, 1965). In the past the nuts were also first pierced and subsequently buried in taro pits (Brown, 1935). The seed rotted, and the shell then acquired an attractive black colour. Some of them were then carved.

Other edible species

The genus comprises six species present in Asia and the Pacific. No other species of *Aleurites* appears to be edible. However, four of the species produce an oil that is used in paints and varnish or for burning in lamps:

cordata (Thunb.) R. Br.
Ex. Steud.: Japan, recently introduced to Hawaii and New Caledonia;

fordii Hemsl.: indigenous to central and western China, cultivated in many tropical

regions including Hawaii; produces an oil called tung oil; in Fiji cultivated at experimental stations;

montana (Lour.) Wils.: Indochina and south-east China, known by the name *abrasin*; produces an oil identical to tung oil; cultivated in Fiji at experimental stations; recently introduced to Hawaii and in many tropical regions where it is cultivated;

trisperma Blanco.: indigenous to the Philippines; recently introduced to Hawaii.

References

- Brand Miller *et al.* (1993), Brown (1935, 1954), Burkill (1966), Christophersen (1971), Cooper & Cooper (1994), Corner (1988), Dignan *et al.* (1994), Dupuy & Guiot (1992), Hemsley (1894), MacKee (1994), Neal (1965), O'Rourke (1995), Parham (1972), Seemann (1862), Smith (1981), St John (1960), Stone (1970), *The Wealth of India* (1985), Whistler (1984b), Wichman & St John (1990), Wilder (1934), Yuncker (1971).

Fruits and Nuts of Oceania



(Photo: J. M. Bompart)

(Photo: A. Bizet)

Above: candlenuts for sale in a market in Tonga. Oil is extracted from these nuts.
Middle: candlenuts (*Aleurites moluccana*).
Left: coral pea (*Adenanthera pavonina*).



(Photo: P. Bonnemère)

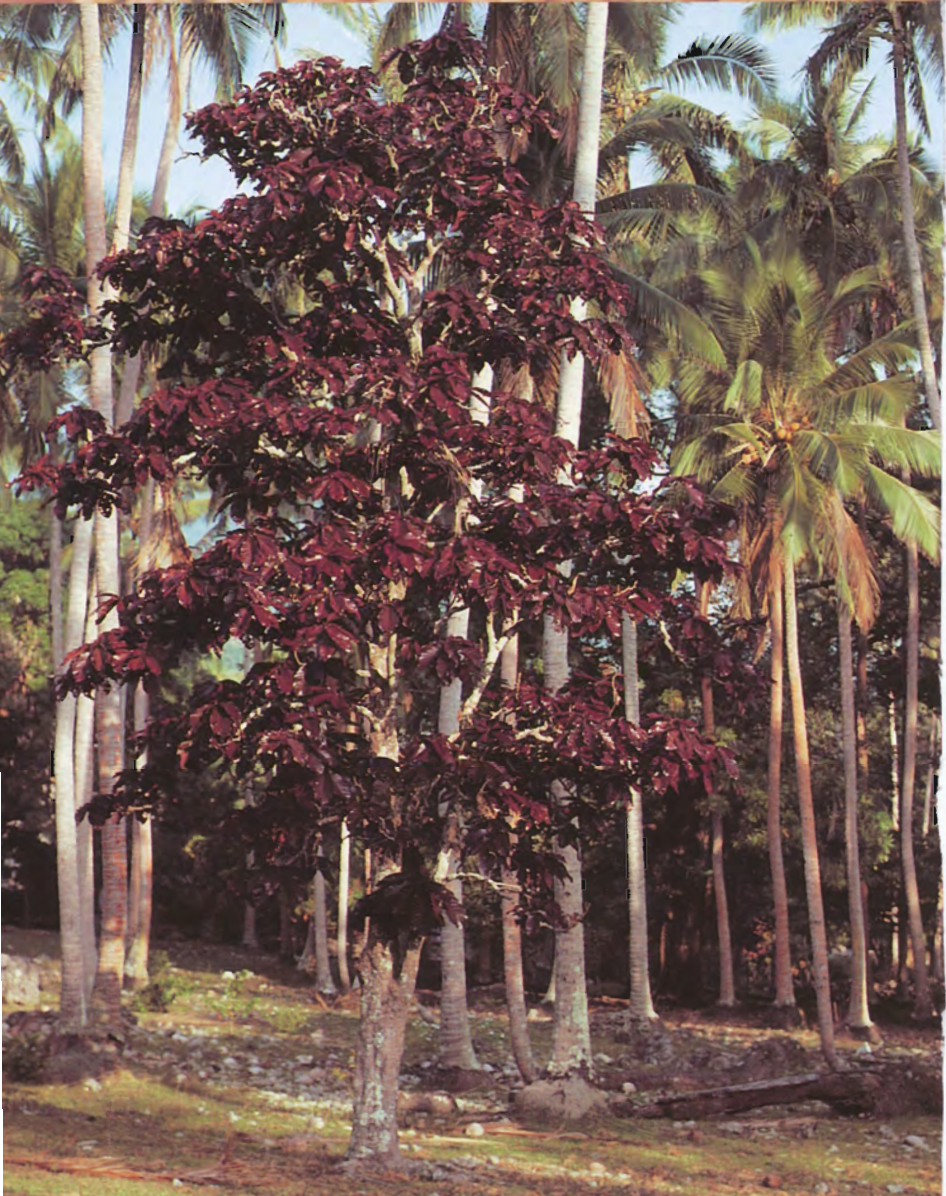
Above: Wild form of breadfruit (*Artocarpus altilis*) from Papua New Guinea.
 Right and far right: Cultivars from Vanua-Lava (Vanuatu); fruits and detail of the epidermis.
 Below: Breadfruits for sale in the market in Apla (variety *ulu aveloloa*).

Breadfruit shows great variability. Note the differences in form, colour and texture among these specimens from Vanuatu.



(Photo: J.M. Bompard)





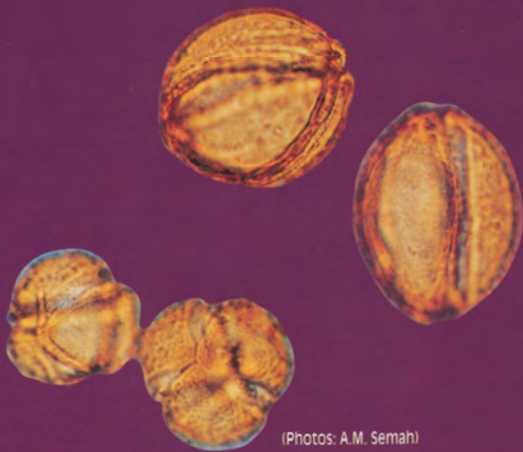


Raw, grilled
or boiled, cut
nuts are eaten
everywhere
in abundance.

Right: Inflorescence of *Barringtonia edulis*. Note how the calyx splits into several lobes.

Left: Cut nut with red foliage, typical of Vanuatu (*Barringtonia edulis*).

Below: *Barringtonia edulis*, magnified views of nut. Above: end-on. Middle: detail of groove. Below: lateral view.



(Photos: A.M. Semah)





In Vanuatu each community has its own collection of cut nuts. Here are several types.

Above: *Barringtonia edulis*. Fruit red and elongate, with a red endocarp.
Left: *Barringtonia edulis*. Green fruit, elongate with a red endocarp.
Right: Wild *Barringtonia edulis* from Fiji.





Left *Barringtonia edulis*. Very elongate fruits from Maewo.
Below: *Barringtonia edulis*. Form found in Tanna.



(Photo: J.M. Bompard)



(Photo: J.M. Bompard)



Above: *Barringtonia novae-hiberniae*. Note the round shape of the fruit, typical of Vanuatu, and the long petiole of the leaves.

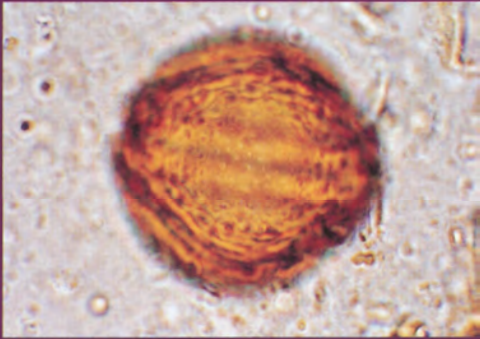
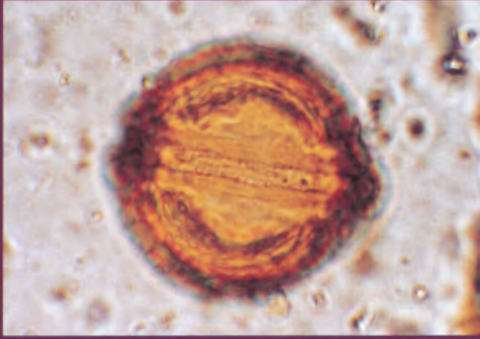
Below: Different types of *Barringtonia novae-hiberniae* fruit observed on Lamén Island (Vanuatu). Note the ring-shaped calyx of the fruits.





Often growing spontaneously, with round fruits and small kernels, another species of cut nut is *Barringtonia novae-hiberniae*.

(Photos: A. M. Semah)



Above: *Barringtonia novae-hiberniae*, magnified views of nut. Above: end-on. Middle: detail of groove. Below: lateral view. Left: Fruits and inflorescence of *B. novae-hiberniae* showing the large apical pore of the flower buds.





Above: *Barringtonia edulis*. Round fruits, resembling those of *B. novae-hiberniae*. Below: Inflorescence of *Barringtonia procera* (in the absence of leaves and flower buds, it can be confused with that of *B. edulis*).



(Photo: J.M. Bompardi)

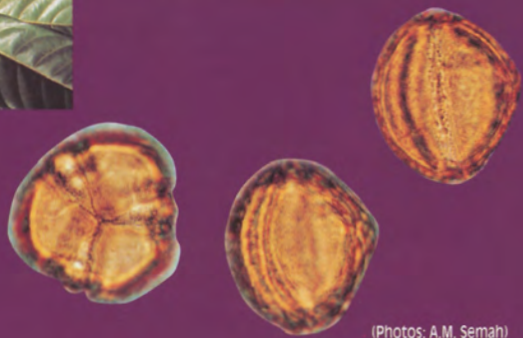




Above: *Barringtonia novae-hiberniae*. Fruits of very small size observed on Lamén Island (Vanuatu).

Left: Edible cut nuts of Vanuatu, not identified and growing spontaneously, very close to *B. novae-hiberniae* from Solomon Islands.

Below: *Barringtonia procera*, magnified views of nut. Left: end-on. Middle: lateral view. Right: detail of groove.



(Photos: A.M. Semah)





Barringtonia procera, another species of cut nut, does not tolerate shade well and requires much care. Always cultivated, it is found in different forms.



Above: Cylindrical red fruits with white endocarp.

Right: Cylindrical red fruits with red endocarp.





Above: Pear-shaped green fruits with red endocarp.





(Photo: C. Bourdy)

Above: Bundles of smoked cut nuts (*Barringtonia*) are hung under the eaves of houses where they keep for several months.
Below: Fruit of *Burckella fijiensis*.





(Photo: J.M. Bompard)

Above: Burckella fruit of elongate shape
Below: Burckella fruit (Burckella obovata), round in shape and smooth-skinned, cultivated and quite rare.

In order to savour the flesh of these fruits when fully ripe, people must thwart the efforts of fruit bats which are very fond of them.





The quality of their edible fruits justifies the protection of these species, certain of which are on the point of disappearing.

Above: fruits of *Burckella* sp. (*Cassidisperrum megahilum*).
Below: *Burckella richii*. Found at Mataka, Vava'u, Tonga.



(Photo: J.M. Bompard)



Species

Artocarpus altilis (Parkinson) Fosberg¹²

Family

Moraceae

Common names (English and French)

Breadfruit

Le fruit à pain (arbre à pain)

Name in Bislama

bredrut

Consumption

Abundant and regular.

Part eaten

Cooked pulp and seeds.

Toxicity

None.

Description

Tree of medium height (15-20 m), with a straight trunk, smooth and massive, the diameter of which may exceed 1 m. Leaves simple, dark green and glossy on their upper surface, light green and matt on the underside; large (20-60 x 20-40 cm); base pointed or rounded; margins entire, or deeply divided into 6-9 lobes; petiole massive, less than 5 cm long. Flowers grouped in a male inflorescence (elongate and pendant) or a female inflorescence (green, spherical or oblong), the two present at the same time on a single tree. Fruits (syncarps) formed from the whole female inflorescence, pale yellow to yellow-orange in colour, round, oval or oblong and variable in size; outer skin marked with hexagonal patterning that is more or less flattened, and with or without

a small spiny point in the centre of the hexagon; pulp more or less dry, in colour cream to dark yellow; seeds chestnut brown and more or less abundant except absent in aspermic (seedless) varieties.

Morphological variability

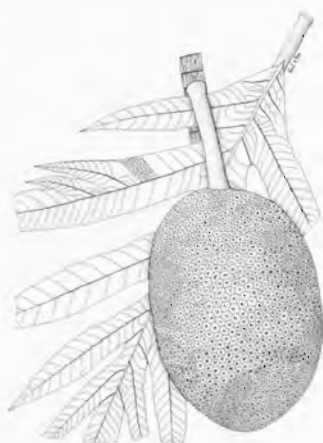
Breadfruit is a species that shows great diversity in Vanuatu, mainly in the north of the archipelago. Each community recognises different cultivars according to the size of the tree, the shape of the leaves (more or less divided), the size or the shape of the fruit, the presence or absence of spines on the epidermis and its colour, the texture, colour and taste of the flesh, the numbers of seeds, or the fruiting season of the tree. Some cultivars produce fruits

¹² Breadfruit has been well reported in the literature, to which we refer our readers for more information. See in particular Ragone (1998, 1991, 1997).

We present here mainly observations made in Vanuatu, because of a lack of information available from other sources for that country.



Above:
Artocarpus altilis: type with round fruits
 Below:
Artocarpus altilis: type with ovoid fruits



that can be kept for a long time; others bear fruit for a longer period of the year. The number of different morphological types recognised by horticulturists ranges from 10 to 120. However, it is certain that identical cultivars are found on more than one island, and a genetic study will be essential for classifying them. Whatever the situation, Vanuatu appears to be an important centre of diversity for breadfruit, and a key locality in the domestication of this species.

Seeded forms predominate in Melanesia (New Guinea, Solomon Islands and Vanuatu), while seedless forms predominate in Polynesia where the tree is therefore propagated by suckers.

Ecology and exploitation

In Vanuatu the tree grows abundantly up to 600 m altitude. The adult tree likes the sun and is found mainly in open spaces, villages, gardens and the edges of footpaths. It may be found in secondary forest, where it usually then indicates a site of earlier settlement. It is a cultivated tree. Breadfruits in Vanuatu always contain seeds, of varying numbers. There exist some fruits, very rare, that are considered seedless, though they do in fact contain some seeds.

Multiplication is by planting of fresh, ripe seeds, or vegetatively by transplanting of suckers. Fruiting occurs between December and February, followed sometimes by a further small production of fruits in June to August. Some cultivars fruit out of season. In Papua New Guinea the species is typically found from 0-1, 250 m altitude, but has



Artocarpus altilis: the centre of origin of breadfruit, long thought to have been Polynesia, is probably in fact New Guinea. In the pre-European times the species was spread by human activity from New Guinea to the Society Islands, Hawaii and the Marianas, via all the islands of the Pacific. It was introduced to the Philippines in ancient times from Guam (Ragone, 1991). Since then breadfruit has been introduced throughout the tropical world.

been found up to 1,450 m (Bourke, personal communication). Among the Ankave of Papua New Guinea, fruiting occurs in the month of June.

Alimentary uses

In Vanuatu breadfruit is cultivated for its fruits, which are cooked in various ways. They may be grilled, braised in an oven, sometimes cut up and boiled, and often grated and cooked in a *lap-lap*. The mode of cooking of each cultivar is according to the texture of its flesh. A fruit with softer, more flexible flesh lends itself well to being made into *nalots*, small balls of paste cooked in coconut milk; a large fruit with firm flesh is better roasted in its skin and then cut into pieces. Further, some cultivars are eaten in the morning, while others that can be cooked quickly are kept for unexpected visitors. In fact the methods of cooking and preparation of breadfruit are very numerous, and form part of the local gastronomy. The seeds are sometimes eaten separately, grilled

or boiled. They are nibbled after being removed from fruits that have previously been cooked. Young leaves that have not yet unrolled are also eaten, cooked by steaming. Pigs are fond of the uncooked fruits. In earlier times breadfruits were preserved all over Vanuatu by fermentation. Numerous techniques for preservation existed, sometimes in pits dug out in the ground, sometimes in natural hollows in coralline rock. These methods of preservation have tended to be lost, though they are still practised by several communities in Vanuatu, such as those of the Banks Islands, Pentecost, Malo, Ambrym and Emae. In New Guinea it is the seeds of breadfruit that are eaten, generally grilled, by the Ankave.

Other uses

In Vanuatu the sap of breadfruit is used as bird-lime for trapping birds, for covering damage to yams caused during their harvesting, and for caulking the timbers of canoes. The wood

is used as firewood or as timber for craft work. It is also used for making canoes, oars and outriggers. In Tonga the bark of small branches was formerly used for making tapa cloth. Nowadays two varieties (of the nine present in the country) are used in traditional medicine. An infusion of leaves or bark is used to treat mouth infections in children, abdominal and stomach disorders, and skin inflammations. A decoction of the bark is used to treat

intestinal disorders, fever and general aches and stiffness. The ash of burnt leaves is mixed with coconut oil, and the resulting paste is applied to burns. In Wallis the timber is used to make cross-beams of houses and poles of canoes. The sap is used for caulking canoes.

References

- Barrau (1957), Dignan *et al.* (1994), Dupuy & Guiot (1992), Purseglove (1991), Ragone (1988, 1991, 1997), Walter (1989).

Species

Barringtonia edulis (Miers) Seemann

Family

Lecythidaceae

Common names (English and French)

Cut nut

La velle (vellier)

Name in Bislama

navele

Consumption

Regular.

Part eaten

Kernels.

Toxicity

None.

Description

Tree of medium height (8-20 m), crown not very dense. Leaves simple, joined in rosettes at the ends of branches, shiny green, long and oboval (25-71 x 8-25 cm), thick and lightly undulate; petiole thick, less than 5 cm long. Flowers spirally arranged on a pendulous rachis (50-100 cm); calyx green or crimson, divided into 3-4 sepals, persistent; flower buds with an apical pore 2-4 mm in diameter; 4 cream or rose-coloured petals; numerous yellow or cream stamens, sometimes rosy at their tips; central style longer than the stamens, persistent. Fruits grouped along the rachis, red or green, ovoid or elongate (8 x 5 cm on average); sessile or pedunculate; containing one white kernel (2.5 x 1.5-3 cm).



Barringtonia edulis.

Morphological variability

In Vanuatu several forms of *Barringtonia edulis* occur, according to the colour, size and shape of the fruit. Each community possesses its own collection of cut nut trees, and each morphotype has its own particular name. Future research will be able to define the varieties that occur



Barringtonia edulis: Solomon Islands, Vanuatu, Fiji (but not Santa Cruz). Introduced to New Guinea (Madang region).

among these numerous morphotypes. One may distinguish:

- trees with red foliage, quite rare (the foliage of the cut nut tree is usually dark green). These trees have inflorescences that are entirely red – calyx and petals – and red fruits;
- trees with very elongate fruits (7-11 cm long), and others with fruits that are almost round, while the majority have ovoid fruits;
- trees with red fruits and trees with green fruits. The epidermis of the fruit is red or green; the other parts (epicarp, mesocarp, endocarp) are usually beige or white, but may be red in certain cultivars. The combinations of these colours have led to definition of several types (Table 2);
- trees in which the shell of the fruit is flexible and easy to break, while typical trees have fruits with a very hard mesocarp.

Besides these, in the south of the archipelago *B. edulis* generally has ovoid fruits,

Type	Frequency
RRWW	Rare
RCWW	Frequent
RCWR	Exceptional
RGRW	Rare
GRWW	Exceptional
GCWW	Frequent
GGRR	Exceptional

Table 2. Different types of *Barringtonia edulis* according to fruit colour

Key:

R = red; W = white; G = green
 1st letter = colour of epidermis
 2nd letter = colour of epicarp
 3rd letter = colour of mesocarp
 4th letter = colour of endocarp

quite like those found in Fiji, while in the north of Vanuatu one finds very elongate fruits, like those found in Solomon Islands.

Ecology and exploitation

In Vanuatu *B. edulis* grows in all the islands, up to 600 m altitude. The species is found in a cultivated state in villages, gardens and along tracks and roads. In secondary forests the species generally indicates the sites of former settlements. The forests of Tanna and Efate contain many spontaneously germinated trees, but it is difficult to be sure that they are really wild trees. Cultivated for centuries, the tree does germinate in the

wild from fruits dropped on the ground or spread by flying foxes. Such trees are less frequent in the north of the archipelago. Humans transplant young saplings, or plant whole ripe fruits directly into the ground close to dwellings. The species is carefully protected, and the best varieties and also the rare ones are selected. In Maewo, some horticulturists practise marcotting¹³ of *B. edulis*, with greater or lesser success, for propagation of interesting forms.

Flowering occurs several times per year, even continuously, with the flowering period varying according to island and individual tree. The fruits reach maturity during the two months after flowering. The period of availability of the fruits extends over several months in any particular region, and over the entire year throughout the length of the archipelago. Production varies greatly from tree to tree. The flowers are fragile, and on certain trees fall before fruiting. Other trees with shorter inflorescences may be more productive. One note: this tree flowers again and fruits very quickly after cyclones. Outside Vanuatu the species is cultivated in Solomon Islands (from seeds, or sometimes from cuttings); it occurs wild, or occasionally cultivated or semi-cultivated, in Fiji.

Alimentary uses

Throughout the area of distribution of this species, the kernels of *B. edulis* are

eaten raw, grilled or boiled. Sometimes they may be crumbled into *lap-lap*. The kernels, slightly dried, are sometimes threaded on the midrib of a coconut palm leaf and then given to children or sold in markets. In Gaua, the cut nuts are peeled, bound up in a piece of the bark of *bourao* (*Hibiscus tiliaceus*), then smoked and kept for several months over the hearth. Unsmoked, the kernels last at most for one or two weeks.

Other uses

Fallen branches or felled trees are used as firewood. The wood is of poor quality and is not used for manufacturing purposes. In traditional medicine the leaves are used for treatment of inflammation of the ear, the sap extracted from the bark for ciguatera poisoning, for coughs and for urinary infections; the form with red leaves is used for abortions or as a contraceptive.

Other edible species

According to Payens (1967) the genus comprises 39 species. In the Pacific the following species have edible kernels:

B. novae-hiberniae Laut. (cf. p. 114);

B. procera (Miers) Knuth (cf. p. 117);

B. seaturae Guppy: wild species endemic to Fiji.

References

Evans (1991), Jebb & Wise (1992), Payens (1967), Smith (1981).

¹³ A procedure for vegetative multiplication of plants in which part of a branch of the plant (usually a tree) is put into contact with soil (often

the soil is bound to the branch surface with plastic), and the branch roots into the soil before being detached from the parent plant.

Species

Barringtonia novae-hiberniae Lauterbach

Family

Lecythidaceae

Common names (English and French)

Cut nut

La velle (vellier)

Name in Bislama

navele

Consumption

Regular and abundant.

Part eaten

Kernels.

Toxicity

None.

Description

Small tree (7-15 m), open crown, denser than that of *Barringtonia edulis*. Leaves simple, joined in loose rosettes at ends of branches, glossy green, oboval (23-58 x 8-23 cm), flexible and flat, veins green or crimson, petiole slender, 2-7 cm long. Flowers set spirally on a terminal or lateral, pendulous rachis, which is fairly short (25-76 cm long); calyx green or crimson, entire (sometimes divided) and annular, persistent, flower buds with a large, upper apical pore up to 4 mm in size; 4 pale green or cream petals, numerous stamens yellow tinged with rose; style persistent. Fruits arranged close together on the rachis, red or green, circular or ovoid (4.2-6.7 x 5.2-9.0 cm); pedunculate; containing one white kernel (2.5 x 1.3-3.5 cm).



Barringtonia novae-hiberniae

Morphological variability

The variability of this species is less marked than that of *B. edulis*. Nevertheless several types may be distinguished, each with its own name in the local language.



Barringtonia novae-ibericae: New Guinea (north-east coast), Bismarck Archipelago, Solomon Islands, Santa Cruz, Vanuatu.

In particular there are:

- trees with red foliage, varying from dull red to deep violet (the foliage of this species is usually glossy green)
- trees with green fruits or with red fruits. As with *B. edulis*, several types may be distinguished according to the combination of colours of different parts of the fruit (Table 3).
- trees with very small fruits (4 cm in diameter)
- trees with fruits whose shell is soft and easy to break.

In Vanuatu *B. novae-ibericae* has fruits that are relatively homogeneous, ovoid or circular, while in

Solomon Islands the fruits are distinctly oblong and elongate (8 x 4.2 cm on average).

Besides these, one cultivar of *B. novae-ibericae* found in Ambrym produces fruits whose consumption induces a certain degree of dizziness like intoxication. These are therefore only eaten in small quantities. Yen (1974) likewise noted that consumption of seeds of *B. novae-ibericae* in the Santa Cruz Islands led to mild headaches in certain people. In this regard it is noteworthy that certain species of *Barringtonia* are toxic, for example *B. asiatica* (L.) Kurz, which is used as a fish poison.

Ecology and exploitation

In Vanuatu *B. novae-ibericae* grows from sea level to 600 m altitude. It is found particularly in villages, in garden areas, in forests modified by humans, and even in dense forest. Abundant in the islands of Epi and Emae, it is also present in Ambrym, Pentecost, Maewo and more rarely in Efate. No specimen has ever been found in Erromango or

Type	Frequency
RRWW	Rare
RGWW	Frequent
GGWW	Frequent
GGRW	Rare

Table 3. Different types of *Barringtonia novae-ibericae* according to fruit colour

Key:

R = red; W = white; G = green

1st letter = colour of epidermis

2nd letter = colour of epicarp

3rd letter = colour of mesocarp

4th letter = colour of endocarp

Tanna. This is a cultivated species, but wild-germinated plants are often found in forests, spread by flying foxes. Wild forms do exist, but it is difficult to distinguish them from wild-germinated domesticated plants. The tree is tolerant of shade. Flowering tends to be continuous, fruiting following two months after formation of flowers. Fruits are thus available throughout the year. The fruits are generally tightly packed on the infructescence and the tree is very productive. As with other *Barringtonia* with edible fruits, this species fruits quickly after cyclones. In New Guinea the species grows from sea level to 700 m altitude, in Solomon

Islands from sea level to 90 m altitude. Forest forms, probably wild, have been seen in the Santa Cruz Islands (Ndeni), in Solomon Islands and in New Guinea. The species is likewise cultivated in these three regions. In Solomon Islands and in the Santa Cruz Islands the species flowers two to three times per year.

Uses

Identical to those of *B. edulis* (cf. p. 111).

Other edible species

See *B. edulis* (p. 111).

References

Evans (1991), Jebb & Wise (1992), Payens (1967), Peekel (1984), Smith (1981), Yen (1974).

Species

Barringtonia procera (Miers) Knuth

Family

Lecythidaceae

Common names (English and French)

Cut nut

La velle (vellier)

Name in Bislama

navele

Consumption

Regular and abundant.

Part eaten

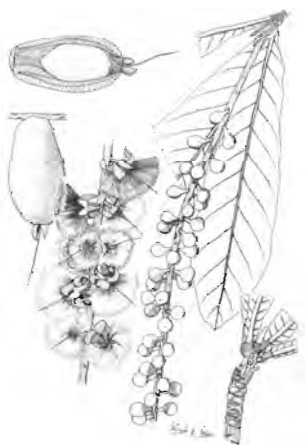
Kernels.

Toxicity

None.

Description

Tree of medium height (8-20 m), trunk slender and thin, branching very little, crown narrow and very loose. Leaves simple, joined in rosettes at the ends of branches, shiny green, lanceolate and narrowing in the lower third (35-70 x 12-24 cm), coriaceous; margins undulate; petiole thick, less than 1 cm long or absent. Flowers set spirally on a long, pendulous rachis (42-130 cm long); calyx green or red, divided into 2-3 lobes, persistent; flower buds with an apical pore less than 2 mm in diameter; 4 yellow or cream petals; numerous yellow stamens; style central and longer than the stamens. Fruits red or green, elongate or pear-shaped (5-13 x 3-6 cm), sessile; containing one white kernel (2-6 x 2-4 cm).



Barringtonia procera

Morphological variability

The fruits of *Barringtonia procera* vary in size, shape and colour. Thus in Vanuatu may be found:

- dwarf trees, the height of which does not exceed 2 m. These trees are quite rare, but are found in most islands of Vanuatu. They bear very poorly. Improvement of their productivity would produce orchards with trees of reduced height, easy to harvest;
- trees with cylindrical fruits, 8 cm or longer (most fruits of this species are less than 8 cm), present in the north of Vanuatu;
- trees with green fruits or red fruits (Table 4).

Type	Frequency
RRRR	Exceptional
RCWR	Exceptional
RGRW	Exceptional
RGRR	Frequent
GCWW	Frequent
GCWR	Exceptional
GCRR	Frequent

Table 4. Different types of *Barringtonia procera* according to fruit colour

Key:

R = red; W = white; G = green

1st letter = colour of epidermis

2nd letter = colour of epicarp

3rd letter = colour of mesocarp

4th letter = colour of endocarp

In Vanuatu (Emae) a single specimen is known that has on the same tree, though not in the same infructescence, both green fruits and red fruits;

- trees with a soft mesocarp which is easy to cut.

In general *B. procera* in Vanuatu has fruits that are longer and more cylindrical than those in Solomon Islands.

Ecology and exploitation

In Vanuatu the species is found mainly in villages and in gardens, at low altitudes. It is always cultivated, does not tolerate shade well, requires much care, and is rarely found as wild-germinated specimens. It is more frequent from the Torres Islands to Pentecost and Malekula, but is still well represented as far as Efate. It is likewise present in Futuna, but has not been recorded from Tanna or Erromango where it is without doubt very rare. Flowering and fruiting occur once per year, usually in the wet season from September to March. The number of trees that fruit in the off-season seems quite high. The trees are not very productive, being not much branched, slender and frail, and bearing few infructescences. Nevertheless, their fruits and their kernels are usually larger than those of other edible *Barringtonia* species. In Papua New Guinea it is found from 0-500 (600) m altitude (Bourke, personal communication). It is a species that is always cultivated, and no wild specimens are known. In Solomon Islands it flowers twice to three times per year.

In its entire area of distribution, *B. procera* thus appears to be a cultivated species, of which no wild form is known.



Barringtonia procera: Solomon Islands, Santa Cruz, Vanuatu. Possibly introduced to the Bismarck Archipelago and certainly to New Guinea (north-east coast).

Uses

The same as those of *B. edulis* (cf. p. 111).

Other edible species

See *B. edulis* (p. 111).

References

Evans (1991), Jebb & Wise (1992), Payens (1967), Smith (1981).



Species

Burckella fijiensis (Hemsley)

A.C. Smith & S. Darwin

Family

Sapotaceae

Common name (French)

La poire-tortue (poirier-tortue)

Consumption

Localised in Futuna; abundant in season.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Tree of medium height (10-20 m), trunk straight and massive; crown tall and dense. Leaves simple, alternate, oboval or oblanceolate (14-25 x 6-10 cm), apex rounded, base narrow; 9-13 pairs of leaf veins, petiole 3-4 cm long. Flowers arranged 20 to 30 in a terminal bunch; calyx green with 4 sepals (2 internal and 2 external), of large size (1 x 1 cm), with a brown, downy covering, persistent; 8 light green petals, lanceolate; 30-32 stamens. Fruits situated at the ends of branches, brown in colour when ripe; pear-shaped and slightly concave (8 x 6 cm); peduncle thick and 3 cm long; style persistent; fruit with abundant latex; 1-2 bulky, flattened seeds (6 x 5 x 3 cm), the dorsal part light brown and glossy, the ventral part pale beige and matt; margins irregular and furnished with protuberances.

Morphological variability

In the various local languages there are no special names to distinguish different types of this tree; however, the species appears to be very variable in size and taste of the fruits and their degree of sweetness; also in the seed, which varies in the degree of indentation of the margin, and in the ventral protuberances which may vary in number and how pronounced they are.

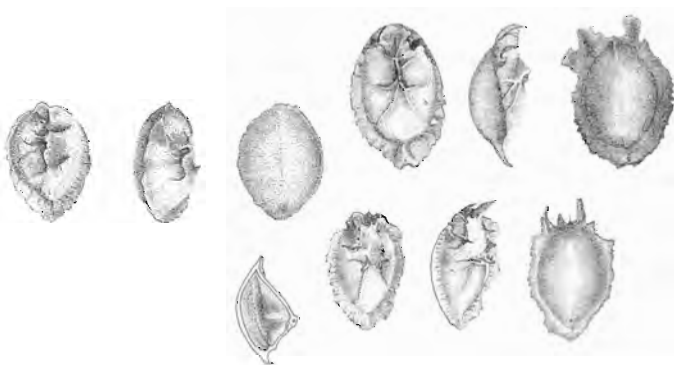
Ecology and exploitation

In Vanuatu this species is strictly localised to the island of Futuna, where it is very abundant from sea level to 200 m altitude. Large plantations exist in the vicinity of Mission Bay. The species is cultivated, but numerous self-germinated plants are also found. It was probably introduced from Fiji by the people of Futuna who came from the islands of the



Burckella fijiensis

central Pacific. The tree is very localised, and several local sources of information indicated that when the plant is transferred to other islands it does not bear fruit. It is propagated using very ripe fruits, seeds or cuttings of the branches. Propagation by cuttings is, however, difficult to achieve. The tree is robust, coping with shade as well as full sun, and dryness as well as humidity. However, it is susceptible to cold. The fruits reach maturity between October and December. In Fiji the species grows from sea level to 825 m altitude. It is the most common *Burckella* in Fiji.



Seeds of *Burckella fijiensis*. Illustration by F. Yoringmal



Burckella fijiensis: Fiji. Aboriginal introduction to Vanuatu (Futuna and probably Aneityum).

Alimentary uses

The fruit of *Burckella fijiensis* is edible and is eaten abundantly when in season. A ripe fruit can be distinguished by its soft and fragrant pulp, and by its dark brown seed. The delicious flesh, which has a distinct and delicate taste, is eaten fresh or roasted.

Curiously, the edible nature of this fruit has not been noted in the Floras of Fiji (Smith, 1981; Parham, 1972).

Other uses

The wood is used for making the frameworks of houses in Vanuatu and Fiji. The leaves are medicinal.

Other edible species

In 1892 Hemsley mentioned for the first time the existence of seeds collected in Fiji and Solomon Islands the shape of which resembled the shell of a small turtle. He called these *Chelonespermum*, and put them in a specific classification. Later other authors described as new the species that had already been identified by Hemsley, to which they also added new species (van Royen, 1959; Whitmore, 1966; Parham, 1972). Smith (1981), and later Pennington (1991), incorporated the genus *Chelonespermum* into *Burckella*, and made *C. fijiensis* Hemsley a synonym of other described species. Those authors never indicated the edible nature of the fruits. Pennington (1991) then distinguished 14 species of *Burckella* in the western Pacific (from

Maluku and Papua New Guinea to Fiji, Samoa and Tonga), which others in earlier times identified as *Chelonespermum*. Only *B. obovata* and *B. sorei* were mentioned as having edible fruits:

B. obovata (G. Forster) Pierre (cf. p. 123)

B. sorei van Royen: species endemic to Solomon Islands (Guadalcanal, Malaita and Santa Ysabel). Closely related to *B. obovata*, it can be distinguished by the smaller leaves and flowers. Its edible nature is noted on sample BSIP 2477 from Santa Ysabel.

We also note two other species the fruits of which may be edible:

B. richii (A. Gray) Lam: present in Tonga, more rarely in Fiji, and in the cultivated state in Samoa where it is very rare. It is called *kau* in Tonga and *au* in Samoa. No name has been noted for Fiji (cf. also *Cassidispermum megahilum* Hemsley, p. 127)

B. thurstonii (Hemsley) Lam: species endemic to Fiji, closely related to *B. fijiensis* from which it may be distinguished by its pilose corolla and its greater number (40) of stamens.

References

Gillespie (1930), Hemsley (1892), Lam (1942), Lam & van Royen (1952), Parham (1972), Pennington (1991), Smith (1981), van Royen (1959), Whitmore (1966), Yuncker (1971).

Species

Burckella obovata (G. Forster) Pierre

Family

Sapotaceae

Common names (English and French)

Burckella

Bukbuk

La doule (doulier)

Name in Bislama

naduledule

Consumption

Regular but not abundant.

Part eaten

Pulpy flesh.

Toxicity

None.

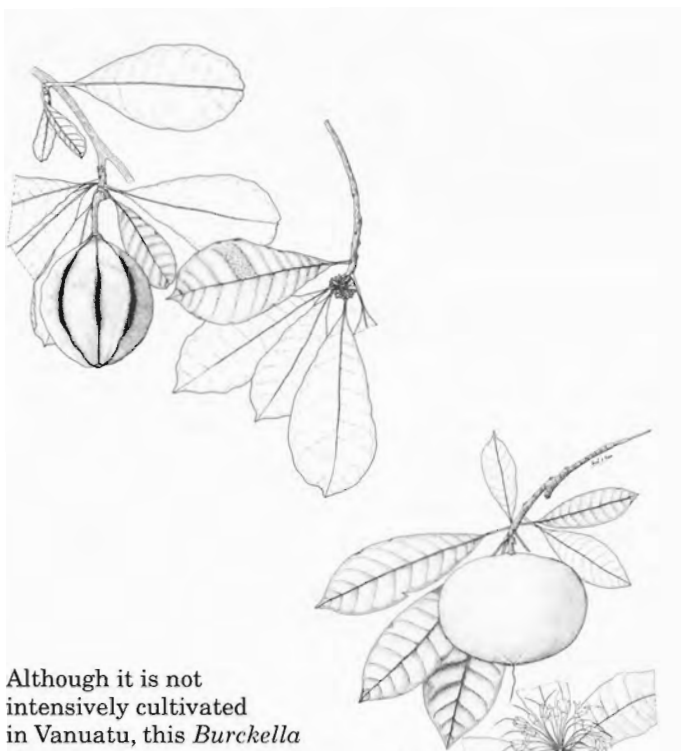
Description

Tree of medium height (15-20 m) in Vanuatu and tall (15-30 m) in Papua New Guinea; trunk straight and massive; crown dense. Leaves simple, mid-green, oval (10-30 x 4-11 cm), apex rounded and slightly acuminate, narrowed at the base; 10-18 pairs of veins; petiole 2-4 cm long. Flowers numerous (30-40) arranged in a terminal cluster; calyx green, with 4 sepals (2 internal and 2 external) that are small in size (0.2-0.4 cm), glabrous, persistent; 8 white or cream petals joined at their bases (0.8-1.2 cm); 12-13 stamens. Fruits green, rounded (5-12 x 4.5-9 cm) or elongate (8-14 x 4.6-7 cm), bearing 5 longitudinal grooves.

Morphological variability

Two main types of this *Burckella* fruit are found in Vanuatu – the elongate and the rounded, of which the latter may sometimes be very large. The former are commoner than the latter, and have the reputation of being sweeter. The rounded form may be further subdivided into smooth fruits and crenate (wrinkled) fruits, the former of these always being cultivated. The taste of the fruits varies from tree to tree, and villagers select and transplant those with sweet fruits and juicy flesh. Inside both types of large fruit, the elongate and the round, the morphology of the different parts is likewise variable.





Although it is not intensively cultivated in Vanuatu, this *Burckella* shows very great morphological variability. Yen (1974) distinguished three forms of the fruit in the Santa Cruz Islands, with elongate, round or cylindrical fruits.

Ecology and exploitation

In Vanuatu this *Burckella* is found in damp forests in zones of less than 300 m altitude. The species is wild but maintained by the villagers who know the locations of many of the trees. They may occasionally be replanted nearer to a village, using a seed from a very ripe fruit or one that has already germinated. It is particularly abundant on Tanna and the Torres Islands. The species is mainly spread by flying



Above

Burckella obovata: type with round, crenate fruits

Middle

Burckella obovata: type with round, non-crenate fruits

Below

Burckella obovata: type with elongate fruits



Burckella obovata: Maluku, Aru Islands, New Guinea, Solomon Islands and Vanuatu. Introduced to Fiji where it is rare and always in the cultivated state.

foxes, which eat the flesh of very ripe fruits and thereby compete with humans for this fruit. Flowering occurs between September and November and the fruits reach maturity at the start of the year (February to May). Production is very variable from one tree to another. In Papua New Guinea the species grows up to 390 m altitude (Bourke, personal communication). It is wild, but sometimes planted in villages. It is also cultivated in Southeast Asia, and in the coastal regions of the Santa Cruz Islands. In Solomon Islands the species is not cultivated outside Guadalcanal and Malaita.

Alimentary uses

Burckella fruits, together with the golden apple, are the largest edible native fruits of Vanuatu. They are harvested before maturity (to beat the fruit bats) by picking them directly from the tree, and then laying them in baskets where they ripen within a few days. They are eaten raw between meals, occasionally while walking in the forest or more regularly when in

season. But they are mainly a food of secondary importance, generally eaten away from the village. However, in Tanna where the species is abundant, the fruits are brought back to the villages when in season and are sometimes sold in the local markets. This forest fruit is only sold very rarely in the markets of Port Vila. *Burckella* fruits are likewise eaten in New Guinea, in Mussau, in the Bismarck Archipelago, in Guadalcanal, in the Reef Islands, in Malaita, in the Santa Cruz islands, in Anuta and in Tikopia. In the last two of these islands, the fruits are conserved through fermentation (Kirch & Yen, 1982) in pits identical to those used for conservation of breadfruit. In Solomon Islands the *Burckella* fruits are generally smaller and have a bitter taste, so they are rarely eaten except in the islands listed above. As in Vanuatu, the edible fruits are collected just before maturity and laid in baskets to finish ripening (Henderson & Hancock, 1989). In the Reef Islands the fruits are also eaten after being cooked in an oven.

Other uses

In Vanuatu the wood is used for making frameworks of houses, the cross-beams of canoes, and paddles. The latex is used for "setting" or fixing the colour and design of tattoos. Juice extracted from the grated bark is used for treatment of asthma and for promoting the lactation of sows. In Hiu for treatment of sick people the leaves are crushed and then heated; the person applying the treatment then puts the leaf mixture in their mouth and spits it forcibly on to the body of the patient. In Solomon Islands the wood provides a good timber for all sorts of constructional work and for making of canoes. Henderson & Hancock (1989) recorded

that communities on Santa Anna used the leaves of *Burckella* for rendering their earth ovens watertight. For this reason the species is much sought after. The flesh of the fruit produces a dye for certain communities of Papua New Guinea.

Other edible species

See *Burckella fijiensis* (p. 120).

References

Foreman (1971), Henderson & Hancock (1989), Kirch & Yen (1982), Lam (1942), Lam & van Royen (1952), Peekel (1984), Pennington (1991), Powell (1976), Smith (1981), Whitmore (1966), Yen (1974).

Species

Burckella sp. (*Cassidispermum megahilum* Hemsley)

Family

Sapotaceae

Consumption

Localised in the region of Lawa on Malekula.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

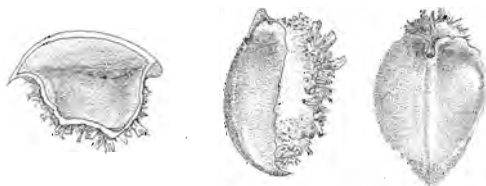
Tree of medium height (15-20 m); massive trunk; crown rounded. Leaves simple, grouped at the ends of branches, medium green above and light green below, oboval to oblong (10-14 x 3.6-5.4 cm), apex rounded and slightly emarginate, base narrowing to a point; margins slightly undulate; 10-12 pairs of fine yellow veins; petiole slender and 2 cm long. Flowers not seen. Fruits yellow-green at maturity, shining, spherical (5 cm in diameter), epidermis smooth and glossy, covered with numerous vertical grooves; peduncle 3 cm long; calyx with 4 sepals (2 internal and 2 external), small in size (0.3 x 0.5 cm); bulky seed (4 x 3 x 2.5 cm), the dorsal part dark brown and shiny, furnished with a slight median longitudinal ridge, the ventral part furnished with numerous hard spines and protuberances (Herbarium specimen CSV1026).



Burckella sp.



Seeds of *Burckella* sp. Illustration by F. Yoringmal



Geographical distribution

Observed in Vanuatu (region of South-West Bay in Malekula), but probably also occurring elsewhere in the Pacific. Further collections are needed, since the material at our disposal does not permit a more exact definition of the species.

Ecology and exploitation

This tree, common locally, grows at the sea's edge. It is wild, protected by humans and spread by fruit bats that feed on the flesh of the fruits. The production of fruits is important, distinctly more so than that of *Burckella obovata*. This seems to be a species heading towards extinction, and the good quality of its edible fruits justifies rapid preservation of the germplasm. It is a species with very narrow distribution, since it is known only from a single village in Vanuatu.

Alimentary uses

The fruits are eaten regularly when in season. Cooked according to need, they are baked on embers slightly before or just as they reach maturity. On the other hand when fully ripe the fruits may be eaten raw between meals, most often at the foot of the tree from which they came.

Other uses

The wood, of good timber quality, is used for constructional carpentry.

Other edible species

See *Burckella fijiensis* (p. 120).

References

Hemsley (1892),
van Royen (1959).

Species

Canarium harveyi Seemann

Family

Burseraceae

Common names (English and French)

Canarium nut

Pili nut

La nangaille (nangailler)

Noix de Kanari (noyer de Kanari)

Name in Bislama

nangai

Consumption

Regular and abundant.

Part eaten

Kernels.

Toxicity

None.

Description

Tree slightly smaller than *Canarium indicum* (15-20 m); trunk massive and straight; crown large, less dense than that of *C. indicum*. Leaves made up of 3-4 pairs of lateral leaflets and one terminal leaflet; petiole 4-7 cm long; leaflets opposite, oboval (11-37.5 x 4.5-15 cm), partially deciduous at the time of fruit ripening; stipule situated on the petiole 1 cm from its base, rounded (0.5-1.4 x 0.5-1 cm), deciduous. Flowers arranged in axillary panicles (10-20 cm long), numerous; 3 cream petals; species naturally dioecious, but man over centuries has managed to select trees that bear either male flowers and hermaphrodite flowers or female flowers and hermaphrodite flowers at the same time. Fruits in groups of 4-6, green then black

at maturity, ovoid (3-6 x 2-4 cm), slightly flattened on one side; the nut has 3 chambers of which two may contain a white kernel covered with a thick brown skin or membrane.

Morphological variability

Botanists distinguish several varieties of *C. harveyi*, two of which are found in Vanuatu:

C. harveyi var. *nova-hebridiense* in the north and *C. harveyi* var. *harveyi* in Erromango and more rarely in Futuna. They are differentiated mainly on the shape of their nut. A transverse section of the nut of the variety *harveyi* is triangular, while that of the variety *nova-hebridiense* shows three dorsal crests and one ventral crest.





Canarium harveyi: present from Solomon Islands to Tonga. Introduced in European times to Niue and Samoa.

In reality there are also many intermediate forms, particularly common in the centre of the archipelago. The vegetative parts of the plant do not seem to show clear differences from one variety to another. The botanical status of these varieties is thus debatable. The species shows less variability than does *C. indicum*. There exist, however, forms with a shell that is easy to open, and very rarely forms with three kernels.



Canarium harveyi

Ecology and exploitation

In Vanuatu the species is found in all the islands, but it is particularly abundant in the north (Banks and Torres Islands), in the centre (Epi, Emae and the Shepherd Islands) and in Erromango. Numerous wild trees have been observed in Erromango. The species is likewise present in Futuna. Elsewhere it is cultivated, but is harder to maintain than *C. indicum*. Propagation is by planting the endocarp of very ripe fruits of which the pericarp is black and soft. Some horticulturists prefer to dry the endocarp slightly before planting. Fruiting occurs some weeks

before that of *C. indicum*, between October and March. The production is less important than that of *C. indicum*. In Solomon Islands the species is cultivated and fruits from October. A certain number of trees may fruit precociously during the year, or may fruit twice in one year (Evans, 1991).

Uses

The uses are the same as those of *C. indicum*. The kernels, which are oilier, are nevertheless preferred to those of *C. indicum* for sprinkling on *lap-lap*. The

very abundant sap of the tree was used in earlier times as a fuel in small lamps. It is used nowadays to caulk the hulls of canoes.

Other edible species

Numerous other species of *Canarium* have kernels or flesh that is edible. We list here the species that occur in Southeast Asia and in the Pacific (for further information see Verheij & Coronel, eds, 1992).

C. album (Lour.) Raeuschel: Vietnam and southern China; seed and flesh edible;

C. decumanum (Rumph.) Gaertn.: Borneo, Maluku, New Guinea; sometimes cultivated, of little importance; edible seed;

C. hirsutum Willd.: New Guinea, Solomon Islands, Philippines;

C. indicum L.: see p. 132;

C. kaniense Lauterbach: New Guinea; edible seed;

C. luzonicum (Blume) A. Gray: endemic to the Philippines; edible seed;

C. oleiferum Baillon: New Caledonia; edible seed;

C. ovatum Engl.: species indigenous to the Philippines, known by the name of *pili* nut. Edible seed. Second nut cultivated in the Philippines, of very great economic importance;

C. patentinervium Miq.: Thailand, Malaysia, Indonesia; edible seed;

C. pilosum Bennett: Indonesia, Malaysia, Brunei; edible seed;

C. pimela Leenh.: indigenous to southern China, in Indonesia and in Brunei; edible flesh;

C. salomonense Burtt.: New Guinea and Solomon Islands; introduced specimens can also be found in Vanuatu; edible seed;

C. schlechteri Lauterbach: indigenous to New Guinea, New Britain; edible seed;

C. vanikoroense Leenhouts: Solomon Islands (Vanikoro), Fiji, probably also the Banks Islands and the north of Vanuatu (a single specimen collected: CSV945); edible seed;

C. vitiense Gray: western New Guinea, north Queensland, Vanuatu (CSV453), Fiji, Samoa and Tonga; mesocarp edible but little eaten;

C. vrieseanum Engl.: Indonesia and the Philippines; edible seed;

C. vulgare Leenhouts: Sunda Islands, Sulawesi, Maluku, New Guinea, probably Solomon Islands and Vanuatu (CSV686; RMV5), Fiji and Cook Islands; species abundant in Indonesia but from New Guinea progressively replaced by *C. indicum*; edible seed.

References

- Aburu (1982), Corner (1988), Evans (1991), Leenhouts (1955a, b, 1956, 1959), Malapa (1992), Smith (1985), Verheij & Coronel, eds (1992), Whitmore (1966).

Species

Canarium indicum Linnaeus

Family

Burseraceae

Common names (English and French)

Canarium nut

Pili nut

Java almond

La nangaille (nangailier)

Noix de Kanari (noyer de Kanari)

Name in Bislama

nangai

Consumption

Regular and abundant.

Part eaten

Kernels.

Toxicity

None.

Description

Tree of medium height (15-20 m) but able to reach 30 m; trunk straight, buttresses often massive; crown large and dense. Leaves composite with 4-8 pairs of lateral leaflets and a terminal leaflet; petiole 9 cm long; leaflets opposite, oblong (13.5-36 x 4.4-21 cm), base rounded and slightly asymmetrical, apex acuminate; stipules situated at the base of the petiole, large and toothed, persistent. Flowers set in axillary panicles (15-30 cm long), numerous; 3 cream petals; species naturally dioecious, but man over centuries has managed to select trees that bear both male flowers and hermaphrodite flowers, or both female flowers and hermaphrodite flowers. Fruits in groups of 6-12, green

and then black at maturity, ovoid (4-8 x 3-4.5 cm); hard nut, ovoid and triangular or hexagonal in cross-section, containing 3 chambers of which 2 are generally sterile, and the third contains a white kernel (3.5 x 2 cm) covered with a thick brown skin or membrane.

Morphological variability

Canarium indicum is a species that shows great morphological variability, from one tree to another and even within the same tree. Man has cultivated it for centuries, selecting and preserving forms with large fruits but also those with fruits of particular characteristics. Nowadays one can mainly distinguish

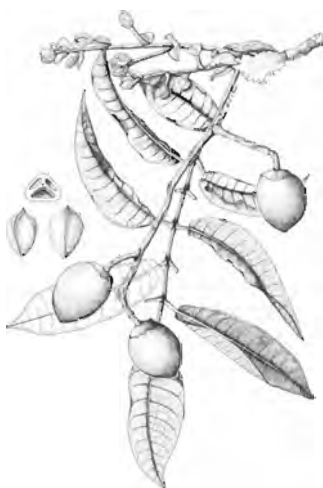


Canarium indicum: present from northern Sulawesi to Vanuatu. Possibly an early aboriginal introduction from the Solomon Islands. Introduced later and cultivated in other islands of the Pacific such as Fiji, Samoa, Cook Islands, Hawaii, the Philippines and Guam.

forms with round fruits, which are very much predominant in Vanuatu, and others with elongate fruits. The situation is the opposite in Solomon Islands where the majority of fruits are of elongate form (Evans, 1991). It is noteworthy that a significant number of fruits cannot be classified. Measures of length, width, thickness, weight and density made on more than 1,000 nuts obtained from different trees in Vanuatu did not reveal the existence of any clearly defined variety (de Biran, personal communication). The variability includes, as we have seen, the shape of the fruits but also the number of kernels in a shell (1 or 2), the colour of the kernels (white or yellow), the rhythm of flowering (some cultivars with continuous flowering), the productivity and the ease of cracking of the nuts.

Ecology and exploitation

In Vanuatu the tree is found in secondary forest up to 400 m altitude. Frequent in the north of the archipelago, it becomes rare from Erromango and is absent



Canarium indicum

from Tanna. The tree, protected in forests, is cultivated around domestic areas (villages and gardens). People transplant spontaneously germinated seedlings or plant in shallow holes fruits that have reached full ripeness or have the endocarp slightly dried. The cultivated trees are pruned to make the fruits easier to pick. In Vanuatu the fruits generally ripen between October and March. Flowering occurs immediately afterwards, followed by a long period

of maturation of the fruits which finally become black. The period of availability of the fruits varies slightly from one year to the next, and also from one tree to the next, since human selection has produced some trees that continue to fruit a little out of season. Generally the cultivated trees are very productive. Trees carrying female flowers are more productive than those with male and hermaphrodite flowers. Forest trees are less productive, and are mainly used for their timber. In Papua New Guinea the species grows from 0 to 700 (930) m altitude (Bourke, personal communication). In New Britain fruiting occurs twice per year, between the months of August and November and then again from April to May. The species is cultivated throughout its area of distribution, but particularly from Papua New Guinea eastwards. In Solomon Islands *C. indicum* is cultivated and often pruned. Young trees survive cyclone strength winds with little damage (Evans, 1991).

Alimentary uses

This is an important food plant in New Guinea and in Vanuatu. In Vanuatu the *nangai* are eaten fresh, as soon as they are picked. They are collected by knocking them down a little before maturity, just as they begin to become black. At this stage they are less oily and are easier to digest.

The hard shell of the nut is cracked between two stones that hold the nut vertically. It is also advisable to remove the thin brown skin that surrounds the white kernel, because this gives a slightly bitter taste to these nuts of exquisite taste and delicate texture. They may be boiled, roasted or crushed and sprinkled on the *lap-lap*. In certain regions, in particular in the Banks Islands, the nuts are preserved by smoking, after the fleshy mesocarp has been removed. They are placed on racks over the hearth or inside little huts constructed for this purpose and under which a small fire is kept permanently burning. They dry slowly, and are then placed in special baskets with a narrow aperture in which they will keep for several months or even several years. In Solomon Islands the nuts are preserved as in Vanuatu on bamboo racks over the hearth. The seeds are also extracted from their shells and cooked in an oven with hot stones until they are dry, then kept in closed containers for several months (Henderson & Hancock, 1989). The nutritional importance of these nuts and their potential for commercialisation has led Solomon Islands and Vanuatu to undertake some research on their taxonomy and agronomy. Indeed, both countries have started some local commercialisation successfully.

Other uses

In Vanuatu the timber is used for making canoes and paddles or for constructing timber frameworks. The buttresses are used for wood sculptures. The bark is used in traditional medicine for treatment of vomiting, and the young leaves for treatment of scabies and ciguatera poisoning. In New Guinea and in Solomon Islands the wood is also used for making canoes and bowls.

Other edible species

See *C. harveyi* (p. 129).

References

Aburu (1982), Brown (1954), Corner (1988), Evans (1991), Henderson & Hancock (1989), Leenhouts (1955a, b, 1956, 1959), Malapa (1992), Peekel (1984), Smith (1985), Whitmore (1966).

Species

Castanopsis acuminatissima Blanco

Family

Fagaceae

Common name (English)

Castanopsis chestnut

Consumption

Occasional.

Part eaten

Seeds.

Toxicity

Tannins present but eliminated by cooking.

Description

Tall tree (10-36 m) with large trunk. Leaves simple, alternate, dark shiny green above and silvery brown beneath, oval, lanceolate or even elliptical, 5-15 cm long. Flowers grouped in a male inflorescence (narrow spikes, beige in colour) or a female inflorescence (10 cm long rachis, greenish in colour), both present together on the same tree. Fruits formed from a single seed, held at its base in a woody cupule, brown, ovoid or conical (1.2 x 0.8 cm), downy, longitudinally veined; seed containing a kernel formed of two large cotyledons.

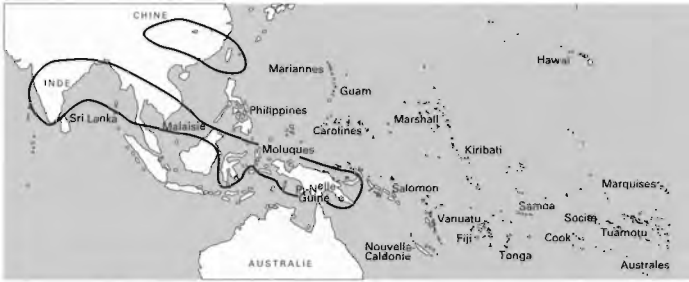
Ecology and exploitation

Castanopsis acuminatissima is a common tree in secondary forest in Papua New Guinea from 600-2,400 m altitude (Bourke, personal communication). This forest tree is widespread in the highlands and produces, when mature, numerous new shoots. It is a vigorous tree that produces large quantities

of nuts each year. In the region of the Ankave, the tree flowers in April to May and bears ripe fruits in August.

Alimentary uses

The seed, although edible, is only eaten in some parts of New Guinea. The fruits are, however, easy to collect and the nuts can be broken without difficulty. They are eaten raw or cooked in bamboo containers by the populations of Okapa (Eastern Highlands), boiled by those of Pomio (New Britain), raw or grilled by the Karam (Madang), the outer envelope first having been removed. The Enga of the Western Highlands also eat them. In season the Ankave pick the seeds of *C. acuminatissima* during their walks in the forest. Brought back to the village, the women peel them by means of a bone of a fruit bat, then cook them and



Castanopsis acuminatissima: India (east Bengal), Burma, China (Guizhou and Yunnan), Taiwan, Thailand, Vietnam, Laos, the Indo-Malayan Region (north Sumatra, Java, north Borneo, Sulawesi, Maluku, New Guinea). Also in the islands of Japen, Misima, Fergusson, Goodenough and New Britain (it is the only species of the family Fagaceae in the Bismarck Archipelago).

serve them with specific edible leaves. Cockatoos, cassowaries and wild pigs eat the fruits when they have fallen to the ground. The seeds of *Castanopsis* would have been an important food for earlier hunter-gatherers. The mortars and pestles of New Guinea seem to have been mainly for the pounding of nuts, among which those of *Castanopsis* featured. Nowadays the seeds are no longer pounded.

Other uses

The timber of this species is hard and the Ankave use it for construction, as do other highland communities of Papua New Guinea.

Other edible species

The genus *Castanopsis* comprises 120 species of which several are edible. With caution, however, because some may be toxic (Corner, 1988).

C. costata (Blume) A.D.C.: Thailand, Malaysia and Borneo;

C. inermis (Lindley ex. Wallich) Benth.: Sumatra and Malaysia;

C. lucida (Nees) Soepadmo: Thailand, Malaysia and Borneo;

C. malaccensis Gamble: Thailand, Malaysia and Sumatra; seeds eaten in small quantities;

C. megacarpa Gamble: Malaysia, Borneo; information on this species is contradictory, sometimes saying that the seeds are edible and sometimes that they are toxic;

C. philippinensis (Blanco) Vidal: Philippines;

C. wallichii King ex. Hook. f.: Malaysia.

References

Brown (1951), Corner (1988), Millar & Dodd (undated), Soepadmo (1972), Verheij & Coronel, eds (1992).

Species***Castanospermum australe*
Cunn. & Frazer ex. Hook.****Family****Papilionaceae****Common name (English)****Moreton Bay chestnut****Consumption****Only in exceptional circumstances.****Part eaten****Seeds.****Toxicity****Yes.****Description**

Tall tree (15-40 m); straight trunk, dense crown. Compound leaves with 5-19 leaflets, sub-opposed, dark green and glossy, oval to lanceolate (6-16 x 2-5 cm); petiolule 0.5 cm long. Flowers on erect racemes up to 20 cm long; calyx yellow and tubular, terminating in 5 lobes; 5 separate petals, yellow-orange or red (3 x 2 cm); 10 orange stamens protruding beyond the corolla and curved upwards. Fruits composed of a large, dark brown, hard husk (18-22 x 5-6 cm), containing 3-5 dark brown, rounded seeds (3-4 cm in diameter), slightly flattened, enveloped in white spongy material.

Geographical distribution

Originally from north eastern Australia, this species has been introduced to Indonesia, Malaysia, Solomon Islands, and probably New Guinea and Vanuatu.

Alimentary uses

The seeds are toxic but may be made edible by cooking. In Vanuatu they are apparently only eaten by a single family in the north of Efate, who prepare them as follows. The seeds, picked up from the ground, are grilled for a long time, then scraped to get rid of burnt parts. They are then eaten hot. Insufficient cooking leads to diarrhoea. Australian aboriginals eat these seeds after macerating them in water for a long time and then roasting them.

Other edible species

This is the only species in the genus.

References

Backer & Bakhuizen van den Brincke (1963), Brand Miller *et al.* (1993), Cooper & Cooper (1994), Corner (1988), Wheatley (1992).

Species***Citrus macroptera* Montrouzier****Family****Rutaceae****Common name (English)****Ghost-lime****Consumption****Occasional.****Part eaten****Juice.****Toxicity****None.****Description**

Small tree or shrub (3-6 m); crown not very dense. Leaves oval or lanceolate (6-13 x 3.2-5.5 cm); margins slightly dentate; fine, parallel secondary and tertiary veins; spines present on the axils of the leaves; petiole with wings that are almost as large as the leaves. Fruits yellow, rounded (6-7 cm in diameter), with a thick skin and pulp that is acid and not very juicy.

Geographical distribution

Species native to Thailand, Malaysia, Indonesia, the Philippines, New Guinea and the Bismarck Archipelago. Early aboriginal introduction to Solomon Islands, Vanuatu, New Caledonia and Polynesia. In Guam the species is either native or an aboriginal introduction.

Ecology and exploitation

In Vanuatu the species grows from sea level to 300 m altitude. It is found in almost all the islands of

the archipelago, but it is particularly abundant in Erromango. It generally grows in small populations. It is not cultivated but is at least protected. The species is naturalised and abundant in Fiji. Several authors (Smith, 1985; Verheij & Coronel, eds, 1992) have indicated that this species hybridises with other species of *Citrus*.

Alimentary uses

In Vanuatu this wild orange is not really eaten, but it is regularly used for its juice.

Other uses

In Guam, Samoa and Fiji, the pulp of the fruit or the macerated leaves were used in earlier times for the washing of hair. The pulp was also used in Guam for washing linen. In Samoa the timber serves for making axe handles and canes.

Other edible species

Many species of *Citrus* are edible, but in the Pacific *C. macroptera* seems to be the only local species. We note also: *C. hystrix* D.C., a species that is often confused with *C. macroptera*, which is localised to the

Indo-Malayan Region.

Its exact centre of origin is unknown.

References

Christophersen (1971), Safford (1905), Smith (1985), Verheij & Coronel, eds. (1992).



From New Guinea to Vanuatu, Canarium is an important food plant.



(Photo: J.M. Bomparoi)

Above: Stipule of *Canarium harveyi*: ear-shaped, it is situated near the base of the petiole.
Below: Fruits of *Canarium harveyi*.



(Photo: J.M. Bomparoi)





Above: Nuts of *Canarium harveyi* smoked and kept in special baskets (Gaua, Vanuatu).
Below: Fruit of *Canarium harveyi* in transverse section.



(Photo: J.M. Bompard)





Canarium species
have nuts of
exquisite taste and
delicate texture.



Above: *Canarium indicum* of ovoid shape
with two kernels.

Middle: *Canarium indicum* with a yellow
epidermis, found on Emae (Vanuatu).

Below: stipule of *Canarium indicum*
situated at the junction of the petiole
and the branch.



(Photo: G. Bourdy)

Above: *Citrus macroptera*.
Below: Sea trumpet (*Cordia subcordata*).





Above: Bundles of dragon plums (*Dracontomelon vitiense*) for sale in the market of Luganville (Vanuatu).
Below left: Bunches of dragon plums.
Below right: Dragon plums cut across to show the nut.





Above: Wild figs of Vanuatu (*Ficus granatum*).
Below: Wild figs (*Ficus aspera*).



(Photo: J.M. Bomaard)

Above: *Elaeocarpus* sp., the flesh of which is eaten (Santo, Vanuatu).

Below: Wild figs of Oceania (*Ficus scabra*).

Foods of secondary importance or regularly eaten, figs are fruits that are sought after for their taste.





Above: *Ficus virgata*.
Below: wild figs of Melanesia (*Ficus wassa*).



Species

Cordia subcordata Lamarck

Family

Boraginaceae

Common names (English and French)

Sea trumpet

Gommier

Sébestier en coeur

Name in Bislama

bourao blong soltwata

Consumption

Nibbled frequently by children; food in times of shortage.

Part eaten

Kernels.

Toxicity

None.

Description

Squat tree, low in height (less than 15 m); bark greyish and fissured, peeling off in rectangular pieces. Leaves simple, alternate, light green, oval (6-8 x 9-16 cm); margins slightly undulate; 4-6 pairs of veins; petiole thin and 4-8 cm long. Flowers grouped in terminal or axillary bunches, not very many; calyx green and tubular (1-1.5 cm), lobed at the apex (3-6 lobes), persistent; 5-7 orange petals fused at their bases (2-4 cm long). Fruits green, becoming yellowish and then dark brown as they dry, hard, round (2-3.5 cm in diameter); containing a nut with 4 chambers; each chamber containing 1-2 kernels the size of a grain of rice, difficult to extract.

Morphological variability

Peekel (1984) indicated two types of *Cordia subcordata* occurring in the Bismarck Archipelago. The commoner type has orange flowers while the other, much rarer, has yellow flowers. Everywhere else, only the orange-flowered form is found.

Ecology and exploitation

The tree grows close to the sea in all Oceanian islands. In Vanuatu it is less frequent in the south of the archipelago, and it disappears at altitude. It is a wild tree, never cultivated and little protected. It is not very abundant in Vanuatu, but some fine specimens may be found, preserved as shade trees, in coastal





Cordia subcordata: from tropical Asia to Hawaii and from southern China to northern Australia, via all the islands between. Probably an aboriginal introduction to the Marquesas. Introduced to Madagascar and then the coasts of tropical Africa. Its floating fruits are dispersed by ocean currents. In certain islands of the Pacific, such as Hawaii, it could have been introduced by the Polynesians.

villages. Flowering and fruiting occurs throughout the year. The species is not very common in Guam and Samoa, but it is abundant in the Caroline Islands, Fiji and Hawaii. It is likewise common in Solomon Islands. The species is rarely cultivated.

Alimentary uses

In Vanuatu, children break the fruits open and eat the seeds, but this is quite a business because the seeds are very small. Adults do collect them, however, in times of food shortage. The seeds are also eaten in Queensland and in Fiji.

Other uses

Little used nowadays, *C. subcordata* was probably an important plant for Pacific peoples in olden times. Nowadays the species mainly furnishes a high quality timber for working. In Vanuatu it is not really abundant enough to be used in this way. However, particularly in Solomon Islands, but also in Fiji, Wallis and Tonga, it is still used for making supporting

posts for houses, roofing, drums, oars for canoes, and carved objects. This major usage has led to the progressive disappearance of the species from certain regions. Henderson & Hancock (1989) noted that the timber is also an excellent fuelwood, and that it was used in earlier times for making fire by rubbing small twigs together. The flowers are used to make necklaces. The leaves, fruits and bark have medicinal properties. In Vanuatu, for example, an extract of leaves diluted with water soothes distension of the abdomen and aerophagia. In earlier times the bark provided good quality ropes. In Tonga and in Wallis, the leaves mixed with those of certain *Ficus* provide a red pigment used for colouring *tapa* cloths. The frequency with which this species is mentioned in the mythology of Hawaii, Tonga and the Tuamotu Islands (Neal, 1929) emphasises its importance in traditional culture; Thaman (1990) also showed that this plant occupied a central place in

the myths of Kiribati, and it is the emblem of the Karongoa tribe.

Other edible species

The genus comprises from 200 to 400 species according to author, the majority of which are found in tropical America. The seeds of *C. sebestena* and the flesh of the fruits of *C. dichotoma* are eaten in the Pacific:

C. sebestena L.: American species cultivated in tropical regions, including in Fiji, Hawaii and Guam;

C. dichotoma Forster f. (syn. *C. myxa* L.): species present from India, southern China and Taiwan to Fiji, via the Indo-Malayan Region and

tropical Australia. The flesh of the fruits is eaten in the Bismarck Archipelago, in Fiji and by Australian aboriginals, but not in Vanuatu where the juice of the fruits is used as glue.

References

Brand Miller *et al.* (1993), Christophersen (1971), Cooper & Cooper (1994), Corner (1988), Dupuy & Guiot (1992), Heine (1976), Henderson & Hancock (1989), Neal (1929), Parham (1972), Peekel (1984), Smith (1991), St John (1951, 1953, 1960, 1974), Stone (1970), Thaman (1990), Wichman & St John (1990), Wilder (1934), Yuncker (1971).



Species

Corynocarpus similis Hemsley

Family

Corynocarpaceae

Consumption

Occasional; a food in times of scarcity.

Part eaten

Pulpy flesh.

Toxicity

The alkaloid karakine is present in the seeds.

Description

Leaves simple, dark green on the upper surface, light green underneath, oboval (8-20 x 4.5-10 cm); 6-10 pairs of veins; petiole 2-3.5 cm long. Flowers grouped in a terminal panicle (10 cm long), white and small in size; calyx with 5 sepals; 5 petals; 5 stamens. Fruits green, white or pale red, spherical or slightly ovoid (3-5 x 1.6-3 cm), flesh more or less juicy.

Morphological variability

A form with red fruits and a form with white fruits are known. These two forms are not present in all islands. Of the two edible forms, the red which is less common is the more sought after.

Ecology and exploitation

In Vanuatu the species is not very common. It is found in all the islands, but becomes rarer towards the south. It is a tree that likes humidity and shade. It is found wild under forest canopies, near gardens and along footpaths in areas of secondary vegetation. It grows up to 1,300 m



Corynocarpus similis

altitude (Wheatley, 1992). Its fruiting period is little known; Wheatley puts it between September and February.

Alimentary uses

The fruit is edible, but is little eaten except in times of food shortage. Only the communities of Tanna and the Torres Islands use it regularly as food. In Torres



Corynocarpus similis: endemic to Vanuatu.

this species was formerly abundant, cultivated and regularly eaten. The fruit was eaten cooked, slightly before it was fully ripe, or raw when it was completely ripe. In Malo only males ate the fruit, because ingestion by females led to swelling of the external genital organs. In Maewo, the fruit must never be picked with the aid of a stick. Anyone who forgets this prohibition will find himself struck in turn by the other fruits which will come to torment him in the night. In this island the fruits are anyway not eaten but are used in traditional medicine. The seed is very toxic and contains karakine, identical to that of *Corynocarpus laevigata* which is found in New Zealand and Hawaii.

Other uses:

The leaves have medicinal properties. The timber is used for making implement handles or digging sticks for planting taro and yams.

Other edible species

C. laevigata Forster & Forster f.: endemic to New Zealand. Maoris eat the toxic seed, after long preparation, and the flesh. This species, called *karaka* in New Zealand, was introduced to Hawaii where it is now naturalised;

C. cribbianus (F.M. Bail.)

L. S. Sm.: present in Solomon Islands where it is called *ibo* (*Kwara'ae*) and also in New Guinea and Australia. The tree, from which fruits with edible flesh were gathered in earlier times, has become rare in Solomon Islands. It is not eaten in Australia.

The fourth *Corynocarpus*, *C. australisica* C.T. White, found in Australia (north Queensland), in New Guinea and in the Aru Islands, is not edible.

References

Cabalion & Poisson (1987), Cooper & Cooper (1994), Henderson & Hancock (1989), van Steenis (1951), Wheatley (1992).



Genus

Diospyros spp.

This pantropical genus includes over 400 species, of still uncertain taxonomic status, that produce edible fruits (e.g. for New Guinea see Gorecki and Gillieson, 1989). By way of example we list two species, native to the Pacific and present in Tonga or Samoa. To our knowledge, no species of *Diospyros* with edible fruits is present in Vanuatu.

Species

Diospyros elliptica (Forster) Green

Family

Ebenaceae

Consumption

Occasional.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Small tree (10 m on average). Leaves more or less elongate, small in size (2-16 x 1.5-9 cm), petiole short. Flowers in groups of 3-15 in male or female inflorescences, pale yellow or rose according to variety; calyx with 3 lobes (2-4 mm long). Fruits yellow or red when ripe, ovoid (1-3 x 0.6-1.6 cm).

Morphological variability

Smith (1981) distinguished seven varieties of this species, of which five are found in Fiji.

Geographical distribution

Fiji, Samoa, Tonga, Niue. Aboriginal introduction to Tonga (Smith, 1981).

Uses

In Tonga children nibble the fruits, which are small in size. In times of food shortage the whole population uses them as food. An infusion or a decoction of the bark is used to treat stomach problems, abdominal pains and constipation; an infusion of bark (only) to treat internal haemorrhage or pains following childbirth.

Species

Diospyros major (Forster) Bakh.

Family

Ebenaceae

Consumption

Occasional.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Small tree (10 m on average). Leaves alternate, grey green, elliptical or oval (10-15 x 7-9 cm), apex rounded; petiole 1 cm long. Flowers small in size, grouped in axillary bunches. Fruits elliptical, 4 cm long, furnished with small hairs.

Geographical distribution

Present in Fiji. Aboriginal introduction to Tonga. Introduced and found in the cultivated state in Samoa. Likewise present in Wallis.

Uses

In Tonga these fragrant fruits are consumed, but they are mainly used for making necklaces. An infusion of leaves is administered in cases of mouth and stomach ailments, and also in cases of sterility and constipation. In Wallis the immature seeds are eaten, and the fruits, cut into quarters, for plaiting into necklaces.

References

Dupuy & Guiot (1992), Parham (1972), Smith (1981), Yuncker (1971).

Species

Dracontomelon vitiense Engler

Family

Anacardiaceae

Common names (English and French)

Dragon plum

Le tambol (tambolier)

Prune dragon (prunier dragon)

Name in Bislama

nakatambol

Consumption

Regular.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Tall tree (10-30 m); trunk large (20-97 cm in diameter), furnished with thick buttresses; crown large and dense. Leaves compound, with 4-9 pairs of alternate leaflets plus one terminal one; petiole 4-10 cm long; leaflets glossy green, oblong or lanceolate (8-15 x 3-5 cm), base asymmetrical; petiolule 0.4-1 cm long. Flowers grouped in panicles, white, small in size. Fruits yellow or orange, round and flattened (1-3.5 cm in diameter), embellished with 5 small depressions; a single stone, flattened and circular, with 5 oval marks of variable size on its dorsal surface; margin of stone irregular; 5 minute seeds.

Morphological variability

The people of Vanuatu distinguish and name two types of this tree, according to the size of the fruit. One is the large-fruited type and one the small-fruited type. This species, essentially wild but protected by humans, does not show much variability, but there is a slight and continuous selection pressure towards trees with fruits that are larger, fleshier and sweeter.

Ecology and exploitation

In Vanuatu the species grows up to 200-300 m altitude, in stands of primary forest. It is also found near villages and gardens, and in forests altered by human activity.



Dracontomelon vitiense: native to Santa Cruz, Vanuatu, Fiji, Samoa. Recorded from the Solomon Islands (Hancock and Henderson, 1988). Introduced to Tonga in European times.

It becomes rarer south of Efate. It is a wild tree, occasionally transplanted close to sites of habitation. It is, however, protected by local peoples during times of tree clearance, and the species, which is abundant, is spread by flying foxes. In the north of the archipelago, flowering occurs between October and January and the fruits reach maturity between May and July. In the south flowering and fruiting occur one to two months later. Productivity varies from one tree to another, but the species is very productive. In Fiji the species grows from sea level to 300 m altitude. It is a wild tree but is also cultivated around villages.

Alimentary uses

The ni-Vanuatu appreciate the slightly acid taste of these small fruits which they eat raw, as a snack, or cooked in coconut milk. Harvesting is done with the help of a long bamboo pole, and the infrutescences are then transported to the village. Abundantly eaten when in season, the fruits are also sold in urban



Dracontomelon vitiense

markets. The fruits are likewise eaten in Fiji, and to a lesser extent in Samoa.

Other uses

Above all this species is exploited for its timber, which is used for frameworks of houses. In Vanuatu tables, stools, dishes for *lap-lap* and canoes are made from the trunk. The large buttresses are likewise used for manufacture of craft objects. By placing a large board cut from a buttress over a hole in the ground, a sort of sounding-box is made on which dancers perform, stamping their

feet on the ground. In certain islands of the north such as Malekula the tree is very often used for growing yams upon. The tree is first killed by being burnt at its base. In traditional medicine the pulverised bark is used for treatment of pains of the abdomen (administered internally) and of the head (applied externally), and the juice of the leaves for treatment of infantile fevers. For eradicating head lice, a shampoo made of grated bark mixed with coconut milk is applied to the scalp.

Other edible species

The genus *Dracontomelon* comprises 8 to 10 species distributed from South East Asia to Samoa. The other edible species are:

D. dao (Blanco) Merr. & Rolfe (syn. *D. mangiferum* Bl.): species present from India to Solomon Islands, through South East Asia and the Philippines; it is distinguished by being a

more massive tree, reaching 50 m in height, and the leaflets having smaller petiolules (not more than 4 mm long). Fruits edible, mostly eaten by children and ignored in some places such as New Ireland.

D. duperreanum Pierre: wild species, cultivated in Vietnam and southern China for its somewhat acid fruits;

D. lenticulatum Wilkinson (syn. *D. edule* (Blanco) Skeels Royen): Malaysian species probably introduced to New Guinea, where it is nowadays cultivated for its edible fruits. Ding Hou (1978) believed that the species was introduced to western New Guinea by Malayan hunters of birds of paradise, prior to the arrival of Europeans.

References

Corner (1988), Ding Hou (1978), Hancock & Henderson (1988), van Royen (1964), Verheij & Coronel, eds. (1992).

Genus

Elaeocarpus spp.

Family

Elaeocarpaceae

The genus *Elaeocarpus* comprises at least 250 species, distributed from Madagascar to the Pacific including eastern Asia, the Indo-Malayan region, Australia and New Zealand. A large number of these species are endemic to a given region, and the taxonomic status of some of these relative to others is still confused. It is probable that many of these species produce fruits whose pulp or seeds are edible. We do not recognise any cultivated species, but only those collected as fruits from the forests. We present here, by way of example, two species found respectively in Vanuatu and New Guinea.

Species

Elaeocarpus chelonimorphus Gillespie

Description

Tree of medium height (10-20 m); trunk straight with reddish brown bark, smooth and with lenticels; crown large; aerial roots forming a cone at the base of the trunk. Leaves grouped at the ends of branches, simple, spiralling, dark green and glossy on the upper surface and light green on the underside, elliptical (8.7-13.5 x 3.2-6 cm); 5-8 pairs of reddish veins, bifurcating before the leaf margin; base rounded or cuneiform (wedge-shaped); margins undulate; petiole pubescent, 1.5-3 cm long. Flowers grouped in a raceme; calyx with lobes sharply-pointed and coriaceous, 1 cm long; petals greenish-white; pedicel 1.7-2 cm long. Fruits green or yellow, ellipsoidal (2-3.8 x 1-2 cm); long peduncle (5 cm); persistent stigma at apex.

Geographical distribution

Banks (Vanua Lava), Pentecost, Paama, Santo and Aneityum. Found in Vanuatu and Fiji.

Alimentary uses

The kernels, which are edible, are eaten mainly in Santo.

Species

Elaeocarpus pulleni Weibel

Description

Tall tree (30 m in height). Leaves gathered at the ends of the branches, oval or oblong (18-25 x 8-10 cm); base rounded, margins crenate; petiole 4.5-7 cm long. Flowers packed 12-20 on a raceme, situated in the axils of the leaves, 5-7 cm long; 5 oboval petals divided into 2-4 lobes, each lobe then subdivided into fine filaments; 30-45 stamens, 0.5 cm long. Fruits blue-green, ovoid or globular (5.5 x 4.5 cm), hard and rugose, containing a flattened seed.

Geographical distribution

Endemic in New Guinea.

Alimentary uses

The seeds are edible.

References

Gillespie (1971), Henty (1982), Parham (1972), Smith (1981).

Species

***Ficus aspera* Forster f.**

Family

Moraceae

Common names (English and French)

Wild fig

Rough-leaved fig

La figuette (figuetier)

Name in Bislama

nabalango

Consumption

Regular, but not of much importance.

Part eaten

The whole fruits (figs).

Toxicity

None.

Description

Small tree (10-15 m); trunk smooth, greyish, furnished with buttresses, exuding a little latex. Leaves simple, alternate, oval or oblong (12-25 x 8-13 cm), blade of leaf less thick than that of *Ficus scabra*, acuminate on young trees, base asymmetrical with a lobe covering the petiole on one side; margins dentate; 5-9 pairs of veins; petiole 1-2 cm long. Male and female flowers invisible, as in all *Ficus* species, enclosed within the fig which is a sort of hollow receptacle with an apical aperture that is closed off by small scales. Figs growing directly on the branches or trunk of the tree (cauliflorous; see glossary), singly or in pairs, white at first and then yellow or red when ripe, sub-globular (1.2-2.5 cm in diameter), downy, with a slightly protuberant apical rosette, peduncle 0.5-1 cm long.

Geographical distribution

Smith (1981) considered that this species is endemic to Vanuatu, where it has been found in almost all the islands. Likewise recorded in New Caledonia, Fiji and Samoa, where it has been confused with *F. scabra*.

Ecology and exploitation

The species is common in secondary forests, areas of old gardens and river banks, from sea level to 300 m altitude. It is a wild species, rarely transplanted, that prefers open areas.

Alimentary uses

In Vanuatu, the young leaves and the ripe fruits are boiled or steamed in small bamboo containers, and then served as an

accompaniment to a meal. These are foods that are eaten only in small quantities but regularly throughout the year. The fruits are also eaten in New Caledonia, but apparently not in Fiji or Samoa.

Other edible species
See *F. wassa* (p. 167).

References
Corner (1975), Smith (1981).

Species

Ficus granatum Forster f.

Family

Moraceae

Common names (English and French)

Wild fig

La figuette vanuataise (figuetier vanuatais)

Name in Bislama

nabalango

Consumption

Regular in the south of the archipelago, occasional elsewhere.

Part eaten

The whole fruits (figs).

Toxicity

None.

Description

Small tree (6-15 m), trunk with smooth, soft bark, cream in colour, exuding a white latex. Leaves simple, oval or elliptical (9.5-30 x 5.5-10.5 cm), blade undulate and glossy, apex rounded, sometimes furnished with a short, broad acumen, base cuneiform or slightly cordate; margins entire; 9-14 pairs of veins; petiole thick and 2-8 cm long. Figs grouped in the axils of leaves, yellow and becoming deep red at maturity, spherical (1.5-2.5 cm in diameter), downy, with an apical ostiole (small aperture) furnished with 3-4 scales; peduncle 0.3-0.8 cm long.

Ecology and exploitation

This species of fig is a wild tree in Vanuatu, sometimes transplanted for its edible fruits. It is very much more

common in the south of the archipelago than in the north. It is recorded from the Torres Islands, Maewo, Ambae, Malekula, Ambrym, Tongoa, Efate, Erromango, Tanna and Aneityum. It is found between 20 and 200 (750) m altitude, in humid



Ficus granatum

primary forests or secondary forests. It generally prefers cleared, sunny sites such as old gardens. The figs reach maturity between July and November.

Alimentary uses

This fig is eaten raw when fully ripe. The size of the fruits varies from one tree to another. The largest fruits are most often also the sweetest and juiciest. Their delicate flavour makes them sought after

and regularly eaten in season, either raw between meals, or during meals after being cooked in a bamboo container. The small developing figs when still green are sometimes grated and cooked in small dishes of *lap-lap* on hot stones.

Other edible species

See *F. wassa* (p. 167).

References

Corner (1975).



Ficus granatum: endemic to Vanuatu.

Species

Ficus scabra Forster f.

Family

Moraceae

Common names (English and French)

Wild fig

La figuette d'Océanie (figuetier d'Océanie)

Name in Bislama

nabalango

Consumption

Occasional, to varying extent according to region.

Part eaten

The whole fruits (figs).

Toxicity

None.

Description

Small tree (10-12 m). Leaves simple, oval or lanceolate (7-18 x 4-11 cm), blade slightly corlaceous and sometimes pubescent, apex acuminate, base symmetrical and slightly cordate; margins entire; 4-8 pairs of veins; petiole 1-2.5 cm long. Figs solitary in the axils of leaves, sometimes on the trunk, straw yellow or pale orange, then deep red when fully mature, spherical (1-1.6 cm in diameter), downy; peduncle 0.3-0.9 cm long.

Ecology and exploitation

This species of fig grows in all the islands of Vanuatu, at low altitude in secondary forests. It is common to find one or two trees transplanted close to domesticated areas, for their edible fruits. Natural multiplication is assured through birds, or

by transplantation of young suckers. The figs reach maturity at various months of the year. In Fiji the species grows in coastal zones, but it is also found inland up to 300 m altitude.

Alimentary uses

In Vanuatu the young leaves and fruits, collected before maturity, are eaten raw, seasoned with a little salt, between meals. They may also be cooked in small bamboo containers, then sprinkled with coconut milk and served as an accompaniment to a dish of yam or taro. This species provides food for nibbling or a supplementary food for varying menus. The period during which the fruits are gathered is fairly short, just

before they reach the deep red colour or just as they reach full maturity. Their consumption is thus very occasional, in contrast to the young leaves which are more frequently used in all the islands of Vanuatu. The fruits do not seem to be eaten outside Vanuatu, but the young leaves are eaten in Fiji.

Other uses

In Tonga the bark is beaten to make *tapa* cloth, and it provides fibres for making fishing lines and nets.

Other edible species

See *F. wassa* (p. 167).

References

Corner (1975), Smith (1981), Whistler (1991).



Ficus scabra: native from New Caledonia to Tonga, including the Loyalty Islands, Rotuma and Niue.

Species

Ficus wassa Roxburgh

Family

Moraceae

Common names (English and French)

Wild fig

Sandpaper cabbage

La figuette de Mélanésie (figuetier de Mélanésie)

Name in Bislama

nabalango

Consumption

Regular, but a food of secondary importance.

Part eaten

The whole fruits (figs) and the leaves.

Toxicity

None.

Description

Tree of variable height (5-20 m) but usually less than 10 m; trunk dark brown, slender; crown irregular and not very dense. Leaves simple, alternate, dark green, oboval or elliptical (16 x 6 cm on average), blade rugose and acuminate; margins irregular; midrib with or without fine whitish hairs; petiole fine, 1-6 cm long. Figs grouped in bunches along the length of the trunk and the branches, green becoming rosy and then red at maturity, spherical (1-1.5 cm in diameter), epidermis rugose; peduncle thin, less than 1.5 cm long.

Ecology and exploitation

In Vanuatu *Ficus wassa* is a common species, abundant in old fallow land and secondary forests of lowlands up to 800 m altitude.

It is a wild tree, which is never cultivated and appears very vigorous. It rapidly recolonises abandoned gardens. The birds that feed on its seeds also assure its dispersal. It is a very long-lived tree, often lasting longer than a human life-span. Fruiting occurs several times per year, and may start when the tree is still less than 1 m tall. The species is equally common in Solomon Islands (up to 1,400 m altitude) and in New Guinea (up to 1,300 m altitude). In Papua New Guinea (Southern Highlands Province) the Wola say that no wild varieties of this tree exist; they propagate them by cuttings of branches and by transplanting germinated





Ficus wassa: present from Flores and Timor to Vanuatu, via Maluku and the Aru Islands.

seedlings. It does, however, appear semi-spontaneously in areas of secondary vegetation, where it multiplies from trees present in old gardens or near to temporary shelters. In the region occupied by the Ankave it occurs spontaneously. In all coastal regions of the north the tree is wild and abundant, quickly recolonising abandoned gardens (Allen, personal communication). In Solomon Islands the tree is wild but sometimes protected or even planted. In the Ankave region the fruits ripen in the middle of the wet season (December).

Alimentary uses

In Vanuatu the fruits are eaten cooked when they are green, boiled in small bamboo containers and then sprinkled with coconut milk. Once mature they ripen very quickly and must be picked and eaten within a matter of days. Young leaves are also eaten, braised in a small bamboo container, chopped up and sprinkled over *lap-lap* before cooking, or boiled. They may be sprinkled with coconut milk. They are also eaten raw with grated coconut.

They are among the many vegetables gathered during the year that add variety to otherwise monotonous diets. Among the Wola (Papua New Guinea) it does not appear to be used nowadays as a food. The tender leaves and the figs are cooked together, over heated stones or in bamboo containers. The figs may also be roasted in small packages in hot embers. They are nibbled raw when ripe. Among the Ankave the green fruits are baked; as for the leaves, they are eaten with pandanus juice (cf. *Pandanus conoideus*, p. 210) or with game. In Solomon Islands the young leaves are regularly used as vegetables, though less so than those of *F. copiosa*. Throughout its area of distribution the species is used more as a vegetable (leaves or green fruits, cooked) than as a fruit eaten fresh.

Other uses

In Vanuatu the leaves, which stimulate milk production, are regularly eaten by lactating women. The wood of *F. wassa* burns slowly and is an excellent firewood. It is sometimes used in New Guinea, though

not in Vanuatu, for the manufacture of small tools. The bark also provides fibres that are used for making ropes, and sometimes (in Papua New Guinea) for making cloth.

Other edible species

An entire textbook could be devoted to the *Ficus* with edible fruits and/or leaves in the Pacific, since they are numerous¹⁴. The leaves and the fruits of these species are most often casually gathered foods that are eaten irregularly and infrequently. However, taking the Pacific as a whole this consumption should not be underestimated, since it constitutes a supplementary food throughout the year.

In Vanuatu all the species of *Ficus* grow in the wild state but may also occasionally be planted (close to villages or in hedges along the edges of roads). It is thus a reserve of food that is easy to access. The main species with edible fruits are listed at the end of the work (p. 277). We list here the ones that may be eaten in Vanuatu:

F. adenosperma Miquel: Solomon Islands, the Santa Cruz Islands, Vanuatu (in all the islands), Rotuma. The figs, green or yellow when ripe, are eaten in times of food shortage by certain communities;

F. tinctoria Forster f.: occurring from the Himalayas and China to the Marquesas

Islands, via India, Sri Lanka, Andaman, Nicobar, the Indo-Malayan Region, the Caroline Islands, the Marianas, Papua New Guinea, Solomon Islands, Santa Cruz Islands, Vanuatu, Fiji, Wallis, Kiribati, Samoa, Tonga, Niue, the Society Islands and northern Australia. Absent from New Caledonia. The figs (yellow-orange or red when ripe, 10-17 mm in diameter), are eaten in the Caroline Islands, and in Vanuatu but only in times of food scarcity. They are eaten but only in exceptional circumstances in Fiji, and they were eaten in earlier times in Samoa and Tonga. According to Thaman they are an important food in the southern islands of Kiribati where they are eaten as a sweetened paste or garnished with grated coconut. In Fiji the juice of the leaves is used in bandages around a bone fracture; a decoction of the leaves is given as a tonic to women who have just given birth (Smith, 1981). Finally, in Wallis the leaves are fed to pigs and the bark may sometimes be used to make *tapa* cloth;

F. virgata Reinw. ex Bl.: New Guinea, Solomon Islands, Vanuatu and New Caledonia. The figs, greenish-yellow and situated in the axils of leaves, are sometimes eaten in Vanuatu in times of food shortage.

¹⁴ Vanuatu is poorly represented in this flora of Oceanian *Ficus*. By comparison, in Solomon Islands there are 64 species of which 24 are endemic.

References

Ficus adenosperma:
Corner (1975), Hancock
& Henderson (1988).

Ficus tinctoria: Borrell
(1989), Corner (1975),
Dupuy & Guiot (1992),
Glassman (1971), Hancock
& Henderson (1988), Parham
(1972), Smith (1981), Yuncker
(1971, 1974a, b).

Ficus virgata: Borrell
(1989), Corner (1975).

Ficus wassa: Borrell
(1989), Corner (1967, 1975),
Henderson & Hancock
(1989), Sillitoe (1983).

Species

Finschia chloroxantha Diels

Family

Proteaceae

Common names (English and French)

Finschia

Le chrysocarpe (chrysocarpier)

Consumption

Occasional.

Part eaten

Kernels.

Toxicity

None.

Description

Tree of medium height (20-30 m), usually less than 20 m; aerial roots, forming a small cone of a little more than 1 m in height at the base of the trunk; trunk straight, grey or brown, with longitudinal fissures and lenticulate. Leaves simple, shiny green, lanceolate and narrow (8-25 x 2-7 cm), thick; petiole thin, 1.5-2.5 cm long. Flowers numerous, strongly perfumed, arranged in spirals along a pendulous rachis 20-30 cm long; 4 bright yellow petals, 1 cm long; thin pedicel. Fruits green, then yellow-orange when ripe, ovoid, flattened, 3 x 2 cm; apex off centre and furnished with a persistent style; hard nut containing one round kernel.

Morphological variability

Sleumer (1955) distinguished two varieties of *Finschia chloroxantha*:

var. *chloroxantha*: the most common and widespread, and the form found in Vanuatu;

var. *macrocarpa* Sleumer:

fruits larger in size (5 x 5 cm) and globular in shape, and may contain two kernels. Found in Irian Jaya.

Ecology and exploitation

In Vanuatu the species is not very common but occurs on many of the islands. It is more abundant in the south of the archipelago, which represents, however, the southern limit of distribution of the species and the genus. It grows in secondary forests or near to gardens. It is a species that springs up spontaneously, is sometimes transplanted close to domestic areas, and is always protected. It fruits from September to November. In Papua New Guinea the species is widespread from the lowlands up to 1,850 (2,000) m altitude (Bourke, personal communication). It is sometimes planted near villages. Among the Ankave, however, it remains





Fenschia chloroxantha: present from New Guinea to Vanuatu. Also recorded from the Aru Islands and from Palau (Micronesia).

a wild species that is neither looked after nor planted. Propagation is assured by rats which transport the fruits, and fruiting occurs in August-September. In Solomon Islands the species is common in the islands of Santa Ana, Isabel and Malaita.

Alimentary uses

In Vanuatu the edible kernel is eaten as it is, after the fruits have been gathered by knocking them down or by picking them up from the ground. The species deserves to be multiplied and developed because the kernel (covered in a fine membrane) has a very pleasant taste. In the coastal regions of New Guinea the kernel, which is generally eaten boiled, provides an important additional source of food. Among the Ankave the fruits are picked up from the ground as people walk in the forest, and are eaten on the spot, and sometimes taken back to the village. They are peeled and broken between two stones, then the kernels are extracted, threaded on to skewers and grilled over a fire. The nuts are an equally popular food in Solomon Islands.

Other uses

The timber from the trunk, very straight and quite long, is used for construction. The tree is a fine ornamental species thanks to its elegant and profuse inflorescences. In Solomon Islands the timber is also used for making small pieces of furniture, drums and frameworks of buildings (Henderson & Hancock, 1989).

Other edible species

The genus comprises four species distributed from the Aru Islands and Palau to Vanuatu, via New Guinea. Two species produce edible seeds: *F. chloroxantha* and *F. ferruginiflora* White. This latter species is found in the northeast of New Guinea (Aiyura in the central Highlands), and its seeds are eaten cooked.

References

Foreman (1971), Henderson & Hancock (1989), Henty (1982), Sleumer (1955), Verheij & Coronel, eds. (1992).

Species

Flacourtia rukam Zollinger & Morritzi

Family

Flacourtiaceae

Common names (English and French)

Indian plum

Rukam

Indian prune

La prune café (prunier café)

Prune de Chine (prunier de Chine)

Consumption

Infrequently, by children or as a food in times of shortage.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Small tree (4-10 m); trunk twisted, without spines in Vanuatu. Leaves oboval or elliptical (4-6 x 7.5-10 cm); margins dentate; 3-4 pairs of veins extending upwards, the first arising from the base being almost parallel to the leaf margin, without reuniting; short petiole 0.4 cm long. Flowers in axillary clusters, pale yellow, unisexual, small in size; male flowers with numerous yellow-orange stamens; female flowers with 4-6 pistils. Fruits spherical, red when ripe, slightly flattened (1.5-2.5 cm); each furnished at its apex with a circle of 4-6 persistent stigmas, terminating sometimes in a minute spine; 5-7 chambers each with 2 superposed seeds; small peduncle 0.5 cm long.

Ecology and exploitation

In Vanuatu this species is found in secondary forests up to 600 m altitude, on calcareous soils, in shaded or cleared areas. It is a wild species, not very common. Fruiting occurs several times per year (fruits are gathered in March, June, August and October). The trees usually fruit abundantly. In the Malayan Region the species grows up to 2,100 m altitude and fruits from September to November (Sleumer, 1954). It is a wild species, also cultivated through suckers or cuttings. In Fiji the species is only cultivated, and it fruits between October and July (Smith, 1981). In Samoa the species is found in forest between 100 and 550 m altitude. The fruits are picked in December, March and April,





Flacourtia rukam: native from Malaysia to the Solomon Islands (but rare in Maluku and in New Guinea). Introduced to China, India, Thailand and Fiji, and also to Samoa, Tonga and Niue (where it is nowadays largely naturalised). Will also be present in the Caroline Islands.

and August and September (Christophersen, 1971). The trees are also found around villages. The species is less frequent in Tonga.

Alimentary uses

The fruits are acid and variable in size, and although edible they are eaten only rarely in Vanuatu. In Tonga they are nibbled by children, or are harvested in times of food scarcity. In Indonesia and in the Philippines they serve to make preserves or condiments, and these modes of preparation were introduced to Samoa by missionaries.

Other uses

In Vanuatu the very hard timber is used in the making canoes, for connecting the float to the hull of the boat, or for making posts of houses or handles of implements. The plant also has medicinal properties. In the Philippines the juice extracted from the leaves is used to treat inflammation of the eyelids; a decoction of the root is administered to women who have just given birth (Verheij & Coronel,

eds, 1992). In Samoa the living part of the bark (the phloem) is used for preparation of a treatment against elephantiasis (Christophersen, 1971).

Other edible species

Flacourtia jangomas (Lour.) Rauschel (syn. *F. cataphracta* Roxb. & Willd.): species probably originating from Assam and Burma; introduced throughout the tropical world where it is cultivated for its edible fruits. Fairly rare in the Pacific. Its fruits and its leaves are smaller than those of *F. rukam*; its pistils are joined into a single column, while those of *F. rukam* are entirely separate from each other. *F. indica* (Burm. f.) Merr. (syn. *F. ramontchi* L'Hér.): species closely related to *F. rukam*, distributed and cultivated throughout the subtropics. Present in Polynesia. Its pistils, curved towards their bases, may be distinguished from those of *F. rukam* which are erect and slightly more in number. The fruits are eaten raw and may be made into ices and jams.

F. inermis Roxb.: present from Sumatra and Peninsular Malaysia to New Britain; three varieties may be distinguished. Scarcely present or entirely absent from Pacific islands.

It is distinguished from the preceding species by bisexual flowers with pistils that are central and very small in size.

The inhabitants of Vanua Lava (Banks Islands) have indicated to us another *Flacourtia* with edible fruits,

small in size. It could be *F. indica* or *F. jangomas*. We also note *F. euphlebica* Merr. from the Philippines.

References

Backer & Bakhuizen van den Brincke (1963), Brown (1954), Christophersen (1971), Corner (1988), Coronel (1983), Ochse *et al.* (1961), Parham (1972), Rechinger (1910), Sleumer (1954), Smith (1981), Verheij & Coronel, eds. (1992), Whistler (1984b), Yuncker (1971).



Species

Garcinia pseudoguttifera Seemann

Family

Clusiaceae

Consumption

Moderate, localised in certain islands.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Tree of medium height (10-25 m); trunk straight, smooth and massive. Leaves simple, opposite, dark green, oval (6-10.5 x 10-17 cm); coriaceous; apex obtuse, often emarginate, base rounded, slightly cordate; numerous secondary veins, parallel and fine; petiole reddish at its base and 1.5-3 cm long. Flowers grouped in male or female inflorescences (dioecious species), axillary and somewhat sparse; calyx green with 4 sepals, persistent; 4 ivory or rosy petals less than 1 cm in length; numerous stamens on the male flowers. Fruits pale yellow when ripe, ovoid (2.5-4.5 x 3-6 cm), epidermis smooth and shiny, apex pointed; containing two flattened seeds with 3 or 4 lightly demarcated ridges.

Morphological variability

In Ambae the villagers distinguish one form with elongate leaves and another with round or oval leaves. In Tanna there exists a form with rounded fruits with red pulp, the leaves of which are oval, and also a form with elongate fruits whose pulp is yellow or white. The

form with red fruits is sometimes transplanted. This is the only form that is present in Fiji.

Ecology and exploitation

In Vanuatu the species is found in primary or old 600 m altitude, except in the south where it is found in coastal forests. It grows in the shade of larger trees, in damp soil. It is a wild species, sometimes protected, but rarely planted except in Tanna. Fruiting occurs from April to June. The tree, which only bears one or two fruits per infructescence, is not very productive. In Fiji the species is wild, and abundant from sea level to 1,150 m altitude (Smith, 1981).

Alimentary uses

The fruits, which are slightly acid, are eaten raw in the south of the archipelago (Tanna, Erromango) and in the Torres Islands. In Tanna men eat them regularly while out hunting, and the trees are carefully tended for this purpose. Elsewhere



Garcinia pseudoguttifera: Solomon Islands, Vanuatu, Fiji and Tonga.

the species is little utilised and the fruits are eaten little or not at all. The fruits are sometimes eaten in Fiji.

Other uses

In Pentecost the timber is used for posts in the construction of houses. In Erromango and Ambae (and maybe elsewhere) the species is associated with women by virtue of the particular arrangement of the leaves, a feature which is common to all *Garcinia*. In the former island the name of the species indicates the "tree of woman" (*nei-aiven*). In Tonga the flowers and the fruits are used to scent coconut oil. In Fiji, oil extracted from the fruits is used as perfume, and juice from the leaves is used for relieving pain.

Other edible species

Over 200 species of *Garcinia* occur in the world, of which close to two thirds produce edible fruits. Among these, several

species have been cultivated since prehistoric times, mainly in the Indo-Malayan Region. In the Pacific the species of *Garcinia* with edible fruits are far less numerous:

G. mangostana L.: produces a fruit that is very popular, the mangosteen. Originally from the Indo-Malayan Region and widely cultivated in Southeast Asia, the species was introduced during the nineteenth or early twentieth century to many tropical regions;

G. dulcis (Roxb.) Kurz.: native to the Philippines and Indonesia, cultivated in Southeast Asia and occasionally introduced elsewhere, as for example in Fiji;

G. hollrungii Laut.: New Guinea and Solomon Islands. The fruits are only eaten in New Guinea.

References

Parham (1972), Smith (1981), Yuncker (1971).

Species***Gnetum costatum* K. Schumann****Family****Gnetaceae****Common name (English)**

Two leaf

Consumption

Occasionally, by adults.

Part eaten

Leaves and seeds.

Toxicity

None.

Description

Tree of medium height (15-20 m), bark brownish red on the outside and brownish yellow on the inside. Leaves becoming yellow as they dry, oval to elliptical (15-18 cm long), slightly thicker than those of *Gnetum gnemon*; petiole 0.5 cm long. Flowers grouped in axillary male or female inflorescences (dioecious species), 6-7 cm long; yellowish; female flowers submerged in whitish hairs. Fruits red or rosy when ripe, fusiform (4 x 1 cm), covered with a delicate skin; containing one seed which is likewise fusiform.

Ecology and exploitation

G. costatum is found in wet forests up to 1,350 m altitude. It is common in secondary forests. In New Guinea it is most often found in forests of *Lithocarpus*, *Anisoptera* and *Hopea*. The tree grows spontaneously, is never cultivated but is always utilised for its leaves, its flowers and its edible

fruits. Fruiting generally takes place between March and July.

Alimentary uses

The fruits, the inflorescences (both male and female) and the leaves of *G. costatum* are eaten boiled with other vegetables. The fruits, which are slightly bitter, are often seasoned with coconut milk. They take longer to cook than those of *G. gnemon*. Among the Ankave the fruits are collected from March to April and are then grilled or, less often, boiled in small bamboo containers with other leaves. The leaves of *G. costatum* are picked throughout the year, and are eaten cooked. Only adults may eat the leaves and fruits of this tree, because it is believed that the gnarled character of its trunk would give it a malign influence over the growth of children.

Other uses

The bark produces very strong fibres, which are used as cords or for making nets for carrying goods. This is in fact the main use for this species.

Other edible species

The genus *Gnetum* comprises 30-35 species distributed in South America, in tropical parts of West Africa, and from the Indo-Malayan Region to Fiji. Besides those of *Gnetum costatum* the seeds of three Indo-Malayan species are eaten:

G. gnemon L.: see p. 180;

G. latifolium Bl. (syn. *G. indicum* (Lour.) Merr.): present from the Andaman Islands to New Ireland and Solomon Islands.

The seeds and the young leaves are eaten cooked in the Philippines and in Solomon Islands. The pulp must be removed;

G. tenuifolium Ridley: Thailand, Malaysia, Sumatra. The seeds are eaten cooked.

References

Henderson & Hancock (1989), Markgraf (1951), Verheij & Coronel, eds. (1992).



Gnetum costatum: New Guinea, eastern Bougainville and Solomon Islands.



Species

Gnetum gnemon Linnaeus

Family

Gnetaceae

Common name (English)

Two leaf

Consumption

Regular in New Guinea, occasional in Vanuatu where the species is rare.

Part eaten

Leaves, inflorescences and fruits.

Toxicity

None.

Description

Tree small in size (5-10 m) but may reach up to 22 m; trunk straight and grey, marked with horizontal ring-shaped folds, not more than 40 cm in diameter. Leaves simple, opposite, becoming yellow when dry, elliptical (7.5-20 x 2.5-10 cm); petiole 0.5-1 cm long. Flowers grouped in crown-shapes on axillary male or female inflorescences (dioecious species), 3-6 cm long; pale yellow. Fruits yellow, becoming purplish-red at maturity, not very numerous, ellipsoidal (1-3.5 cm long).

Morphological variability

In his revision of the genus, Markgraf (1951) described six varieties of *Gnetum gnemon* (var. *brunonianum* (Griff.) Mgf., var. *gnemon*, var. *gracile* Mgf., var. *griffithii* (Parl.) Mgf., var. *ovalifolium* (Poir.) Bl., var. *tenerum* Mgf.). However, Smith (1979) did not accept this division of the species.

Ecology and exploitation

In Vanuatu the species is rare, localised on a few islands (Pentecost, Ambae, Maewo and the Torres Islands). The tree is very tolerant of shade. It is found at low altitude, near to areas of habitation, most often in a cultivated state but sometimes spontaneous, so that one cannot determine whether the species was wild or naturalised. The villagers generally know all the trees that exist within their territory and they propagate them only from seeds. In New Guinea the species grows in humid forests between 0 and 1,100 (1,330) m altitude (Bourke, personal communication). It is commonly found along rivers and in regions with a well-defined dry season, sometimes in the wild state and sometimes cultivated; propagation is by seed or by cuttings. It is likewise cultivated in Solomon





Gnetum gnemon: present from Assam to the Caroline Islands and Fiji. Introduced to the Andaman Islands, Sumatra and Java.

Islands and particularly in Santa Anna and in the Reef Islands. Henderson and Hancock (1989) noted that the communities of the Reefs liked to include this tree in their system of arboriculture because it was tolerant of shade and resistant to cyclones. In Fiji the species is found from sea level to 850 m altitude (Smith, 1979).

Alimentary uses

Everywhere, the young leaves are eaten as vegetables and the seeds are boiled or roasted. In Vanuatu the young leaves are eaten boiled or braised in small bamboo pots. The seeds are simply sucked after the hard shell has been removed. They are most often cooked in bamboo, seasoned with coconut milk, a preparation that is used equally for leaves and for inflorescences. They may also be grilled. These are foods that are only used very occasionally, with the sole purpose of varying the menu. In New Guinea the young seeds are nibbled raw, the ripe seeds are eaten cooked, boiled or roasted. Among the Ankave, adults eat the leaves cooked with game, with pork and

with the juice of red pandanus (*Pandanus conoideus*). The fruits are also eaten. For the same reasons as with *Gnetum costatum*, only adults may eat the leaves and the fruits. In Solomon Islands the species is an important edible plant. The roasted seeds keep for a long time, but they become very hard and must as a result be ground before being eaten. In Java the ripe seeds are roasted then ground in order to make a sort of paste from which very small pancakes (1-2 cm in diameter) are made. These are then dried in the sun, packed and sold commercially. They are eaten after being fried in boiling oil, which has the effect of doubling their volume.

Other uses

The bark of *G. gnemon* provides very strong fibres that are used for making carrying bags. They are regularly used as objects of exchange between different communities. In Solomon Islands the fibres are used for making fishing nets; in the Philippines for making ropes.

References

Backer & Bakhuizen van
den Brincke (1963), Brown
(1951), Coronel (1983),
French (1986), Henderson
& Hancock (1989), Markgraf
(1951), Parham (1972),
Smith (1979), Verheij &
Coronel, eds. (1992).

Species

Inocarpus fagifer (Parkinson
ex. Zollinger) Fosberg

Family

Fabaceae

Common names (English and French)

Tahitian chestnut

Otaheite chestnut

Polynesian chestnut

La châtaigne de Tahiti (châtaignier de Tahiti)

Name in Bislama

namambe

Consumption

Staple food in season.

Part eaten

Seeds.

Toxicity

None.

Description

Tree of variable height according to region; less than 10 m tall in the Santa Cruz Islands, but reaching 20 m in Vanuatu. The trunk, straight and fluted, becomes progressively covered with projections, sometimes conspicuous, that resemble sinuous buttresses on old trees. Leaves simple, oblong or oboval (16-44 x 7-22 cm); petiole thick, 0.5-2.5 cm long. Flowers grouped along a rachis, white, small in size (about 1 cm); 5 narrow petals. Fruit yellow, chestnut brown or reddish when mature, rounded or oblong, flattened (5-13 x 3-12 x 4 cm). It contains one white seed (7 x 5 cm on average) which is edible after cooking.

Morphological variability

In Vanuatu the species displays a great variety of forms, the result no doubt of its cultivation since ancient times. The leaves may be either elongate and narrow or oblong and wide. The size, the colour and the shape of the fruit are very variable. Amongst this great diversity four morphotypes, present in all the islands, may be distinguished, according to whether they bear:

- broadly rounded or quadrangular fruits, green or brown when mature (the most common morphotype);



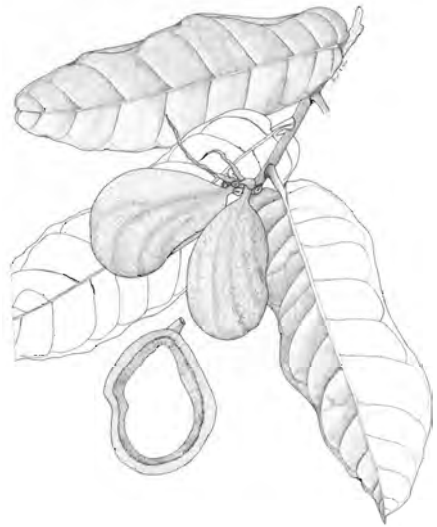
Inocarpus fagifer: rare in Java, the species becomes abundant in Maluku, the eastern islands of Indonesia and Oceania. Aboriginal introduction to Tonga and doubtless to Polynesia, but the Polynesians did not introduce it to Easter Island. European introduction to Micronesia, Peninsular Malaysia and the Philippines. Very rare in New Caledonia.

- fruits that are crescent-shaped or furnished with a sort of beak at the apex, green or brown, sometimes yellow;
- orange or red fruits, rounded, elongate or oval in shape;
- fruits very pale yellow in colour, smaller and broadly rounded (the least common morphotype).

We also record a tree that carries very small fruits that are shiny green and circular, 4 cm in diameter, that is extremely rare. In Tonga morphotypes with pale fruits or red fruits may be found. The cooked kernel has a flavour that varies greatly from one tree to another, and the villagers choose trees according to the taste of the kernels that they produce.

Ecology and exploitation

This tree, well known to Polynesians by the name *mape*, grows in Vanuatu in the coastal zone up to 400 m altitude. It is found around the edges of villages, close to gardens, in the undergrowth where the species often



Inocarpus fagifer.

multiplies in small populations close to rivers. It is more abundant in the south of the archipelago than the north. The tree, naturally spread, resistant and prolific, is found in the spontaneous state (and is then carefully protected), and it is also cultivated. The Tahitian chestnut produces numerous seedlings that are left in place at the foot of little-used trees, but are systematically destroyed at

the foot of others in order that fruits that have fallen to the ground in the course of harvesting may be easily found. When an isolated tree is found that bears fruits that are special, for their size, their shape or their colour, the villagers transplant one of the germinated fruits of that tree close to their village. The species was undoubtedly cultivated more in earlier times than it is nowadays. Fruit bats feed on the pulp of the fruit and spread the seeds. The fruits reach maturity between January and April, according to the particular year and the region and the tree. In New Guinea the species grows up to 400 (820) m (Bourke, personal communication). In the Milne Bay region, fruiting occurs from November to February. In Solomon Islands the Tahitian chestnut appears to be a wild species more often than cultivated. It is, however, cultivated in Temotu Province and particularly in the Reef Islands. The species is also found in the wild state, in a form that is slender and without buttresses, in the east of Johore, Sarawak and Sabah (Corner, 1988). In the Philippines, where it is introduced, it is protected but traditionally not much cultivated. It is propagated by seeds, by cuttings or by marcotting.

Alimentary uses

Tahitian chestnuts, available during the break-season between two harvests of

yams, represent one of the main alternative foods of the ni-Vanuatu. They are roasted in their skin or else peeled and then, after extraction of the seed which is a little bitter, boiled and sprinkled with coconut milk. The fruits may also be grated and reduced to a puree which is then wrapped in leaves and braised. In earlier times the trees were more abundant than nowadays and the fruits were eaten in greater quantities. In some regions the trees were divided up between several families in order to share out the fruit harvest. Often harvested in great quantities, the fruits keep for several months on bamboo drying racks, placed in the darkness of a hut. They are regularly turned, and the seeds are removed as they become ready. One other very effective method for keeping Tahitian chestnuts consists of burying them in a deep pit, or keeping them flat between two thick layers of grass. In Solomon Islands, in Fiji and in Polynesia, Tahitian chestnuts are also eaten roasted, boiled or in the form of *lap-lap*. In Solomon Islands they are preserved by smoking after they have been roasted. In Tonga they are grilled in their skins, then cooked in coconut milk. They are eaten in small quantities from March to May. In Samoa and in Wallis, they are cooked in an oven of hot stones; less commonly they may be grilled or boiled.

Other uses

The wood, which is brittle and susceptible to attack by borers, is little used. It does, however, make good fuelwood. In Tonga the flutings of the trunk are used for making handles of tools. The wood is also used for making kava bowls, and for mallets for beating *tapa* cloth. In the Reef Islands the buttresses of the tree are placed over a hole excavated in the earth, thus forming a platform for dancing (Henderson and Hancock, 1989). This usage is reminiscent of that of the buttresses of dragon plum (*Dracontomelon vitiense*) in Vanuatu. The timber is also used in the Rennell Islands for making canoes. In Tonga the leaves are used for making belts worn by ordinary people, which may in certain circumstances be an indication of status and respect. In earlier times the leaves were used as a covering for earthen floors of huts before mats are spread on them. In Wallis they were sewn into sails for boats. The species is used in traditional medicine for treating urinary

infections (bark grated and mixed with coconut milk or the juice from the bark). The bark, which is fortifying, is chewed before important physical activity is undertaken. The juice of green fruits is used in Tonga for treating insect bites and burns, and an infusion of bark against dysentery. In Samoa there is a belief that the human race originated from this tree (Kramer, 1906), and in Vanuatu myths tell how a man emasculated after a hot Tahitian chestnut was applied to his genitals became the first woman.

Other edible species

This is the only edible species in the genus.

References

- Aburu (1982), Brown (1954), Burkill (1966), Corner (1988), Coronel (1983), Dignan *et al.* (1994), Dupuy & Guiot (1992), Henderson & Hancock (1989), Kramer (1906), MacKee (1994), Parham (1972), Smith (1985), Whistler (1991), Yen (1974).



(Photo: J.M. Bompard).

Above: Indian plum (*Flacourtia rukam*)
Right: *Finschia chloroxantha*: fruits and
inflorescence.
Below: Infructescence of *Gnetum gnemon*.





(Photo: C. Sam)



(Photo: C. Sam)

Above: different forms of Tahitian chestnuts found in Vanua-Lava (Vanuatu).
Below: detail.





(Photo: J.M. Bompardi)

In season, the Tahitian chestnut (*Inocarpus fagifer*) is an important food for the peoples of Oceania.



(Photo: J.M. Bompardi)

Above: Collection of Tahitian chestnuts in western Samoa.

Below: Tahitian chestnuts in Samoa





The wild Indian mulberry is a tree protected for its medicinal properties and for the dyes obtained from its roots.

Above: Indian mulberry (*Morinda citrifolia*) cultivated on Malo (Vanuatu).

Right: Wild Indian mulberry tree in Vanuatu.

Below: *Neisosperma oppositifolium*.







(Photo: P. Bontemiere)

Above: Red pandanus: cooking in bamboos.
Below right: Long pieces of the fruits of red pandanus (*Pandanus conoideus*) are cooked on heated stones (cooking in a hot stone oven) with leafy vegetables.
Above right: Infructescence of red pandanus.





(Photo: M. Bourke)



(Photo: P. Bonnemère)





Above: Infructescence of pandanus (*Pandanus dubius*).

Left: Fruit of *Pandanus dubius* opened up to show the edible seed.

Far-Right: Orchard of Highland pandanus (*Pandanus julianettii*).





(Photo: M. Bourlier)



The
preparation
of the fruits
of pandanus.

All photos: D. Eastburn



Left: Picking of the infructescences.
Above: Transport of the infructescences,
passing by a garden of sweet potatoes.



(All photos: D. Eastburn)

Highland
pandanus
(*Pandanus
julianettii*)
is a valuable
supplementary
food for certain
communities.

Above: The fruits are baked in an oven of hot stones.

Below: The nuts are extracted from the cooked fruits and cut into pieces.





Above: *Pandanus tectorius* in a coastal village of Papua New Guinea (Umboi Island).
Below: Infructescence of *Pandanus tectorius*.

(Photo: M. Bourke)





(Photo: C. Mescam).

**Mats woven
from pandanus
(Pentecost, Vanuatu).**

Above: large mat (sese).
Below: small mat (tsip).





(Photo: M. Bourke)

(Photo: P. Lemmonier)

The seeds of pangi (*Pangium edule*) are eaten, but with certain precautions on account of their toxic substance.




Left: In New Guinea the Ankave tip the seeds of *Pangium edule* into a wooden device tightly lined with leaves, which they immerse in stagnant water. This maceration lasts for three or four weeks.
Above: Seeds of *Pangium edule* in their shells. Papua New Guinea (southern coast of West New Britain).



(Photo: A. Bizet)

Pangium edule.





Among the Ankave, the transformation of the kernels of *Pangium edule* into sauce is organised with strict gender-based division of labour.



(Photo: P. Lemmonier)

After maceration, the sauce obtained is stored in long internodes of bamboo, then distributed according to strictly defined rules over portions of root crops during communal meals.

Species

Maesa ambrymensis Guillaumin

Family

Myrsinaceae

Consumption

Gleaned by children.

Part eaten

Fruits.

Toxicity

None.

Description

Small tree (4-6 m). Leaves simple, dark green, rounded (7-19 x 4.5-11 cm); 5-10 pairs of veins bifurcating near the leaf margins; petiole 1-4.5 cm long. Flowers grouped on an axillary panicle, small in size (2 mm); 5 white petals, brownish green at the base. Fruits numerous, white and fleshy when mature, small in size (3 mm).

Ecology and exploitation

This species is found in all the islands of Vanuatu, up to 800 m altitude, in zones of secondary forest.

Uses

In Vanuatu children nibble the fruits. The wood is used as fuelwood.

References

Wheatley (1992).



Maesa ambrymensis: endemic to Vanuatu.

Species

***Morinda citrifolia* Linnaeus**

Family

Rubiaceae

Common names (English and French)

Indian mulberry

La morinde (morindier)

Name in Bislama

yalotri

Consumption

Localised and occasional.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Small tree (6-15 m). Leaves simple, opposite, dark green and glossy, oval or elliptical (22 x 31 cm); 6-7 pairs of thick veins; petiole 1-4 cm long. Flowers arranged in axillary heads or capitula; calyx entire; corolla white with 5 lobes that are backwardly curved and fused at the base (0.9 x 0.4 cm); 5 stamens; peduncle 2-4 cm long. Fruits (syncarps) pale green, then pale yellow at maturity and finally straw-yellow, globular or elongate (3-6 cm), furnished with numerous protuberances, with a strong odour, hard then soft when fully ripe. The seeds are arranged in a crown-shaped pattern when seen in transverse section.

Morphological variability

In Vanuatu as in Solomon Islands, two forms of *Morinda citrifolia* exist. The most common, widely spread through the archipelago, is wild although protected by humans for its colouring and medicinal properties. The other, cultivated for its edible fruits, is rare. It is mainly found in the Torres and Banks Islands, Malo and Aneityum. The trees that are cultivated for their fruits have paler and larger leaves that are slightly embossed, with a slightly longer petiole, and fruits that are larger, more regular and without the protuberances that are found on wild fruits. In



Morinda citrifolia: possibly originating from northern Australia, the species has a very wide distribution, facilitated by human activity but also because the seeds float and were carried around by ocean currents. Aboriginal introduction to Tonga, Hawaii and probably all the eastern Pacific. Naturalised in the Caribbean. Introduced to the Seychelles.

Gaua the two forms are distinguished by different names: *vuvur* (the wild form) and *wolemb* (the cultivated form).

Ecology and exploitation

In Vanuatu *M. citrifolia* is a very common tree which is found at low altitude, in dry soils and sites exposed to the sun: roadsides, plantations and along the shoreline. It is rarely planted right inside villages because of the strong odour of the fruits rotting on the ground. It is a wild species that is carefully tended. Spontaneously germinated plants may be transplanted closer to domestic areas for their medicinal, tinctorial or sometimes food uses. Flowering and fruiting of wild trees, whose fruits are small in size, is continuous. Trees cultivated for their fruits tend to fruit less often, but their production is more important and their fruits are larger. In Solomon Islands this is a species of coastal zones which grows in the wild state, but it may also be cultivated and then it bears larger fruits. In Fiji



Morinda citrifolia.

the species is found growing wild from sea level to 450 m altitude.

Alimentary uses

In Vanuatu the fruits are only eaten in the extreme north of the archipelago (Banks and Torres Islands) and in Malo. In these regions a particular type of Indian mulberry is grown whose fruits are very much larger, less swollen and sweeter.

Part used	Colour obtained	Utilisation	Locality
Bark	Yellow	tapa	Fiji, Samoa, Tonga, Cooks, Austral Is, Society Is, Marquesas Is
	Reddish brown	Pandanus for mats	Hawaii, Tonga
Bark plus root	Yellow or brown	Timber, vegetable fibres, hair	Solomon Islands
Root	Yellow-orange	Madras handkerchiefs and turbans	India
	Light brown	Vegetable fibres (except pandanus)	Marshall Islands

Table 5. Different methods of preparation of dyes from Indian mulberry

The fruits of the wild trees, which are slightly acid, are rarely eaten. In Solomon Islands the small fruits of the wild species are not eaten. There exist, however, mainly in Rennell, Bellona and the Reef Islands, forms with large fruits that are eaten. Henderson and Hancock (1989) thought that these forms and this utilisation had a Polynesian origin. In the islands of the Pacific the Indian mulberry is eaten in times of food shortage. Various authors have also reported regular consumption of the raw or cooked fruits in Fiji, Samoa, Kiribati and the Austral Islands. In India the green fruits are used as ingredients of curries.

Other uses

The roots of *M. citrifolia* contain several colouring agents, the most abundant of which is morindone (Pétard, 1986). These dyestuffs produce a yellow colour (in an acid medium) or a red colour (in an alkaline medium). The colour disappears pro-

gressively as the trees become older (Brown, 1957). Throughout its area of distribution the species is utilised for this property. In Vanuatu it is a tree that is culturally important and is protected. In earlier times the crushed bark of the roots was used to dye pandanus or vegetable fibres used in clothing; nowadays this pulverised bark is always used for making a hair colouring that is much sought after. Trees that are cultivated for their fruits, on the other hand, are not used for this purpose. The grated bark or epidermis of the roots, to which other plants or a mordant are added, is used to obtain a yellow to reddish-brown dye, which serves to colour assorted plant fibres (Table 5).

The Indian mulberry is likewise very important as a medicinal plant for which it is not possible to quote all the uses. Research appears to indicate that Indian mulberry contains immunostimulant substances, which explains the great diversity of usages in traditional

medicine. The raw fruit is crunched and eaten for treating enlarged spleens, boils of the armpit and numerous types of infection. In Kiribati (Thaman, 1990) and in Tonga the Indian mulberry is eaten to fortify people for long fishing expeditions or journeys by canoe. In Tonga a poultice of warmed leaves is still used for soothing abscesses and sores. Sometimes also bunches of leaves are brandished or waved to drive away evil spirits that haunt the living during the night, especially in the vicinity of cemeteries or on beaches. In Tahiti oral tradition says that this species originated from cerumen (ear-wax), and Tongans say that the god Maui was resuscitated when leaves of Indian mulberry were placed under his body. Yet more uses of

Indian mulberry are that the leaves are used to tenderise meat and octopuses (in Tonga), and the wood is used for frameworks of buildings (Reef Islands, Marshall Islands and Tonga).

References

- Brand Miller *et al.* (1993), Brown (1935), Brown (1957), Cardon & du Chatenet (1990), Dupuy & Guiot (1992), Glassman (1953), Groenendijk (1992), Hemsley (1894), Henderson & Hancock (1989), Parham (1972), Peekel (1984), Pétard (1986), Safford (1905), Smith (1988), St John (1951, 1960), St John & Mason (1953, 1960), Stone (1959, 1967, 1970), Thaman (1990), Whistler (1984b), Wichman & St John (1990), Wilder (1934), Yuncker (1971).

Species

Neisosperma oppositifolium (Lamarck) Fosberg & Sachet

Family

Apocynaceae

Common names (English and French)

Twin apple

Ochrosia

Consumption

Regularly picked by children.

Part eaten

Seeds.

Toxicity

Some risk.

Description

Small tree (10-15 m); abundant white latex. Leaves simple, arranged in whorls of 3 to 4 leaves, glossy green, thick and oboval, showing distinct narrowing in the lower third (20 x 10 cm); fine parallel veins that reunite in arches very close to the margins; petiole thick and 2-7 cm long. Flowers arranged in terminal clusters; calyx green and split into 5 lobes; 5 small white petals, fused at their bases and turned over at their tips; long pedicel. Fruits joined in pairs on a very small peduncle, green, ovoid and slightly flattened (7-10 x 5-6 cm), pointed at the tips; very fibrous pulp surrounding a thin nut; 2 flat seeds which are oval and edible. Old fruits that have fallen to the ground retain the thick, curved fibres of the pulp. They thus resemble small, pale brown hedgehogs.

Ecology and exploitation

In Vanuatu the species is found on watersides, river banks and along beaches.

It is never found away from the immediate vicinity of the sea. Very common, present in all the islands, wild and spread by marine currents, it is not afforded any special care and fruits throughout the year. In the Marquesas Islands, in contrast, the species is rare and grows up to 800-900 m altitude. In the Austral Islands, the Society Islands, New Caledonia and Fiji, it is a wild species of the coastline.

Alimentary uses

The fruit cut with a knife reveals two small, flat seeds which are edible. In Vanuatu children extract the seeds from their shell and nibble them as they are. In times of food shortage adults eat them as well. In Tonga they are eaten now and then. In the Marquesas Islands the seeds are considered to be poisonous. They were



Neisosperma oppositifolium: from the Seychelles to Sri Lanka and from the Andaman Islands to the Marquesas Islands. Present in all the Pacific Islands except Cook Islands and Kiribati; rare in Malaysia. The fruits float in the sea after their flesh has disappeared and germinate when they settle on a shore, accounting for the wide distribution of this species (Boiteau, 1981).

nevertheless eaten in times of food shortage in Nukuhiva and Fatuhiva.

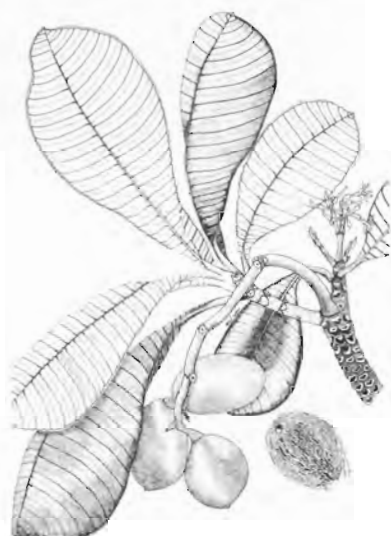
Other uses

The species is not used much. Its light timber is occasionally used in small constructions. Its burnt leaves produce an ash that is used as a fish poison in Malekula. In the north of Ambrym the pulp of young fruits mixed with other leaves is used for dyeing hair black. In the Marquesas Islands the fruits were in earlier times a component of necklaces. In Wallis the timber is used for frames of houses and for making broomsticks and boards of canoes. The leaves are used as a covering for ovens of hot stones.

Other edible species

The genus comprises 18-20 species. In the Indo-Malayan and Pacific Regions, in addition to *Neisosperma oppositifolium* one other species has edible seeds:

- *Ochrosia akkeringae* (Teysm. & Binnend) Miq. (syn. *Ochrosia littoralis* Merr., *Excavatia littoralis*



Neisosperma oppositifolium.

(Merr.) Markgraf.): native to Indonesia, the Philippines and Papua New Guinea. The seeds are eaten raw or cooked.

References

Backer & Bakhuizen van den Brincke (1963-1968), Boiteau (1981), Brown (1935), Brown (1957), Corner (1988), Dupuy & Guiot (1992), Peekel (1984), Smith (1988), Whistler (1992).

Species

Pandanus conoideus Lamarck

Family

Pandanaceae

Common names (English and French)

Red pandanus

Screwpine

Pandanus rouge

Consumption

Regularly and abundantly.

Part eaten

The pericarp of the fruit.

Toxicity

None.

Description

Small tree, 4-7 m high, furnished with stiff aerial roots. Leaves greyish green on the inner surface, long and narrow (100-200 x 5-8 cm), thick, apex frayed; edges and midrib with small spines. Fruits (syncarps) 30-40 cm long, reaching 1 m in some cases, weighing up to 10 kg, made up of numerous drupes that are small in size (2 x 0.5 cm) and arranged one against the other, with a pericarp that is rich in red or less commonly yellow oil.

Morphological variability

Several varieties of red pandanus are known (between 10 and 35 according to author). The Ankave recognise 15 types which fruit at staggered times from August to April. One of these bears yellow fruits.

Ecology and exploitation

This species is found at moderate altitudes. It is particularly common in the zone that girdles the island of New Guinea between 500 and 1,500 m, and it disappears above 2,000 m. The tree grows in damp, shady places and becomes mature after about four years. It is cultivated, usually propagated by cuttings. Individual trees persist on sites of ancient habitation, where they may sometimes appear as though they are wild specimens. The length of the fruiting season depends on the altitude and therefore on temperature. At lower altitude fruits are available more-or-less throughout the year. The higher the altitude the shorter the season becomes, so that above 1,700 m it only



Pandanus conoideus: New Guinea, Maluku (the islands of Ceram, Buru and Ternate). Recently introduced in the Bismarck Archipelago.

lasts for four months, from January to April (Bourke *et al.*, in press).

Alimentary uses

Pandanus conoideus belongs to the species of pandanus with edible fruits, the pericarp of which is remarkably oily. The fruit is red, or very rarely yellow. Methods for its preparation vary, but one most currently used is roasting or sometimes boiling for about half an hour after the fruit has been cut up into pieces. The red segments are then extracted from the endocarp and squeezed to obtain a thick, oily paste that looks like tomato sauce. This sauce, which is used to an extent as a substitute for coconut milk in areas where coconut does not grow well, is used to season other foods, such as sweet potato and certain types of cabbage. Its slight but distinct taste goes well with pork meat. It is not found much in the markets of Port Moresby, but it may be bought from December to March in the markets of Lae or in towns in the Highlands. Among the Ankave, this sauce is most often eaten when people are

gathered together. In season, households take turns to entertain the community with a large feast of root-crops (*Xanthosoma sagittifolium* and sweet potato), upon which the red sauce is poured. Each family receives one portion, which they either eat on the spot or take back to eat at home according to their preference. This is the occasion for great gatherings of village people in a society whose members most often live spread out. Men and women may plant red pandanus and may likewise harvest the fruits, but the squeezing of the pericarp to obtain the sauce is only performed by men.

Other uses

In certain places the oil is used for rubbing on the body and in the hair, and also for polishing arrowheads.

Other edible species

See *P. tectorius* Parkinson (p. 216).

References

Bourke *et al.*, in press, Dignan *et al.* (1994), May (1984), Stone (1982), Tarepe & Bourke (1992).

Species

Pandanus dubius Sprengler

Family

Pandanaceae

Common names (English and French)

Pandanus

Knob-fruited screwpine

Pandanus

Name in Bislama

pandanus

Consumption

Occasional.

Part eaten

Seeds.

Toxicity

None.

Description

Tree of medium height (10-20 m); loose crown; roots adorned with lenticels in vertical lines. Leaves dark green, becoming nut-brown when dry, long and narrow (2 m or more in length; 11-16 cm wide), the outermost third folded back towards the base, thick. Fruits (syncarps) solitary, spherical (20-30 cm in diameter), made up of numerous drupes arranged one against the other, the upper, most visible quarter blue-green, the lower quarter fibrous and white, the mid-section shiny brown, elongate (10 x 6 x 4 cm); peduncle 60-80 cm long. Seed situated at the base of the drupe, white, round (1-1.5 cm in diameter).

Ecology and exploitation

Pandanus dubius is a coastal species found on beaches and rocky shores. In Vanuatu the tree is found from the north to the south, on the coastline and near to domestic habitations. Generally wild, it is sometimes transplanted for its edible fruits or its thick leaves which are used for basketry.

Outside Vanuatu the species does not appear to be cultivated (Stone, 1982).

Alimentary uses

In Vanuatu, children occasionally eat the seeds which they extract from the drupes and eat just as they are. The seeds are also eaten elsewhere, such as in the Philippines and in Guam.



Pandanus dubius: present from the east coast of Peninsular Malaysia to the Mariana Islands and Rotuma. Absent from the majority of islands of Indonesia and from Polynesia.

Other uses

The leaves, which are very long and thick, are sometimes plaited into floor mats in the Philippines (Brown, 1951) or in Guam (Safford, 1905). In the Bismarck Archipelago the leaves are used for making native bags (Peekel, 1984).

Other edible species

See *P. tectorius* (p. 216).

References

Brown (1951), Peekel (1984), Safford (1905), St John (1989), Stone (1982).



Species

Pandanus julianettii Martelli

Family

Pandanaceae

Common names (English and French)

Highland pandanus

Screwpine

Pandanus des hautes terres

Consumption

Important and regular in season.

Part eaten

Seeds.

Toxicity

None.

Description

Tall tree (20-30 m), branched in its upper part; trunk straight, greyish, furnished at its base with long, stiff aerial roots. Leaves arranged in spirals at the ends of the branches, dark green and slightly glossy, long and narrow (300-400 x 8-12 cm), thick and leathery; leaf margins and midrib set with spines. Flowers in male or female inflorescences (dioecious); male inflorescence easily reaching 2 m, and bearing a series of elongate heads set one against the other, each a combination of small, whitish flowers with stamens; female inflorescence comprising a single globular or ellipsoidal head. Fruit (syncarp) globular or ellipsoidal (30-35 x 25-30 cm) weighing 5-7 kg, made up of numerous blue-green drupes rounded at the extremity; containing one nut with a hard shell, which once broken reveals an oily endosperm beige in colour.

Ecology and exploitation

Pandanus julianettii is found in the Highlands of New Guinea between 1,450 and 2,800 m (Bourke, personal communication), thus above the region of distribution of red pandanus. In general these two species are separated by a gap of about 100 m altitude. Among the Wola, only the female trees that produce the fruits are cultivated; male plants are wild and are found only in the forest. The species is propagated vegetatively by cuttings taken from the crowns. Unproductive trees or those blown down by the wind are used for this purpose. The times of flowering and fruiting are somewhat irregular. The fruits mostly reach maturity from February to March, but ripe fruits may be found throughout the year. The seasonality may vary





Pandanus julianettii: highlands of New Guinea.

between two immediately neighbouring localities. Among the Ankave and the Baruya, *karuka* fruits mainly from October to December. Periods of drought are followed by major harvests that occur in a synchronous manner in most villages of the Highlands (Bourke *et al.*, in press). This happened after the two big droughts of 1972 and 1982. Afterwards, production returns to an irregular pattern varying from one region to another. The trees produce from one to three syncarps per year.

Alimentary uses

This is an important source of food in the Highlands; for certain tribes the seeds of this *pandanus* constitute a valuable supplementary diet for one to two months of the year. The seeds are eaten raw, smoked or cooked; they may be grilled over a flame, they may be roasted beneath ashes or they may be cooked in earth ovens. The nuts in their hard shells may also be buried in soil saturated with water. They then develop a strong

flavour and are savoured raw or cooked. If the harvest is very abundant, the seeds are stored. Sometimes this is by burying them in dry soil, still in their shells, when they remain edible for close to a year, even after germination; sometimes by slow drying over a very smoky fire, when the nuts once smoked will keep for up to two years (the nuts may also be removed from the shells and wrapped in small parcels of leaves). At the time of harvesting the Baruya move for several weeks to the high forests where they dry large quantities of fruits over the hearths in their shelters. They then carry the nuts back to the village and store them, eating them for the best part of the following year. Finally, in some regions part of the mesocarp may also be eaten, raw or cooked.

Other edible species

See *P. tectorius* (p. 216).

References

Bourke *et al.*, in press, May (1984), Rose (1982), Sillitoe (1983), Stone (1982).

Species

Pandanus tectorius Parkinson

Family

Pandanaceae

Common names (English and French)

Pandanus

Screwpine

Pandanus

Vacouet

Name in Bislama

pandanas

Consumption

Irregular; food that is gleaned.

Part eaten

Seeds.

Toxicity

None.

Description

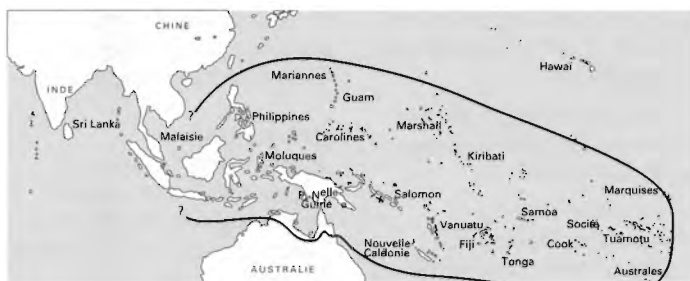
Small tree (5-10 m); trunk narrow; numerous large adventitious roots; crown not very dense. Leaves long and narrow (longer than 1 m), thick but pliable, apex frayed; margins with or without spines. Flowers grouped in male or female inflorescences (dioecious). Fruit (syncarp) single, green then orange when ripe, made up of a number of drupes that are light green on the upper part of the fruit, white on the lower part and yellow in the middle portion, polymorphic and variable in size (1.5 to 7 cm). This variability is marked from one tree to another, and may even occur to a lesser extent between different syncarps on the same tree. The drupes each contain 2 or 3 white seeds, ovoid, 1 cm long.

Morphological variability

This species shows great morphological variability, doubtless because it has been cultivated since ancient times. The peoples of Vanuatu distinguish about ten different local forms. Some botanists split *Pandanus tectorius* into several species, the geographical distribution of some of which is very narrow (St John, 1989).

Ecology and exploitation

P. tectorius is a very common tree in Vanuatu. It is found in stands on beaches and shores with calcareous soils, close to villages, and in remnant or secondary forests where it



Pandanus tectorius: the synonymy between *P. tectorius* and *P. odoratissimus* L. f. is not recognised by all authors, and it is therefore difficult to fix the western limit of the geographical distribution. One may, however, refer to a *P. tectorius* complex being distributed from the Philippines to Polynesia and from the Caroline Islands to the tropical coast of Australia, via all the islands of Oceania (Stone, 1976).

is an indicator of ancient habitations. The species is wild along the sea edge, and mainly cultivated in the villages. Distributed by marine currents or by pre- or post-European seafarers, it multiplies naturally by seeds or by cuttings of shoots that grow at the bases of the trees. This intensive cultivation has produced some cultivars that have particularly flexible leaves, the margins of which are free of spines.

Alimentary uses

In the Marshall Islands and in Kiribati, a large number of cultivars have been selected for their edible fruits. In Papua New Guinea, the fruits are eaten very occasionally. They are simply sucked when fully ripe to obtain a sweet juice. The same use is made of them in Samoa and Tonga. In Vanuatu children, and sometimes also adults, nibble the seeds.

Other uses

In Vanuatu, and throughout the Pacific, this pandanus is used above all for its leaves, which are the main material

used for basket-making and similar work (the leaves are softened in the fire, cut up into narrow strips, steeped in water and then bleached in the sun and dried).

According to the object to be woven – a mat, a basket or a hat – the weaver will choose from the variety of trees at his or her disposal. Some have smooth leaves, pliable and without spines, which are particularly sought after for basketry. In Tonga, necklaces and belts for dancers are made with the fragrant fruits. Once dried, the fibrous base of the fruit is used as a brush for decorating *tapa* (Whistler, 1991). In Wallis the fruits and the bracts of male inflorescences are used for plaiting into necklaces.

Other edible species

Worldwide, there exist close to 600 species of *Pandanus*, many endemic to a particular region, others traditionally cultivated. Apart from the species that we have covered (pp. 210-218) there exist in the Pacific, particularly in New Guinea, other species with edible

pulp or seeds (*cf.* list at end of book, p. 277). In particular we mention:

P. brosimos Merr & Perry: perhaps the wild ancestor of *P. julianettii*;

P. houlettei Ridley: Peninsular Malaysia; pericarp sweet and edible;

P. leram Jones ex. Fontana: Nicobar Islands, Maldiv Islands, Andaman Islands, Java and Sumatra;

P. ysabelensis St John: in Solomon Islands the pulp is sucked like sugar cane.

References

- Brown (1951), Dupuy & Guiot (1992), Henderson & Hancock (1989), St John (1989), Stone (1976), Verheij & Coronel, eds. (1992), Whistler (1991).

Species

Pangium edule Reinwardt

Family

Flacourtiaceae

Common names (English and French)

Pangi

Pangi

Consumption

Seasonal in Papua New Guinea; food in times of scarcity in Vanuatu.

Part eaten

Seeds.

Toxicity

A toxic substance is present in all parts of the plant, but is eliminated by the methods of preparation.

Description

Tall tree (20-40 m); trunk straight. Leaves simple, arranged in a spiral at the ends of the branches, dark green, rounded, often cordate (18-22 x 16-17 cm); 3-5 pairs of veins arising from the petiole, protuberant and brown underneath; petiole 14-15 cm long. Male and female flowers on different trees (dioecious), pale green; 5-8 petals. Fruits indehiscent, with a rugose skin that is brown in colour at maturity, ellipsoidal or pear-shaped (15 cm long on average); pulp yellow, with an agreeable but strong odour; about ten nuts, imbricated one against the other, flattened (2-5 cm), with a thick, hard shell. Each nut contains one kernel which is divided into two flat portions enclosing the embryo.

Ecology and exploitation

In Vanuatu this species is present in many of the islands, in the wild state, but it is rare in the south of the archipelago. The

trees are carefully protected and are very occasionally transplanted. Fruiting occurs during the dry season (July to August). In New Guinea the species grows between 0 to 1,050 m altitude (Bourke, personal communication). In the region of the Ankave, it is planted or it multiplies spontaneously in sites that are made favourable for the plant by regular visits from people who protect the young plants. The fruits are in fact used on the spot, at the same place where the trees grow. Some fruits are missed and these give rise to new trees, which as the seasons go by leads to the appearance of little orchards that are intentionally kept in order. In addition, the regular trampling of these spots hinders the regrowth of weeds. It is thus a situation of semi-cultivation.



Pangium edule: origin obscure, but found from Malaysia to Vanuatu. Introduced to Micronesia during European times.

The tree does not require any maintenance. The fruiting season extends over several months during the driest season, from April to August.

Alimentary uses

In Vanuatu the use of *Pangium edule* as food is rare and localised. It is essentially a food in times of scarcity, to be utilised for example after a cyclone. All parts of this species contain a toxic substance, a cyanogenic glycoside, which is eliminated by roasting and/or maceration before eating. The manner of preparation in Vanuatu is as follows: the fruits are opened and put to soak for several weeks until a strong odour is released and the shells become soft. The kernels are then washed, roasted and then put back to macerate in running water for some days. Softened and with their toxic constituent removed, they are cooked for a second time and then dried. The product is then eaten in this form. In New Guinea the Ankave, who use this plant strictly for food, eat the kernels in the form of a paste or a liquid sauce,

beige in colour, that is poured over root crops (taro and sweet potato). This is a dish that is eaten at the time of large gatherings of villagers which take place between May and September. To obtain this sauce, the Ankave extract the kernels from their shells after cooking the nuts in bamboo containers. They are then wrapped up in a large parcel of leaves and put to macerate in a wooden device placed at the bottom of a bowl filled with water. The maceration lasts for three to four weeks. This process for turning the kernels into a sauce is undertaken with very strict gender division of labour. The kernels of *P. edule* are likewise eaten by the Jimi of New Guinea. In some regions of Southeast Asia an oil, which is used for cooking, is extracted from the seeds after preparation in a similar manner. In the Bismarck Archipelago the inhabitants regularly consume the flesh of the cultivated fruits (Peekel, 1984). In Solomon Islands, finally, the seeds are generally not eaten, except



Pangium edule (after J.J. Ochse, Tropische Groenten)

in Ngatokae where they are cooked as a pudding after being crushed and soaked in water (Henderson and Hancock, 1989).

Other uses

In Vanuatu the main use of these seeds is for manufacture of little bells which, once hollowed out, fastened together and tied around the ankles, serve as bells during customary dances. The same usage

is found in certain parts of New Guinea, in the Bismarck Archipelago and in Solomon Islands. In the Philippines the leaves and the bark are used as a fish poison. In Malaysia the leaves are used for preserving meat. The seeds, freshly crushed, are applied to sores. In Solomon Islands the leaves are used for treatment of lice. In some regions of Southeast Asia the oil extracted from the seeds is used as lamp oil (of poor quality) or for soap.

Other edible species

This is the only edible species in the genus.

References

Backer & Bakhuizen van den Brincke (1963), Bonnemère (1993), Brown (1954), Corner (1988), Henderson & Hancock (1989), Peekel (1984), Sleumer (1954), Stone (1970), van Heel (1974).

Species

Pipturus argenteus (Forster f.)

Weddell

Family

Urticaceae

Common names (English and French)

Pipturus

Pipturus

Consumption

Occasionally by children, and a food in times of shortage.

Part eaten

Fruits.

Toxicity

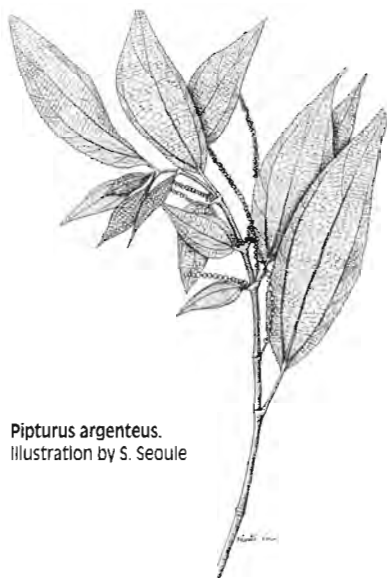
None.

Description

A not very high tree (5-10 m), small trunk that is smooth and slightly fissured. Leaves simple, alternate, dark green above and silvery underneath, oval or sometimes elliptical (12-15 x 5-8 cm), base cordate and apex acuminate or acute; 3 pairs of main veins arising from the petiole; margins dentate; petiole 4-8 cm long. Flowers grouped in bunches on an inflorescence that is some centimetres long, minute; white petals. Fruits sessile, green and then white when mature, rounded (3 mm in diameter), with minute seeds and furnished with protuberances.

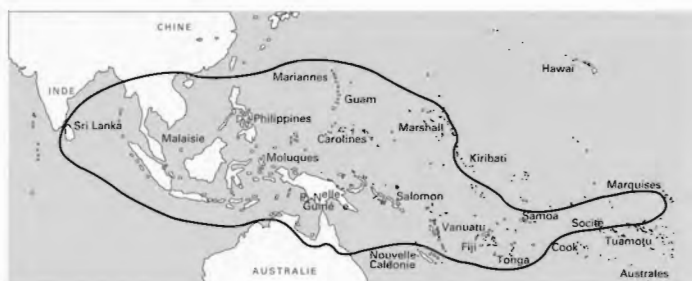
Morphological variability

Several varieties have been distinguished in this species which is variable in its morphology. According to Smith (1981), the variety present in Vanuatu, *Pipturus argenteus* var. *lanosus* Skottsberg, likewise occurs



Pipturus argenteus.
Illustration by S. Seoule

in Fiji, Rotuma, Tonga, Niue, Samoa, the Marquesas Islands and the Society Islands. Additional collections will be necessary for sorting out the taxonomy of this species.



Pipturus argenteus: present from Sri Lanka to the Marquesas Islands. Absent from New Caledonia, the Cook Islands, the Tuamotu Islands and also from Kiribati.

Ecology and exploitation

In Vanuatu *P. argenteus* is found in all open areas and in fallows ancient or modern, up to 500 m altitude. The species grows well in stony soils. It is a wild tree, but is protected because it provides timber for construction. It fruits throughout the year. Among the Ankave of Papua New Guinea, it grows in ancient gardens and in forests in areas where landslips have occurred. In Fiji the species is found from sea level up to 1,000 m altitude, in Samoa up to 700 m altitude.

Alimentary uses

In Vanuatu children nibble the ripe fruits in the way that sweets are sucked. In times of food scarcity all the population turns to these fruits, which though minute are sufficiently abundant to provide a sweet and palatable foodstuff. The fruits are also eaten by children in Tokelau.

Other uses

In Vanuatu the tree provides timber for construction of above-ground frameworks of buildings. In Samoa and in Tonga, fishing lines and nets of excellent quality are made from fibres extracted from the bark. Among the Ankave, the sap of the tree is used as glue, and the fruits are eaten by the birds.

Other edible species

The genus *Pipturus* comprises 40-50 species distributed from the Mascarene Islands to Polynesia, via the Indo-Malayan Region and Australia. No other species is recorded as having fruits that are eaten.

References

Christophersen (1971), Henry (1968), Parham (1972), Smith (1981), Stone (1970), Whistler (1984b), Yuncker (1971).

Species

Pittosporum pullifolium Burkill

Family

Pittosporaceae

Consumption

Snack food.

Part eaten

Seeds.

Toxicity

Yes.



Pittosporum pullifolium: New Guinea and Solomon Islands.

Description

Small tree or shrub not exceeding 5 m, occasionally of medium height (15-20 m), semi-epiphytic in lower regions. Leaves simple, grouped like a crown at the end of each branch, elliptical or oval (2.5-25 x 1.5-19 cm), stiff and coriaceous. Flowers in terminal or pseudo-terminal inflorescences; sepals free, yellow or crimson, elliptical (0.5 x 0.3 cm), petals rounded at the apex (1 x 0.4 cm). Fruits numerous, more than 20 per infrutescence, ellipsoidal, sometimes compressed (1.5-3.5 x 1-2 cm), made up of three lobes that curve inwards slightly at maturity; peduncle woody, 1-3 cm long; numerous flat seeds.

Ecology and exploitation

Pittosporum pullifolium is found at the edges of sub-alpine forests (3,200-3,800 m altitude) and in cloud forests at lower altitudes (1,200-2,100 m).

Alimentary uses

The small seeds are removed from the shell and eaten raw. They may also be roasted in the shell. The Karam (Papua New Guinea) consider these seeds, which have a bitter taste, to be the food preferred by a bird whose meat also has a bitter flavour.

Other edible species

The genus *Pittosporum* contains about 195 species, of which 80 are distributed in Oceania. No other species have any alimentary use.

References

Bakker & van Steenis (1957), Bulmer (1964), French (1986).

Species

Planchonella grayana St John

Family

Sapotaceae

Common name (English)

Comb tree.

Consumption

Very rare.

Part eaten

Pulpy flesh.

Toxicity

The pulp is very astringent.

Description

Large tree; crown big and rounded. Leaves simple, arranged in spirals at the ends of the branches, dark green, elliptical or oblong (8-15 x 4-7 cm), apex rounded, base narrowed and decurrent; 8-11 pairs of veins; petiole 2-3 cm long. Flowers white, small in size (5 mm); 5 sepals; 5 petals. Fruits dull green, spherical or slightly ovoid (3.5 x 2.5 cm); containing 5 brown seeds.

Morphological variability

The taxonomy of this species has undergone numerous modifications, and botanists have still not reached consensus on the subject. Smith (1981) placed the taxon in the genus *Planchonella* and made it a distinct species, *P. grayana* St John (and it is under this name that we present it here). However, Wheatley (1992) identified it as *Pouteria costata* (Endler) Pierre ex. Lam var. *vitiensis*. Finally Pennington (1991),

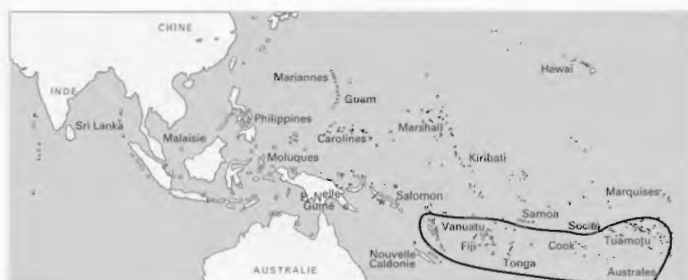
in his revision of the genera of Sapotaceae, does not mention *P. grayana* St John among the synonyms of *Pouteria costata* (Endlicher) Baehni.

Ecology and exploitation

Present in the majority of islands of Vanuatu, the species is particularly abundant in the south. It is found at low altitude, in forests along river banks. It is a wild tree, fruiting at the end of the year (October to December), which always produces abundantly. It is not afforded any special care. The seeds are spread by fruit bats which feed on the pulp. In Fiji the species is found from sea level up to 400 m altitude.

Alimentary uses

The fruits are hardly eaten at all. The inhabitants of Tanna occasionally eat very ripe fruits, in small quantities (one to two at



Planchonella grayana: Vanuatu, Fiji, Samoa, Tonga, Niue, Cook Islands, the Austral Islands and Tuamotu Islands.

the most) because the pulp is strongly irritant to the gums. At Tasmate, on the west coast of Santo, the fruits are picked at maturity, peeled and then washed carefully to remove the abundant latex. They are then eaten raw. Despite this intensive washing, the pulp still irritates the lips somewhat. The fruits may also be roasted, with the peel still on, in a small oven of hot stones made especially for the occasion. They are eaten hot, after having been peeled.

Other uses

The timber is sometimes used in construction of dwellings and of canoes.

Other edible species

The genus *Planchonella* includes over a hundred species from South East Asia to Polynesia (some also in Africa and South America). As we have noted, their taxonomic status is confused and they vary in placement between the genera *Planchonella* and *Pouteria*. Some authors quote other *Planchonella* as being edible, in particular in northern Australia (Cooper & Cooper, 1994), but their identity is still problematic.

References

Baehni (1942), Cooper & Cooper (1994), Gray (1862), Lam (1942), Pennington (1991), Smith (1981), van Royen (1957), Wheatley (1992), Wilder (1934).

Species

Pometia pinnata J.R. & G. Forster

Family

Sapindaceae

Common names (English and French)

Taun tree
Pacific lychee
Le pomet (pometier)
Bois de pieu

Name in Bislama

nandao

Consumption

Regular in season.

Part eaten

Arils.

Toxicity

None.

Description

Tall tree (up to 30 m), crown large, dense, irregular. Leaves paripinnate, red at first, then green when fully developed, 35 cm long, petiole thick, 1-2 cm long; 6-8 pairs of opposite leaflets, slightly lanceolate (17 x 8 cm), coriaceous, plus 1 pair that is very small in size and round in shape, situated at the base of the petiole; petiolule short, 0.2 cm long. Flowers grouped in long, terminal racemes, small in size. Fruits green or red, round or very slightly oval (4-6 cm in diameter); pericarp thick; a fine membrane covering a white or rosy aril, containing a single seed.

Morphological variability

This species, undoubtedly still in the process of evolution, is extremely variable. Jacobs (1962) distinguishes 8 forms of it: *Pometia pinnata* J.R. & G. Forster f. *acuminata*, f. *alnifolia*, f. *cuspidata*, f. *glabra*, f. *macrocarpa*, f. *pinnata*, f. *repandra* and f. *tomentosa*. All the trees of this species in the Pacific, and therefore all those in Vanuatu, belong to the form *pinnata*. The variability of the species appears to be greater in New Guinea than in Vanuatu since several forms coincide there. Jacobs indicates, moreover, that the taun trees of the Pacific derive



Pometia pinnata: found from Sri Lanka to Samoa, via the Andaman Islands, Wallis and Niue. Aboriginal introduction to Tonga (from Fiji), then in European times to New Caledonia and to the east of Samoa (Hawaii and the Marquesas) where it is only found in the cultivated state. Rarer in northern Thailand, southern Yunnan, Indochina and Taiwan.

very clearly from those of New Guinea. In the local situation in Vanuatu, two main forms of *P. pinnata* may be distinguished according to the colour of the fruit: one with red fruits, the other with green fruits. Apart from these two main forms, which are found throughout the country, other more localised forms may be found that differ in the colour of the epicarp and of the aril. By way of example, there are forms with oval fruits, with orange fruits and with brown fruits streaked with green. In Tonga three forms are distinguished: *tava moli* (with orange fruits), *tava kula* (with reddish fruits) and *tava hina* (the most common form with whitish fruits, from *hina*: the grey hair of an elderly person). Several varieties are known in Fiji: *dawa moli*, *dawa seren* (with large, reddish fruits), *dawa lowa* (with blackish fruits) and *dawa sisici* (with small green fruits, known from Kandavu).



Pometia pinnata.

Ecology and exploitation

In Vanuatu *P. pinnata* grows in secondary forest up to 300 m altitude. It is in the centre of the archipelago (Malekula, Ambrym, Emae, Epi, Malo) that the species is the most abundant and most diversified. The tree is wild, and its better forms (those that produce fruits of good quality) are transplanted close to areas of habitation. In addition, the fruits are spread by fruit bats.

Trees in the forest most often produce fruits of poorer quality, some of which are too acid and are eaten scarcely or not at all. Trees transplanted near to habitations are carefully and regularly weeded, sometimes to encourage the growth of young plants and sometimes, later on, to facilitate the picking of fruits. They are likewise pruned in order to reduce the height of the adult trees. Flowering occurs from September to November, followed by fruiting in December and January. The production, which varies from one tree to another, seems to be less abundant than in the islands of the central Pacific, and the fruits are often infested with maggots. The short fruiting season makes *P. pinnata* a tree with fruits that are much sought after. In Papua New Guinea the species is found from 0 to 850 (1,120) m (Bourke, personal communication). It is the dominant species of certain forests. It is also cultivated, mainly in the Bismarck Archipelago. In Solomon Islands the species although common is little cultivated. In the Santa Cruz Islands it is wild in the forest and cultivated close to villages. The species is present in Fiji, wild in the forest or cultivated in villages, from sea level to 300 m altitude. In Tonga cultivated forms exist, while in Samoa the species is only known in its wild form and is not eaten.

Alimentary uses

In Vanuatu the fruits, which are easily damaged, are picked with the aid of a long bamboo pole and placed carefully in baskets. They do not keep and they are eaten raw. They are sometimes soaked in seawater to make them tastier, a practice that is also known in Solomon Islands (Reef Islands). They are sold in moderate quantities in the markets of Port Vila and Santo. In Indonesia the seed is likewise eaten after having been grilled. The fruits are also eaten in New Guinea, mainly in the Bismarck Archipelago where they are particularly valued, in the Santa Cruz Islands, in Fiji, in Wallis and in Tonga. In Solomon Islands they are only eaten in times of food scarcity, apart from some cultivars with large fruits that are eaten more regularly (Henderson and Hancock, 1989). The seeds may also be eaten once they are roasted and are sometimes dried on racks and stored.

Other uses

The timber is not much used for building in Vanuatu but is instead used for craftwork or as fuelwood. In Tonga it is used to make frameworks for buildings and for beaters for *tapa*. It is one of the main timbers utilised in Solomon Islands, where it is commercialised under the name of *taun*. It is also used in the making of canoes (not very durable) and for oars and axe handles. In Vanuatu the

juice of the bark is used for treating maladies of the spleen and for coughs. The bark is likewise applied to wounds and sores. Finally, an extract of the leaves is used to treat ciguatera. In Tonga an infusion of bark is administered for treatment of stomach aches, sores of the mouth and as a mouthwash for toothache; a decoction of the bark is drunk as a treatment for sterility in women. The species is further used for treatment of post-natal haemorrhage, jaundice of the newborn and to cauterise (seal off) the umbilicus of the newborn. The Ankave use the timber of one of the two forms of *P. pinnata* for making houses, fences and bridges.

The bark is also used for making lime, one of the necessary ingredients when chewing betel nut.

Other edible species

Pometia ridley King, the second species of the genus *Pometia*, likewise produces fruits whose pulp and seeds are eaten. The seeds may first be roasted.

References

Christophersen (1971), Dupuy & Guiot (1992), Foreman (1971), Henderson & Hancock (1989), Jacobs (1962), MacKee (1994), Parham (1972), Radlkofer (1932), Smith (1985), Soerianegara & Lemmens, eds (1994), van Royen (1964).

Species

Pouteria maclayana (F. Muell.) Baehni

Family

Sapotaceae

Consumption

Occasional.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Tree of medium height. Leaves grouped at the ends of branches, dark green, shiny on the upper side, oblong or oboval (23 x 9 cm), apex slightly acuminate, base tapering to a point; 7-8 pairs of lateral veins, protuberant on both sides; margins undulate; petiole 3.5 cm long. Flowers grouped on axillary inflorescences, small in size, cream or white; calyx with 6 unequal sepals. Fruit olive-green, globular (10 cm in diameter); pulp yellow orange, fibrous; 2-3 seeds partially covered with a hard brown shell.

Ecology and exploitation

The tree, which is wild, grows from sea level to 200 m altitude.

Alimentary uses

The fruits, which have intensely yellow pulp, are occasionally collected from the tree and eaten raw. They may also be boiled. In earlier times on the island of Karkar, this species was eaten more regularly. It still is so eaten in times of food

scarcity. Flying foxes also eat the pulp. The fruit is eaten cooked on Rennell and Bellona.

Other uses

The species above all provides good timber for construction.

Other edible species

The genus *Pouteria* comprises about 50 species, several of which have edible fruits. Originating from tropical America, they have been introduced to the Indo-Malayan Region or the Pacific, where they are now cultivated. We note:

P. sapota (Jacq.) Moore & Stearn;

P. campechiana (H.B.K.) Baehni;

P. duclitan (Blanco) Baehni.

References

Borrell (1989), Coronel (1983), Henderson & Hancock (1989), Verheij & Coronel, eds (1992).



Pouteria maclayana: the small islands of Lingga, Talaud and Nanusa; also New Guinea and the southern Solomon Islands.



Pouteria maclayana. Reproduced from Hermann-Erlee and Van Royen, 1957, *Blumea*, 8, 2.

Species

Scleropyrum aurantiacum
(Laut. & K. Sch.) Pilger

Family

Santalaceae

Consumption

Occasional.

Part eaten

Seeds.

Toxicity

None.

Description

Flowers yellow-green. Fruits red at maturity, containing a single white kernel, hard, covered with a shell.

Ecology and exploitation

The species, which is not very abundant, is found in Papua New Guinea from 600 to 2,000 m altitude. These are wild trees that are not maintained by the Ankave. Fruiting takes place in July to August.

Alimentary uses

This is a very occasional food. The Ankave eat the white kernel contained in the nut after grilling it over a fire. Children are not allowed to eat it because the fruit ripens very slowly, and it is believed that the children's growth would likewise be retarded.





Above: *Planchonella grayana*.
Below: Taun tree (*Pometia pinnata*)
from Tanna (Vanuatu).





Above: Different types of golden apple (*Spondias cytherea*) from Wala-Rano (Malekula, Vanuatu).

Below: Left: cut fruit and endocarp of a wild fruit from the forest (Vikar, from Santo, Vanuatu). Right: cut fruit and endocarp of a cultivated fruit.



(Photo: J.M. Bompard)





Above: *Sterculia vitiensis*.
Below: *Pouteria maclayana*.

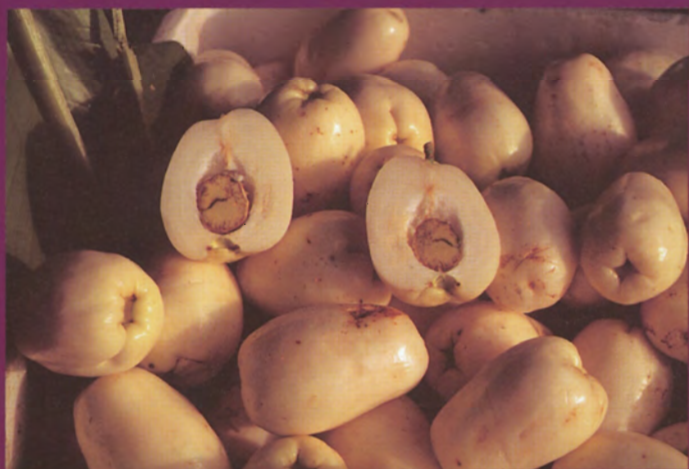


(Photo: M. Bourke)





Above: Malay apples. The white fruits here have not yet reached maturity.
Middle: The two types of inflorescence, white and red, of the Malay apple.
Below: Type of Malay apple (*Syzygium malaccense*) with white fruits.



(Photo: J.M. Bompart)



The flavour of the fruits of the Malay apple may be insipid, sweet or delicately scented. But it is always refreshing.



Top: Edible *Syzygium* sp. from Vanuatu.
Above: *Syzygium richii*.







(Photo: M. Bourke)

Above: children breaking open sea almonds, *Terminalia catappa* (Milne Bay).
Right: Infructescence of sea almond.
Left: cultivated sea almonds from Papua New Guinea (Normanby Island).





(Photo: M. Bourte)

Above: *Terminalia sepicana*.
Middle: *Parartocarpus venenosus*.
Below: *Terminalia samoensis*.



(Photo: J.M. Bompard)



Species

Spondias cytherea Sonnerat

Family

Anacardiaceae

Common names (English and French)

Golden apple

Otaheite apple

Ambarella

Vi or Wi or Evi

Tahitian apple

La pomme de Cythère (pommier de Cythère)

Consumption

Regular in season.

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Tree of medium height (10-15 m); trunk straight, grey, smooth, often with 4 to 8 small buttresses; crown rounded. Leaves compound, alternate (23.6-70 x 11-26 cm); petiole 10 cm long; 5 to 8 opposite leaflets, dark green, becoming yellow before falling, elliptical (4-14 x 2.5-5 cm); 15-20 pairs of parallel veins; sessile. Flowers grouped in panicles 50 cm long, with white petals, minute. Fruits green, yellow or orange when ripe, spherical or ovoid (6-12 x 4.5-9 cm); endocarp connected to the peduncle by a woody prolongation, thick, tough fibres curved back towards the base, penetrating the pulp of the fruit; pulp juicy, yellow or orange, often with fibres that are sometimes arranged in a very loose and indistinct matrix.

Morphological variability

The villagers distinguish several sorts of golden apple according to the colour of the fruits (yellow or orange when ripe), their size and their taste. Several forms exist that have very large fruits, mainly in Malo and in Malekula (east coast). Likewise there occurs a form with small, green fruits that are eaten whole (skin and nut included) before they are ripe. When these fruits have reached their full ripeness, they become dry and fibrous and no longer edible. Finally, a tree whose juvenile leaves are red in colour (*wi kar*) has been observed in Santo. Spontaneously generated forms of the tree often have acid or fibrous fruits that are not eaten, but whose



refreshing juice is drunk. *Spondias cytherea* could in fact be the cultivated form of a related wild species originating from further west. In general, the species in Vanuatu shows a greater variability of form than appears to be found elsewhere.

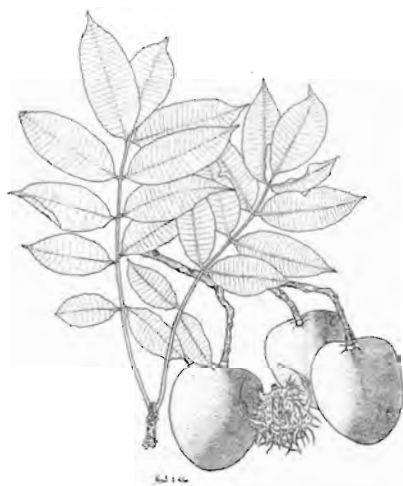
Ecology and exploitation

In Vanuatu the tree is found frequently up to 300 m altitude. The villagers prefer to plant this tree with its deciduous leaves around areas of habitation or close to gardens rather than inside the village itself. The golden apple is rare in the south (Tanna and Aneityum) and usually has fruits of inferior quality. The east coast of Malekula and, to a lesser degree, Malo, Pentecost and Ambrym are the zones in which the species is most diversified. The golden apple is a cultivated species in Vanuatu. One does find there, however, a form

with small fruits that are dry and fibrous when ripe, which may be related to a wild form. The golden apple is propagated by planting a germinated seedling or a cutting of a branch into loose, light, moist soil. Fruit bats feed on the sweet fruits which they thus spread in the forests. However, spontaneously generated trees are not common outside open areas. The tree loses its leaves in June-July, flowers in July to September and fruits in April to June. In Papua New Guinea the species is found in forests between 0 and 950 (1,070) m altitude (Bourke, personal communication). It is rarely cultivated. In Solomon Islands it is essentially a wild species. In the Santa Cruz Islands, in contrast, a cultivated form exists alongside a wild form; the species is likewise cultivated in the Reef Islands. From Vanuatu and further eastwards, the golden apple is cultivated.

Alimentary uses

The golden apple appears to have been naturalised in Vanuatu for a long time. In numerous regions the name was also applied to the papaya, introduced later, under the impression that it was a related fruit. The fruits are picked while still green, just before they are fully ripe, and are then eaten raw several days later when they have ripened further inside the house. They have a pleasant taste, slightly acid. The green fruits may likewise be roasted in their skins or



Spondias cytherea.



Spondias cytherea: present from the Indo-Malayan Region to Tahiti. Introduced in European times to numerous tropical regions, such as Hawaii, the Caroline Islands and Jamaica (1782 and then 1792). The centre of origin of this species is not known, although the Society Islands are often quoted as this. It is more likely to have been from western Melanesia (Solomon Islands, Vanuatu, New Guinea), or from the small islands of Sunda in eastern Indonesia, or perhaps in the Philippines although that seems less likely.

grilled over hot coals. When in season they are sold in large quantities in urban markets. Nowadays they are used for making jams, savoury compotes, chutneys and condiments. The fruits are eaten throughout the area of distribution of the species, but they are of poor quality in New Guinea and in Solomon Islands. In Solomon Islands the fruits, which are bitter, are often rubbed with lime or lemon juice and are then cooked before being eaten.

Other uses

Such uses are rare. The wood, which is too soft to be used for construction, is simply used for making outriggers of canoes. The golden apple is, however, a good medicinal plant which is used particularly for treating ciguatera (decoction or extract of leaves or bark). The juice of the leaves is administered for treatment of coughs.

Other edible species

14 species of *Spondias* occur in the Indo-Malayan Region, the Pacific and

tropical America, 7 of which have edible fruits with a more or less sweet taste:

S. acida Bl.: west Indo-Malayan Region, rare and very productive; acid fruits;

S. mombin L.: originally from tropical America, introduced to certain Pacific islands and grown for its fruits;

S. novoguineensis Kostermans: described in 1991, native to New Guinea, Solomon Islands, Ternate, the Aru Islands and Seram (Ceram). Semi-cultivated and protected for its edible fruits, frequently confused with *S. cytherea*;

S. pinnata (Koenig ex. Linn. F.) Kurz: India, Burma (Myanmar), Andaman Islands, and doubtless also Thailand and Indochina just as in Sri Lanka where the species has been introduced. Cultivated for its edible fruits;

S. purpurea L.: originally from tropical America, introduced to the Philippines, cultivated for its fruits;

S. tuberosa Arruda:
endemic to northeast
Brazil, producing edible
fruits but little cultivated.
Its tuberous roots are eaten
in times of food shortage.

References

Brown (1954), Corner
(1988), Ding Hou (1978),
Henderson & Hancock
(1989), Kostermans (1991),
Ochse *et al.* (1961), Popenoe
(1974), van Royen (1964).

Species

Sterculia vitiensis Seemann

Family

Sterculiaceae

Common names (English and French)

Sterculia

Sterculia

Consumption

Regular in season (southern Vanuatu).

Part eaten

Seeds.

Toxicity

None.

Description

Tall, slender tree reaching 30 m in height; trunk straight, pale grey, smooth; crown terminal and flattened; thin buttresses. Leaves arranged in a spiral at the ends of the branches, palmate, dark green, broad; petiole long, 20 cm in length; 7-9 lanceolate leaflets (10-25 x 3-10 cm), base sharply pointed; 12-15 pairs of veins; sessile or sub-sessile. Flowers grouped in sub-terminal panicles; 5 sepals fused at their bases; petals yellow then pale red, small in size (0.5 cm). Fruits are follicles yellow orange at maturity, globular (8-10 cm in diameter), hard and with a downy covering, splitting at maturity along a groove round the periphery to reveal a vermilion red interior and a row of glossy black seeds fastened along the edges. Seeds elongate, 1-2 cm long.

Ecology and exploitation

In Vanuatu the species is mainly found in the southern islands. It is recorded from Maewo, Malekula, Malo,

Pentecost, Santo, Tongoa, Efate, Erromango, Tanna, Aneityum. It grows at low altitude in areas of gardens or spaces cleared by human activity. It is a species that is cultivated for its edible seeds, but it is sometimes found in the wild state, spread by birds which also feed on the seeds. It is never very abundant. In Fiji it has been found up to 300 m altitude.

Alimentary uses

The seeds when ripe are eaten grilled, either directly in their shells or separately after being extracted by hand. In Malo the shells of the fruits are used as moulds in which *lap-lap* is cooked. The root crop paste (the *lap-lap*) is put into the shell which is then closed and roasted under hot coals. These fruits are also eaten in Fiji.



Sterculia vitiensis: Vanuatu and Fiji.

Other uses

In Vanuatu the soft wood is sometimes used for making canoes. In Fiji the tree provides good timber for construction, but the species is not abundant enough really to be used for this purpose (Smith, 1981).

Other edible species

Close to 200 species belonging to the genus *Sterculia* exist in the tropical world. Eighteen are present in New Guinea. Among the species with edible seeds we note:

S. foetida L.: from East Africa to New Guinea and northern Australia. Seeds poisonous, but roasting destroys the toxic substance. Eaten by Australian aboriginals, as also by certain Indian and Malayan peoples;

S. oblongata R. Br.: Philippines and perhaps also Sulawesi. Seeds eaten raw or cooked;

S. parkinsonii Mueller: fruits eaten in Solomon Islands;

S. schumanniana (Laut.) Mildbr.: Papua New Guinea and Solomon Islands.

Among the Ankae the species is abundant; it fruits in April. The fruits are eaten cooked. The timber is used for construction of frameworks. Rotting trunks of this tree contain larvae which are much appreciated as a food. The species is not eaten in Solomon Islands;

S. treubii Hochr.;

S. urceolata J.E. Smith.

References

Backer & Bakhuizen van den Brincke (1963), Brown (1954), French (1986), Henderson & Hancock (1989), Parham (1972), Smith (1981), van Royen (1964), Verheij & Coronel, eds (1992), Wheatley (1992).

Species

Syzygium malaccense
(L.) Merrill & Perry

Family

Myrtaceae

Common names (English and French)

Malay apple

Mountain apple

Le jamalac (jamalac)

Jambose de Malacca (jambosier de Malacca)

Pomme malac (pommier malac)

Name in Bislama

nagavika

Consumption

Regular (especially by children).

Part eaten

Pulpy flesh.

Toxicity

None.

Description

Tree of medium height (5-25 m); crown oblong or conical, dense. Leaves simple, opposite, dark green and glossy, oval or elliptical (5-12.5 x 9-28 cm); petiole short, 0.5-2 cm in length. Flowers grouped in axillary panicles, scented; calyx cup-shaped with 4 joined sepals; 4 fuchsia-pink or white petals, 0.5-0.7 cm long; numerous pink or white stamens (1.5-2.6 cm long); style persistent, white or red. Fruits pink or white, pear-shaped or ovoid (2-4 x 5-7 cm); base swollen with 4 furrows; pulp watery surrounding a single round seed.

Morphological variability

In Vanuatu the villagers recognise four to six different forms of Malay apple according to colour, size and taste of the fruits. In Ambrym, Vanua Lava, Epi, Maewo, Malo, Malekula, Pentecost, Tanna and the Torres Islands a form exists whose flowers and fruits are entirely white. This is known as *white hair*, *albino* or *star*. It is a rare and much sought-after form in Vanuatu, because it is sweeter and less often infested with maggots than the red-fruited form.

Forms with white flowers and red fruits also exist in Vanuatu.

Ecology and exploitation

In Vanuatu the Malay apple grows in all the islands, up to somewhat more than 500 m altitude. Abundant in zones of open forest, it becomes scarcer in high and thick forests. It is an ornamental fruit tree that is found around villages and, more often, in areas of gardens and old fallows or in coconut groves. The species, if not wild, has at least been naturalised since ancient times. Better forms are transplanted close to domestic areas from spontaneous germinations or are planted as ripe fruits. The fruits are spread by flying foxes. The tree bears fruit from September for eight months. Flowering takes place between June and September in the north of the archipelago and between October and January in the south. Generally fuchsia pink in colour, sometimes white, the spectacular flowers have the appearance of small powder puffs. The fruits reach maturity two to three months later, i.e. between September and November in the north. Fruiting has been recorded out of season; it may be a case of either a second fruiting of lesser importance or of a cultivar that fruits in the off-season. The fruits are fragile and are often infested with maggots. In Papua New Guinea the species is found from 0 to 850 (1,580) m altitude

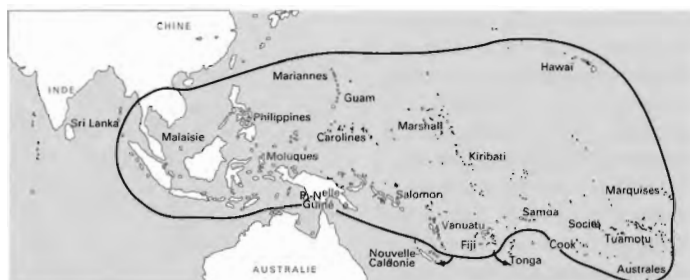
(Bourke, personal communication). It is found in the spontaneously generated state as often as in the cultivated state as far as Vanuatu. From Fiji eastwards, it becomes naturalised and more often cultivated. In New Britain fruiting occurs between December and February. In Fiji the species does not appear to show seasonality.

Alimentary uses

The fruits are eaten throughout the area of distribution of the species. In Vanuatu the Malay apple is eaten raw as soon as it is picked. It does not keep well, but it can be traded commercially as long as it has been picked slightly before full maturity. The flavour of the fruits is very variable, and may be insipid, sweet or delicately scented. It is always refreshing.

Other uses

In Vanuatu the wood is used for making canoes. It is occasionally used as constructional timber in Vanuatu and in Fiji (Smith, 1985). The species is also a traditional medicinal plant. The juice extracted from the leaves is used for treatment of abdominal pains, sore throats, toothache, general and unspecific pain or fever. Juice extracted from the bark is kept for treatment of diarrhoea and ciguatera, decoctions of the bark relieve fever, stomach ache, sores, constipation or post-natal bleeding. In Wallis the leaves are used to treat certain skin disorders and the bark for sore throats.



Syzygium malaccense: the origin of this species is uncertain: the eastern part of the Indo-Malayan Region or western Melanesia (New Guinea, Solomon Islands, Vanuatu). Wherever it is from, it is introduced and has been cultivated throughout the Indo-Malayan Region (Malaysia, Philippines, Indonesia) since very early times, and in the entire inter-tropical region. Naturalised or maybe even indigenous in Solomon Islands, Santa Cruz and Vanuatu, and introduced in ancient times to Hawaii (recorded as being used there for construction in the 16th century (1520); Weisler, 1991), aboriginal introduction to Samoa, European introduction to Tonga and more recently to New Caledonia. Cultivated in Vietnam, Thailand, and Central and South America.

In Hawaii a dye for *tapa* is made from the bark (Buck, 1964). In certain islands, such as Pentecost, the tree is of ritual importance. It appears very often in Fijian mythology.

Other edible species

The genus *Syzygium* comprises more than 1,000 species worldwide. Other edible species occur, more so in New Guinea than in Vanuatu, Samoa or Tonga, but for the most part they are poorly known. The consumption of those fruits is less important and less regular than with the Malay apple. Several species of *Syzygium* are found in the territory of the Ankave, but only a single one of these produces edible fruits, which are eaten raw. The wood of the majority of these species is used in construction, and their bark is used for making lime, one of the essential ingredients for chewing betel. We only list the edible species that are found in the Pacific:

S. aqueum (Burm. F.) Alston (water apple, *pomme d'eau*, bell fruit): without doubt originally from Southeast Asia, the species is widely distributed from Thailand to Solomon Islands; introduced to New Guinea in ancient times. Fruits white or pink, sometimes red, bell-shaped with a narrow base and a broad apex bearing a depression, small in size (1.5-2 x 2.5-4.5 cm). Eaten throughout the area of distribution;

S. clusiifolium (A. Gray) Mueller: originally from Solomon Islands and New Guinea; likewise present in Vanuatu (south and centre of the archipelago); probably introduced to Samoa, Tonga, Niue. Fruits ovoid, deep crimson in colour at maturity, flecked with pink, 3-2.5 cm; containing a hard seed. They are eaten occasionally (the species is mainly used for its timber);

S. corynocarpum (A. Gray) Mueller: probably originally from Fiji; introduced in

early times to Tonga, Niue, Wallis, Futuna and Samoa. Fruits elongate and curved, deep crimson in colour, scented. Eaten throughout its area of distribution. It is also used for making garlands (*leis*); in Tonga and Samoa the wood is used for construction; the bark and the leaves are medicinal;

S. richii (A. Gray) Merrill & Perry: Vanuatu, Samoa, Tonga, Fiji. Fruits ovoid, dull red. Eaten in Fiji and Tonga (Yuncker, 1971). Timber used for craftwork in Tonga;

S. samarangense (Blume) Merr. & Perry (Java apple, wax jambu, *pomme-cire*, *jambosse de Semarang*): native to the Indo-Malayan Region as far as Solomon Islands; introduced in ancient times to the Philippines and to Niue; introduced by Europeans to Fiji, where the species is always cultivated, and to Samoa where it is nowadays naturalised. Fruits slightly pear-shaped or oboval, flat at the apex, white or pale pink 4 x 5 cm. They are eaten in Java, New Guinea, Fiji and Tonga, but not in Samoa. Leaves with medicinal properties (treatment of ulceration of the tongue in the Philippines and of fevers in Cambodia);

S. cf. nutans: we have recorded one species of *Syzygium* in Vanuatu (Banks Islands and Maewo) that has not been accurately identified (CSV438 and CSV1029). Fruits 11 cm long, 5.5 cm in diameter at the middle, 2.5 cm in diameter at the apex;



Syzygium malaccense.

persistent green sepals on a contracted base; style persistent, 0.5-1 cm long; dry and fluffy pulp 5-8 mm thick, bright red and shiny when ripe, pear-shaped, abruptly narrowed in the upper third, interior hollow and containing six hemispherical seeds, 2.2 cm in diameter. They have little flavour. Children sometimes pick and eat them. The species is found in forest, in ancient gardens or close to villages where it is sometimes transplanted. The tree is very ornamental. Small in size, decorated with attractive fruits, it may be planted in many ornamental gardens.

References

- S. malaccense*: Backer & Bakhuizen van den Brincke (1963), Brown (1935), Brown (1957), Buck (1964), Dignan *et al.* (1994), Dupuy & Guiot (1992), Hartley & Perry (1973), Hemsley (1894), Kirch (1989), MacKee (1994), Miller *et al.* (1934), Ochse *et al.* (1961), Parham (1972), Peekel

(1984), Pétard (1986),
Smith (1985), Weisler
(1991), Whistler (1988),
Wilder (1934), Yen (1974).

S. aqueum: Backer &
Bakhuizen van den Brincke
(1963), Ochse *et al.* (1961),
Peekel (1984), Verheij &
Coronel, eds (1992).

S. clusiifolium: Henderson
& Hancock (1989), Wheatley
(1992), Whistler (1988),
Yuncker (1971).

S. corynocarpum:
Christophersen (1971),
Dupuy & Guiot (1992),

Parham (1972), Smith
(1985), Whistler (1984b,
1988), Yuncker (1971, 1974b).

S. richii: Cabalion & Morat
91983), Guillaumin (1954),
Smith (1985), Yuncker
(1971).

S. samarangense: Backer &
Bakhuizen van den Brincke
(1963), Coronel (1983),
Ochse *et al.* (1961), Smith
(1985), Verheij & Coronel,
eds (1992).

Species

Terminalia catappa Linnaeus

Family

Combretaceae

Common names (English and French)

Sea almond
Indian almond
Tropical almond
La badame (badamier)

Name in Bislama

natavoa (natapoa)

Consumption

Regular.

Part eaten

Kernels.

Toxicity

None.

Description

Large tree (15-25 m). Trunk vertical and bearing horizontal branches in layers, made up of short sections placed end to end. Leaves grouped at the ends of the branches, simple, shiny green, oboval (10-40 x 8-20 cm), apex round, base decurrent; petiole short or absent (0.1-2 cm); once a year the leaves turn yellow then red and fall to the ground.

Flowers grouped on a rachis 10-17 cm long, often scented; calyx fusiform; 5-6 cream or white petals, small in size (0.4-0.8 cm); 10-12 stamens. Fruits bright red, yellow or brownish at maturity, ovoid and slightly flattened, sometimes almost orbicular (4.2-10 x 3-6.4 cm), with two narrow lateral wings that may become submerged within the

swollen flesh as the fruit ripens. The fruit contains a single nut, very hard, enclosing a white, elongate kernel (0.9-3.4 cm long).

Morphological variability

In Vanuatu the sea almond shows great variability in relation to the morphology of the leaves and the fruits. Two main groupings may be distinguished:

- the first is characterised by fruits of medium size (5 x 3 cm), of regular oval shape, shiny red when mature and with a smooth epidermis. Usually arising spontaneously, these trees grown beside the sea, fruit continuously, and have smaller leaves;



- the second has fruits that are very variable in size and shape, yellow, orange or red when mature, and with an epidermis that is speckled and dull. They are the most often cultivated, fruit once or twice per year, and are found a little away from the shore. Among these, the ni-Vanuatu distinguish a form with red fruits and a less common one with yellow fruits.

Tongans also distinguish a form with red fruits (*telie kula*) present along beaches and a form with light green fruits (*telie hina*) which is more common away from the sea.

Ecology and exploitation

In Vanuatu *Terminalia catappa* is particularly abundant along the shoreline, up to an altitude of 400 m at which it is distinctly uncommon. The species is present in all islands of the archipelago, but is particularly abundant and diverse in the centre (Malekula, Ambrym, Epi, Efate). It is much rarer on the west coast of Malekula and Santo. Largely spread by birds and bats, this is a species that is little cultivated. At most, spontaneously generated plants may be transplanted close to domestic areas, sometimes in the centre of villages, sometimes a little away from dwellings because the branches break easily in high winds. At higher altitudes the tree is rarer and is often cultivated. Flowering and fruiting are continuous or occur for one to several months of the

year according to the tree. A slight peak in flowering may, however, be discerned between October and January, at the start of the wet season, followed by a peak in fruiting between March and June. The trees are generally very productive, but the quality of the kernels is variable. Harvesting starts when the epicarp of the fruits has become yellow or red, then continues according to need, by knocking off the fruit with a pole or by climbing the tree to pick the fruits. In Papua New Guinea the species is present from 0 to 300 (430) m altitude (Bourke, personal communication); in Fiji it is found from sea level up to 300 m altitude.

Alimentary uses

In Vanuatu the sea almond, which has a delicate flavour, is usually eaten raw. In villages the kernels are eaten directly beneath the tree, after the shell has been broken open between two stones. This is an important food in season and is sold in urban markets (the kernels are threaded on to the midrib of a coconut palm leaflet). In Vanuatu these nuts are sold commercially in groceries, as a dried product. They are very popular, and this trade could be further developed as a source of income for local horticulturists. In Tonga they are eaten only rarely. In Samoa and in Wallis, children sometimes nibble them. Likewise in New Guinea they are not eaten much. Their usage is more frequent in New



Terminalia catappa: present from tropical Asia (India, Sri Lanka, Andaman Islands, Thailand, Indochina) to Polynesia. Introduced to Hawaii at the very beginning of the European era. Nowadays cultivated in all tropical regions.

Britain and in Bougainville, where they are sometimes preserved by smoking. In Solomon Islands where children regularly eat them, some forms also exist that have large fruits, the seeds of which are sometimes stored after having been dried over a fire.

Other uses

In Vanuatu the timber is used for making canoes and for carving artisanal objects. It is also a good firewood and a good timber for building frameworks. The bark is very often used for treatment of coughs (extract of the juice) or urinary infections (decoction). The leaves are used to treat mild food poisoning; they are either chewed and swallowed, or they are simply applied whole and externally, to the surface of the abdomen. In Tonga the timber is used for construction, and in Wallis it was used in earlier times for making drums. In Kiribati the tree is reputed to have been the favourite of the goddess Nei Tituaabane (Thaman, 1990).



Terminalia catappa.

Other edible species

There are in tropical parts of the world 150 to 250 species of *Terminalia* according to author. Some of these produce fruits whose seed or flesh is edible. We will only cover the main edible species found in the Pacific:

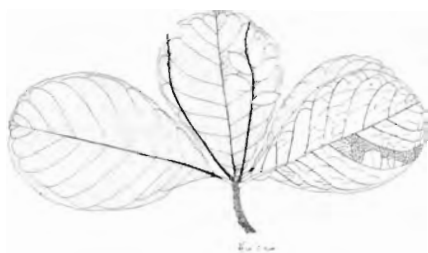
T. ferdinandiana Exell (billygoat plum or green plum): endemic to northern Australia. Fruits ovoid, pale green or yellow-green, 1.5-2.5 cm long, containing a large, woody seed. The flesh, regularly eaten by Australian aboriginals, contains sixty times more vitamin C than oranges (Low, 1991);

T. impediens Coode: originally from New Guinea; introduced to Solomon Islands; often confused with *T. kaernbachii*. Fruits ellipsoidal, purplish-red at maturity, large in size (7.9 x 4.7 x 3.5-6 cm); endocarp woody and thick, splitting into two unequal portions at germination; seed fusiform, 5 x 1 cm, made up of two cotyledons one wrapped around the other. They ripen during the wet season, from October to November. Very abundant, they do not rot until long after they have fallen to the ground, which allows the trees to be located in thick forest; the kernels are tasty and are eaten raw. The species is found in lowlands from 0 to 1,000 m altitude (Bourke, personal communication); it is not present in the part of the territory of the Ankave below 600 m; not very abundant. The trees are not really cultivated but are preserved after the opening up of gardens and are looked after. The distribution of the species is partly effected by cassowaries which eat the fruits;

T. kaernbachii Warburg: cf. p. 259.

T. litoralis Seemann: native to Fiji and Tonga. Fruits greenish-yellow then red when ripe, flattened, glabrous, without marked lateral wings, small in size (2.1-3.6 x 1.3-2 cm). The species provides good timber for working and the small kernels are eaten by children in Fiji and in Tonga;

T. microcarpa Decne: native to the Philippines. The fresh fruits are eaten;



Terminalia samoensis.

T. samoensis Rechinger: North Sulawesi, New Ireland, Solomon Islands, Vanuatu, Kiribati, Marshall Islands, Samoa, Society Islands, Tuamotu. Small tree or shrub along the seashore, of small size and with a slender trunk, growing in coralline soils. Fruits fleshy, ovoid or ellipsoidal, slightly flattened, red when ripe, 2 x 1 cm. The kernels (in Vanuatu) and the flesh (in Samoa) are occasionally nibbled;

T. sepicana Diels: northeastern New Guinea, New Britain, Solomon Islands, Vanuatu. Fruits ellipsoidal, flattened, with 2 lateral wings and 2-3 wings that are less well developed, green then red when ripe. Very small in size, they contain kernels that children amuse themselves by sometimes nibbling. The timber may be used for construction, but it is of poor quality.

References

- T. catappa*: Backer & Bakhuizen van den Brinke (1963), Brand Miller *et al.* (1993), Brown (1957), Christophersen (1971), Coode (1969, 1973), Corner (1988), Dignan *et al.* (1994), Dupuy & Guiot (1992), Evans (1991), Exell (1954),

Foreman (1971), Henderson & Hancock (1989), MacKee (1994), Morton (1985), Parham (1972), Peekel (1984), Smith (1985), Stone (1970), Thaman (1990), Whistler (1984b, 1992), Wilder (1934)

T. ferdinandiana: Brand Miller *et al.* (1993), Low (1991)

T. impediens: Coode (1969, 1973), Evans (1991), Henty (1982)

T. litoralis: Smith (1985), Whistler (1992)

T. microcarpa: Coronel (1983)

T. samoensis: Exell (1954), Whistler (1992)

T. sepicana: Coode (1969, 1973)

Species

Terminalia kaernbachii Warburg

Family

Combretaceae

Common names (English and French)

Okari nut

Noix d'Okari (noyer d'Okari)

Consumption

Regular in season.

Part eaten

Kernels.

Toxicity

None.

Description

Tree from 20 to 40 m in height; outer bark greyish on the outside, reddish and fibrous inside; crown broad. Leaves clustered at the ends of the branches, simple, turning red before falling, oboval (15-32 x 6-16 cm); lower surface of leaves and petioles with a fine, reddish-brown downy covering; petiole 1-2 cm long. Flowers grouped on an upright rachis; calyx with triangular lobes, downy; stamens and pistil fairly long (at times 2 cm). Fruits red when mature, ellipsoidal, slightly flattened, large in size (9-11 x 6-8 x 5-6 cm); containing a bulky and hard nut, which on germination splits into two more-or-less equal parts and liberates a large kernel (4 x 2 x 2.5 cm) made up of 3-4 cotyledons.

Ecology and exploitation

Terminalia kaernbachii is found scattered through wet lowland forest, from 0 to 1,100 (1,260) m altitude (Bourke, personal communication). The species is usually planted or main-

tained in forests and zones of semi-harvesting. Trees that arise spontaneously are protected and left in place when gardens are opened up. The species is also planted in villages. It is propagated easily by seeds, but these rapidly lose their viability. Growth is rapid but production of nuts does not begin until the trees are twenty years old. The species tolerates poorly drained soils and wet climates. Flowering is induced more by seasonal change in day length than by temperature or by rainfall. The fruits thus reach maturity with one to two months' difference according to latitude (March-April at latitude 3-4° S; June-July at latitude 8-9° S) (Bourke, personal communication). The fruit of this species is the largest known among the Combretaceae.





Terminalia kaernbachii: Maluku (Aru Islands), New Guinea, Bismarck Archipelago. Introduced to Solomon Islands (New Georgia).

Alimentary uses

The kernels of *T. kaernbachii* may be eaten raw or cooked, after being knocked down with poles or picked up directly from beneath the tree. The weight of the kernel, the largest of all the *Terminalia*, ranges from 1.5 to 10 g. They are better, and keep best, after having been lightly grilled and seasoned with salt. Among the Ankave the trees, which are generally planted, provide few fruits. However, when the harvest is abundant the kernels are macerated in water, in the same manner as those of *Pangium edule*. When in season the nuts are sold

in markets. This is one of the most important nuts of Papua New Guinea, because of the large size of the kernel. It is also one of the best tropical nuts, and it deserves to be introduced to other countries in the region where it does not already occur.

Other edible species

See *T. catappa* (p. 254)

References

Aburu (1982), Coode (1969, 1973, 1978), Evans (1991), Exell (1954), Henderson & Hancock (1989), Henty (1982), Peekel (1984), Verheij & Coronel, eds (1992).

Bibliography

Some references comprise several volumes, published on different dates. In the individual species entries, under References, we have given the exact year of publication of the volume in which that particular species was dealt with. Below we give the dates of publication of the first and last volumes of the work cited.

Additionally, the dates in square brackets indicate the first edition.



ABURU (K.), 1982 – « Notes on some fruit and nut-bearing trees in the Keravat area of east New Britain ». In Bourke (R. M.), Kesavan (V.), eds: 101-123.

ATCHLEY (J.), COX (P. A.), 1985 – Breadfruit fermentation in Micronesia. *Economic Botany*, 39 (3): 326-335.

AUBREVILLE (A.), 1964 – *Les Sapotacées, taxonomie et phytogéographie*. Paris, Muséum national d'histoire naturelle, *Adansonia*, mémoire 1, 158 p.

AUBREVILLE (A.), 1967 – *Flore de la Nouvelle-Calédonie et dépendances. I- Sapotacées*. Paris, Muséum national d'histoire naturelle, 168 p.



BACKER (C. A.), BAKHUIZEN VAN DEN BRINK (R. C.), 1963-1968 – *Flora of Java*. Noordhoff, Groningen, 3 vol.

BAEHNI (C.), 1942 – *Mémoires sur les Sapotacées. II-Le genre Pouteria. Candollea*, 9: 147-476.

BAKKER (K.), VAN STEENIS (C. G.), 1957 – « *Pittosporaceae* ». In Van Steenis (C. G.), ed: 5 (3): 353-354.

BARRAU (J.), 1950 – *Liste préliminaire des plantes économiques de la Nouvelle-Calédonie*. Nouméa, Service de l'agriculture de la Nouvelle-Calédonie, 30 p.

BARRAU (J.), 1956 – *L'agriculture vivrière autochtone de la Nouvelle-Calédonie*. Nouméa, Commission du Pacifique sud, 154 p.

BARRAU (J.), 1957 – L'arbre à pain en Océanie. *Jatba*, 4: 117-123.

BARRAU (J.), 1962 – *Les plantes alimentaires de l'Océanie, origines, distribution et usages*. Annales du Musée colonial de Marseille, Marseille, 276 p.

BARRAU (J.), 1965 – Histoire et préhistoire horticoles de l'Océanie tropicale. *Journal de la société des océanistes*, 21: 55-78.

BARRAU (J.), 1971 – Plantes utiles de Tahiti. *Journal de la société des océanistes*, dossier 8, 34 p.

BARRAU (J.), PEETERS (A.), 1972 – Histoire et préhistoire de la préparation des aliments d'origine végétale ; les techniques d'utilisation de ces aliments chez les cueilleurs et les cultivateurs archaïques l'Australasie. *Journal de la société des océanistes*, 28: 141-152.

BEAGLEHOLE (J. C.), ed, 1955-1967 – *The journals of Captain Cook*. Cambridge, Hakluyt Society, extra series 34, 35, 36.

BELLWOOD (P.), 1979 – *Man's conquest of the Pacific. The prehistory of Southeast Asia and Oceania*. New York, Oxford University Press, 462 p.

BELLWOOD (P.), 1985 – *Prehistory of the Indo-Malaysian archipelago*. New York, Academic Press, 370 p.

BIZET (A.), WALTER (A.), 1996 – Problématique de terminologie botanique en français: l'exemple des fruits, noix et arbres fruitiers du Vanuatu. *La banque des mots* (Cilf), 51: 31-47.

BOITEAU (P.), 1981 – *Flore de la Nouvelle-Calédonie et dépendances. 10-Apocynacées*. Paris, Muséum national d'histoire naturelle, 302 p.

BONNEMÈRE (P.), 1993 – « *Pangium edule*: a food for the social body among the Ankave-Anga of Papua New Guinea ». In Hladik (M.) et al., eds: *Tropical forests, people and food, biocultural interactions and applications to development*, Paris,

The Parthenon Publishing Group, Unesco, Man and Biosphere, serie 13: 661-672.

BORRELL (O. W.), 1989 – *An Annotated Checklist of the Flora of Kairiru Island, New Guinea*. Melbourne, Marcellin College, 242 p.

BOURDY (G.), CABALION (P.), AMADE (P.), LAURENT (D.), 1992 – Traditional remedies used in the Western Pacific for the treatment of ciguatera poisoning. *Journal of Ethnopharmacology*, 36: 163-174.

BOURKE (R. M.), ABURU (K.), 1982 – *Bibliography of fruit and nuts in Papua New Guinea*. Port Moresby, Department of Industry, Technical Report 82/1, 8 p.

BOURKE (R. M.), KESAVAN (V.), eds, 1982 – *Proceedings of the Second Papua New Guinea food crops conference*. Port Moresby, Department of Primary Industry, 3 vol., 572 p.

BOURKE (R. M.) et al., in press – *Production patterns of 180 crops in Papua New Guinea*. Port Moresby, Department of Agriculture and Livestock, Research Bulletin 54.

BRAND MILLER (J.), JAMES (K. W.), MAGGIORE (P. M.), 1993 – *Tables of composition of Australian Aboriginal Foods*. Canberra, Aboriginal Studies Press, 256 p.

BROWN (F. B.), 1935 – *Flora of southeastern Polynesia. III-Dicotyledons*. Honolulu, The Museum Press, Bernice P. Bishop Museum, Bulletin 130, 386 p.

BROWN (W. H.), 1951-1957 [1941-1943] – *Useful plants of the Philippines*. Manila, Department of Agriculture and National Resources, Technical Bulletin 10, 3 vol.

BUCK (P. H.), 1964 [1957] – *Arts and crafts of Hawaii*. Honolulu, The Museum Press, Bernice P. Bishop Museum, special publication 45, section 1, 84 p.

BULMER (R. N.), 1964 – Edible seeds and prehistoric stone mortars in the Highlands of East New Guinea. *Man*, 183: 147-150.

BURKILL (I. H.), 1966 – *A Dictionary of the economic products of the Malay Peninsula*. Kuala Lumpur, Ministry of Agriculture and Cooperation, 2 vol., 2 444 p.



CABALION (P.), MORAT (P.), 1983 – Introduction à la végétation, à la flore et aux noms vernaculaires de l'île de Pentecôte (Vanuatu). *Jatba*, 30: 197-248.

CABALION (P.), POISSON (J.), 1987 – *Corynocarpus similis* Hemsley, plante alimentaire et toxique de Vanuatu (ex Nouvelles-Hébrides). *Journal of Ethnopharmacology*, 21: 189-191.

CANDOLLE (A. de), 1984 [1883] – *Origine des plantes cultivées*. Marseille, Jeanne Laffitte, Laffitte reprints, 378 p.

CAPPELL (A.), 1973 [1941] – *A new Fijian dictionary*. Suva, Fiji Government Press, 464 p.

CARDON (D.), CHATFNET (G. du), 1990 – *Guide des teintures naturelles, plantes-lichens, champignons, mollusques et insectes*. Paris, Delachaux et Niestlé, 400 p.

CARLOS (J. T.), 1990 – *South Pacific fruit production: technoguides and recent advances*. Apia, Institute for Research, Extension and Training in Agriculture, University of South Pacific, 142 p.

CARLOS (J. T.), DAWES (S. N.), 1990 – *South Pacific Tropical Nut Cultivation: Status and outlook*. Apia, Institute for Research, Extension and Training in Agriculture, University of South Pacific, 194 p.

CHRISTOPHERSEN (E.). 1971 [1935] – *Flowering plants of Samoa*. Honolulu, Kraus reprint, Bernice P. Bishop Museum, Bulletin 128, 222 p.

COODE (M. J.), 1969 – *Manual of the forest trees of Papua New Guinea: Combretaceae*. Lae, Division of Botany, Department of Forests, part 1 (revised), 86 p.

COODE (M. J.), 1973 – Notes on *Terminalia* L. (Combretaceae) in Papuasia. *Contributions from Herbarium Australiense*, 2: 1-33.

COODE (M. J.), 1978 – « Combretaceae ». In Womersley (J.), ed: 43-110.

COOK (J.), 1980 [1777] – *Relations de voyages autour du monde*. Paris, Maspéro, 2 vol., 308 p. et 158 p.

COOPER (W.), COOPER (T.), 1994 – *Fruits of the rain forest: a guide to fruits in Australian tropical rain forests*. Australia, RD Press, 328 p.

CORNER (E. J.), 1967 – Ficus in the Solomon islands and its bearing on the post-Jurassic history of Melanesia. *Philosophical transactions of the Royal Society of London*, series B, 253: 23-159.

CORNER (E. J.), 1975 – Ficus in the New-Hebrides. *Philosophical transactions of the Royal Society of London*, series B, 272: 77-101.

CORNER (E. J.), 1988 [1940] – *Wayside trees of Malaya*. Kuala Lumpur, The Malayan Nature Society, United Selangor Press, 2 vol., 862 p.

CORONEL (R.), 1983 – *Promising fruits of the Philippines*. Laguna, University of the Philippines at Los Baños, College of Agriculture, 508 p.

COX (P. A.), 1980 – Two Samoan technologies for breadfruit and banana preservation. *Economic botany*, 34: 181-185.

CRANE (E. A.), 1979 – *The Geography of Tonga. A study of environment, people and change*. Tonga, Wendy Crane Publisher, 76 p.



DIGNAN (C. A.), BURLINGAME (B. A.), ARTHUR (J. M.), QUIGLEY (R. J.), MILLIGAN (G. C.), 1994 – *The Pacific islands food composition tables*. Nouméa, Commission du Pacifique sud, 148 p.

DING HOU, 1978 – « *Anacardiaceae* ». In Van Steenis (C. G.), ed: 8 (3): 468-486.

DRAKE DEL CASTILLO (E.), 1886 – *Illustrationes Florae Insularum Maris Pacifici*. Hist. Nat. Class., vol. CII, 458 p.

DUMONT D'URVILLE (J. S. C. S.), 1989 – *Voyage pittoresque autour du monde*. Tahiti, éditions Haere po no Tahiti, 158 p. (rééd. d'une partie du t. 1 de l'édition de 1834, Paris, Tenré)

DUPUY (F.), GUIOT (H.), 1992 – *Arbres et arbustes de Wallis*. Mata Utu, Territoire des îles Wallis et Futuna, lycée de Wallis (BEP agricole), 56 p.

DURIEZ-TOUTAIN (C.), 1994 – *La contribution mariste à l'histoire de Tonga 1840-1900*. Thèse en histoire, université Paris-VII, 560 p.





EVANS (B.), 1991 – *A variety collection of edible nut tree crops in Solomon islands*. Honiara, Dodo Creek Research Station, Research Bulletin, 8, 98 p.

EXELL (A. W.), 1954 – « *Combretaceae* ». In Van Steenis (C. G.), ed: 4 (5): 533-589.



FERDON (E. N.), 1987 – *Early Tonga as the Explorers saw it 1616-1810*. Tucson, University of Arizona Press, 340 p.

FOREMAN (D. B.), 1971 – *A Checklist of the vascular plants of Bougainville*. Lae, Papua New Guinea, Department of Forests, Division of Botany, Botany Bulletin, 5, 194 p.

FOSBERG (F. R.), 1960 – Introgression in *Artocarpus* (Moraceae) in Micronesia. *Brittonia*, 12: 101-113.

FRENCH (B. R.), 1986 – *Food Plants of Papua New Guinea, a Compendium*. Ashgrove, Australia and Pacific Science Foundation, 408 p.



GIFFORD (E. W.), 1971 [1929] – *Tongan Society*. Honolulu, Kraus reprint, Bernice P. Bishop Museum, Bulletin 61, 366 p.

GILLESPIE (J. W.), 1971 [1930] – *New plants from Fiji-I*. Honolulu, Kraus reprint, Bernice P. Bishop Museum, Bulletin 74, 100 p.

GLASSMAN (S. F.), 1953 – New plants records from the eastern Caroline Islands, with a comparative study of the native plant names. *Pacific sciences*, 7 (3): 291-311.

GLASSMAN (S. F.), 1971 [1952] – *The flora of Ponape*. Honolulu, Kraus reprint, Bernice P. Bishop Museum, Bulletin 209, 152 p.

GORECKI (P. P.), GILLIESON (D. S.), 1989 – *A crack in the spine, prehistory and ecology of the Jimi-Yuat Valley, Papua New Guinea*. Townsville, James Cook University of North Queensland.

GOWERS (S.), 1976 – *Some common trees of the New Hebrides and their vernacular names*. Port Vila, Vanuatu, Department of Agriculture, Forestry Section, 190 p.

GRAY (A.), 1862 – Characters of new or obscure species of plants of monopetalous orders in the collection of the United States South Pacific exploring expedition under Captain Charles Wilkes, U.S.N. with various notes and remarks. *Proc. Amer. Acad. Arts*, 5: 321-352, 6: 37-55.

- GROENENDIJK (J. J.), 1992 – « *Morinda citrifolia* L. ». In Lemmens (R. H.), Wulijarni-Soetjipto (N.), eds: *Plant resources of South-East Asia, III-Dye and tannin-producing plants*, Bogor, Prosea: 94-96.
- GUILLAUMIN (A.), 1919 – Contribution à la flore des Nouvelles-Hébrides. I-Prémises de la flore d'Efate (récoltes de M. Levat). *Bulletin de la Société botanique de France*, 19: 267-277.
- GUILLAUMIN (A.), 1931 – Contribution to the flora of the New Hebrides; plants collected by S. F. Kajewski in 1928 and 1929. *Journal of the Arnold Arboretum*, 12: 221-264.
- GUILLAUMIN (A.), 1932 – Contribution to the flora of the New Hebrides; plants collected by S. F. Kajewski in 1928 and 1929. *Journal of the Arnold Arboretum*, 13: 1-29 and 81-126.
- GUILLAUMIN (A.), 1933 – Contribution to the flora of the New Hebrides; plants collected by S. F. Kajewski in 1928 and 1929. *Journal of the Arnold Arboretum*, 14: 53-61 (suppl.).
- GUILLAUMIN (A.), 1935 – Contribution à la flore des Nouvelles-Hébrides ; plantes recueillies par M. et Mme Aubert de la Rüe dans leur deuxième voyage (1935-1936). *Bulletin de la Société botanique de France*, 72: 346-354.
- GUILLAUMIN (A.), 1946 – *Les plantes cultivées, histoire, économie*. Paris, Payot, 352 p.
- GUILLAUMIN (A.), 1948 a – Compendium de la flore phanérogame des Nouvelles-Hébrides. *Annales du Musée colonial de Marseille*, 6, 55/56 (5-6): 5-53.
- GUILLAUMIN (A.), 1948 b – *Flore analytique et synoptique de la Nouvelle-Calédonie, phanérogames*. Paris, Office de la recherche scientifique coloniale, 370 p.
- GUILLAUMIN (A.), 1954 – Les plantes utiles des Nouvelles-Hébrides. *Jatba*, 1 (7-9): 293-297 ; 1 (10-12): 453-460.
- GUILLAUMIN (A.), 1956 – Contribution à la flore des Nouvelles-Hébrides ; plantes récoltées par Miss Cheesman. *Bulletin de la Société botanique de France*, 103 (5-6): 278-282.



- HANCOCK (I. R.), HENDERSON (C. P.), 1988 – *Flora of the Solomon islands*. Honiara, Dodo Creek Research Station, Ministry of Agriculture and Lands, Research Bulletin, 7, 204 p.
- HANDY (W. C.), 1985 [1940] – *The Hawaiian planter: his plants, methods and areas of cultivation (vol. 1)*. Honolulu, Kraus reprint, Bernice P. Bishop Museum, Bulletin 161, 228 p.

HARTLEY (T.), PERRY (L.), 1973 – A provisional key and enumeration of *Syzygium* (Myrtaceae) from Papuasia. *J. Arnold Arbor*, 54: 100-227.

HAUDRICOURT (A. G.), HEDIN (L.), 1987 [1943] – *L'homme et les plantes cultivées*. Paris, Métailié, 282 p.

HEINE (H.), 1976 – *Flore de la Nouvelle-Calédonie et dépendances. 7-Acanthacées, Bignoniacées, Boraginacées, Solanacées*. Paris, Muséum national d'histoire naturelle, 212 p.

HEMSLFY (W. B.), 1892 – *Chelonespermum* and *Cassidispermum*, proposed New Genera of Sapotaceae. *Annals of Botany*, 6 (22): 203-210.

HEMSLEY (W. B.), 1894 – The flora of the Tonga or Friendly Islands. *Journ. Linn. Soc. Bot.*, 30: 158-217.

HENDERSON (C. P.), HANCOCK (I. R.), 1989 – *A guide to the useful plants of Solomon islands*. Honiara, Ministry of Agriculture and Land, Research Department, 82 p.

HENRY (T.), 1968 – *Tahiti aux temps anciens*. Paris, musée de l'Homme, publication de la Société des océanistes, n° 1, 672 p.

HENTY (F. E.), ed, 1981 – *Handbooks of the flora of Papua New Guinea*. Melbourne, Melbourne University Press, vol. 2, 276 p. (vol. 1 by Womersley, ed., 1978 ; vol. 3 by Barry E. Conn.).

HENTY (F. E.), 1982 – « Some nut-bearing plants in Papua New Guinea ». In Bourke (R. M.), Kesavan (V.), eds: 78-85.

HUSSON (A. M.), LAM (H. J.), 1953 – Revision of the Burseraceae of the Malaysian area in a wider sense. V. *Haplolobus*. *Blumea*, 7 (2): 413-458.



JACOBS (M.), 1962 – *Pometia* (Sapindaceae), a study in variability. *Reinwardtia*, 6: 109-144.

JARDIN (C.), 1974 – *Kulu, Kuru, Uru: lexique des noms de plantes alimentaires dans le Pacifique sud*. Nouméa, Commission du Pacifique sud, 232 p.

JEBB (M.), WISE (R.), 1992 – Edible Barringtonias. *Kew magazine*: 164-180.



KAHN (M.), SEXTON (H.), eds, 1988 – *Continuity and Change in Pacific Foodways*. Food, Foodways (special number), 3 (1-2), 176 p.

KIRCH (P. V.), 1984 – *The evolution of the Polynesian chiefdoms*. Cambridge, Cambridge University Press, 314 p.

KIRCH (P. V.), 1989 –
Second millenium B. C.
arboriculture in Melanesia:
archaeological evidence
from the Mussau Islands.
Economic Botany, 43: 225-240.

KIRCH (P. V.), YEN (D. E.), 1982
– *Tikopia: the prehistory and
ecology of a Polynesian outlier*.
Honolulu, The Museum Press,
Bernice P. Bishop Museum,
Bulletin 238, 396 p.

KOSTERMANS (A. J.), 1991 –
*Kedondong, Ambarella,
Amra. The Spondiadeae
(Anacardiaceae) in Asia
and the Pacific area*. Bogor,
Prosea, 100 p.

KRAMER (A.), 1906 – Hawaii,
Ostmikronesien und Samoa.
Stuttgart.



LAM (H. J.), 1942 –
A tentative list of wild
Pacific *Sapotaceae*, except
those from New Caledonia.
Blumea, 5 (1): 1-280.

LAM (H. J.), VAN ROYEN (P.),
1952 – *Burckella* Pierre.
Blumea, 6: 580-593.

LANTING (M. V.), 1986 –
Talisai: another tree of
multiple uses. *Canopy
International*, July-
August: 5.

LEENHOUTS (P. W.), 1955 a –
*The Genus Canarium in
the Pacific*. Honolulu, The
Museum Press, Bernice P.
Bishop Museum,
Bulletin 216, 54 p.

LEENHOUTS (P. W.),
1955 b – *Florae malesianae
precursores. XI-New taxa
in Canarium. Blumea*,
8 (1): 181-194.

LEENHOUTS (P. W.), 1956 –
« *Burseraceae* ». In Van
Steenis (C. G.), ed: 5 (2):
249-257.

LEENHOUTS (P. W.), 1959 –
A monograph of the genus
Canarium. Blumea, 9 (2):
275-475.

Low (T.), 1991 – *Wild food
plants of Australia*. North
Ryde, Angus & Robertson,
240 p.



MACKEE (H. J.), 1994 –
*Catalogue des plantes
introduites et cultivées en
Nouvelle-Calédonie*. Paris,
Muséum national d'histoire
naturelle, 164 p.

MALAPA (R.), 1992 –
*Inventaire des Canarium de
Tonga*. Port-Vila, Orstom,
rapport de stage, 18 p.

MARKGRAF (F.), 1951 –
« *Gnetaceae* ». In Van Steenis
(C. G.), ed: 4 (3): 340-341.

MARTIN (J.), 1817 – *Histoire
des naturels des îles Tonga
ou des Amis situées dans
l'océan Pacifique depuis leur
découverte par le capitaine
Cook ; sur les détails fournis
par William Mariner, qui y a
passé plusieurs années*. Paris,
Gide et Nicolle, 2 vol., 796 p.

MARTIN (F. M.), CAMPBELL (C. W.), RUBERTE (R. M.), 1987 – *Perennial edible fruits of the tropics: an inventory*. Washington D. C., Department of Agriculture, USDA Agricultural Research Service, Agricultural Handbook No 642, 248 p.

MASSAL (E.), BARRAU (J.), 1956 – *Plantes alimentaires du Pacifique sud*. Nouméa, Commission du Pacifique sud, Document technique n° 94, 56 p.

MAY (R. J.), 1984 – *Kaikai Aniani. A guide to bushfoods markets and culinary arts of Papua New Guinea*. Bathurst, Robert Brown, 192 p.

MENNINGER (E. A.), 1977 – *Edible nuts of the world*. Florida, Stuart, Horticultural books, 176 p.

MERRIL (E. D.), 1945 – *Plant life of the Pacific world*. New York, MacMillan Company, 296 p.

MILLAR (A. D.), DODD (J.), n. d. – « Papua New Guinea: wild and cultivated fruits and nuts ». In: *Tree crops: the 3rd component, Cornucopia Press*: 199-207.

MILLER (C. D.), ROBBINS (R. C.), KISAKO (H.), 1934 – The nutritive value of the mountain apple *Eugenia malaccensis* or *Jambosa malaccensis*. *The Philippine Journal of Science*, 53 (3): 211-221.

MORTON (J. F.), 1985 – Indian almond (*Terminalia catappa*), salt tolerant, useful, tropical tree with 'nut' worthy of improvement. *Economic Botany*, 39 (2): 101-112.



NEAL (M. C.), 1929 – *In Honolulu gardens*. Honolulu, The Museum Press, Bernice P. Bishop Museum, Bulletin 13, 336 p.

NEAL (M. C.), 1965 – *In Gardens of Hawaii*. Honolulu, The Museum Press, Bernice P. Bishop Museum, Special Publication, 50, 924 p.

NIELSEN (I.), 1983 – *Flore de Nouvelle-Calédonie et dépendances. 12-Légumineuses, Mimosées*. Paris, Muséum national d'histoire naturelle, 140 p.



OCHSE (J. J.), SOULE (M. J.), DIJKMAN (M. J.), WEHLBURG (C.), 1961 – *Tropical and subtropical agriculture*. New York, MacMillan Company, 2 vol., 1446 p.

O'ROURKE (G. L.), 1995 – Ethnomedicine in the Tongan islands. *Harvard papers in Botany*, 6: 1-36.

PARHAM (J. W.), 1972 – *Plants of the Fiji islands*. Suva, Government Printer, 462 p.



PAWLEY (A.), SANCHEZ (T.),
à paraître – Words of Waya:
a dictionary of the Wayan
dialect of western Fijian.
Pacific Linguistic.

PAYENS (J. P.), 1967 –
A monograph of the genus
Barringtonia (Lecythidaceae).
Blumea, 15 (2): 157-263.

PEEKEL (P. G.), 1984 [1945] –
Flora of the Bismarck
Archipelago for naturalists.
Lae, Office of Forests,
Division of Botany, 620 p.

PENNINGTON (T. D.), 1991 –
The genera of Sapotaceae.
Kew, Royal Botanical
Gardens, 296 p.

PÉTARD (P.), 1986 –
Quelques plantes utiles de
Polynésie française et Raau
Tahiti. Tahiti, Haere po no
Tahiti, 354 p.

POLLOCK (J. V.), 1984 –
Breadfruit fermentation
practices in Oceania.
Journal de la société des
océanistes, (79): 151-164.

POLLOCK (N.), 1975 –
« The risks of dietary
change: a Pacific Atoll
Example ». In Arnott
(M. L.), ed: *Gastronomy.*
The Anthropology of food
and food habits, Paris,
Mouton: 121-130.

POLLOCK (N.), 1986 –
Food classification in
three Pacific societies:
Fiji, Hawaii and Tahiti.
Ethnology, 25 (2): 107-117.

POLLOCK (N.), 1992 – *These*
roots remain. Food habits
in island of the central and
eastern Pacific since Western
contact. Laaie, Institute for
Polynesian Studies, 298 p.

POPENOF (W.), 1974 [1948] –
Manual of tropical and
subtropical fruits. London,
Hafner Press, 474 p.

POWELL (J. M.), 1976 –
« Ethnobotany ». In
Paijmans (K.), ed: *New*
Guinea vegetation,
Canberra, Australian
National University Press.

PURSEGLOVE (J. W.), 1991
[1968] – *Tropical crops.*
Dicotyledons. Essex,
Longman Scientific and
Technical, 720 p.



RADLKOFER (L.), 1932 –
Sapindaceae. *Pflanzenr*,
98 (4): 165.

RAGONE (D.), 1988 –
Breadfruit varieties in
the Pacific atolls. Suva,
UNDP, 46 p.

RAGONE (D.), 1991 –
« Ethnobotany of breadfruit
in Polynesia ». In Cox (P. A.),
Banack (S. A.), eds: *Islands,*
Plants and Polynesians: an
introduction to Polynesian
ethnobotany. Portland,
Dioscorides Press: 203-220.

RAGONE (D.), 1997 –
Breadfruit Artocarpus
altilis (Parkinson) Fosberg.
Rome, IPGRI, 78 p.

RECHINGER (K.), 1910 – *Botanische und Zoologische Ergebnisse einer wissenschaftlichen Forschungsreise nach den Samoa Inseln*. Akad. Wiss. Wien. Denkschr.

ROSE (C. J.), 1982 – « Preliminary observations on the pandanus nut (*Pandanus julianetti* Martelli) ». In Bourke (R. M.), Kesavan (V.), eds: 160-167.



SAFFORD (W. E.), 1905-1910 – *The useful plants of Guam*. Contributions from the United States National Herbarium, 9 et 10, Washington, Government Printing Office.

SCHMID (M.), 1970 a – *Florule d'Anatom*. Nouméa, rapport Orstom, 54 p.

SCHMID (M.), 1970 b – *Florule de Tanna*. Nouméa, rapport Orstom, 40 p.

SCHMID (M.), 1970 c – *Florule de Tanna (supplément I)*. Nouméa, rapport Orstom, 20 p.

SCHMID (M.), 1971 – *Florule d'Anatom (supplément II)*. Nouméa, rapport Orstom, 14p.

SCHMID (M.), 1973 a – *Espèces de végétaux supérieurs observés à Vate - Nouvelles-Hébrides*. Nouméa, rapport Orstom, 42 p.

SCHMID (M.), 1973 b – *Florule de Tanna (supplément II)*. Nouméa, rapport Orstom, 12 p.

SCHMID (M.), 1974 a – *Florule de Erromango*. Nouméa, rapport Orstom, 52 p.

SCHMID (M.), 1974 b – *Florule de Pentecôte*. Nouméa, rapport Orstom, 26 p.

SCHMID (M.), 1979 – « Les écosystèmes forestiers mélanésiens (Nouvelle-Calédonie, Nouvelles-Hébrides, Fidji et îles Salomon) ». In: *Écosystèmes forestiers tropicaux*. Paris, Unesco: 709-740.

SEEMANN (B.), 1862 – *Viti: an account of a government mission to the Vitian or Fijian islands in the years 1860-1861*. London, MacMillan Company, 448 p.

SEEMANN (B.), 1865-1973 – *Flora vitiensis: a description of the plants of Viti or Fiji islands with an account of their history, uses and properties*. London, L. Reeve & Co., 454 p.

SILLITOE (P.), 1983 – *Roots of the earth, crops in the Highlands of Papua New Guinea*. Manchester, Manchester University Press, 286 p.

SIMMONDS (N. W.), 1976 – *Evolution of crop plants*. Essex, Longman, 340 p.

SLEUMER (H.), 1954 – « Flacourtiaceae ». In Van Steenis (C. G.), ed: 5 (1): 1-106.

SLEUMER (H.), 1955 – « Proteaceae ». In Van Steenis (C. G.), ed: 5 (1): 147-206.

- SMITH (A. C.), 1979-1991 – *Flora vitiensis nova: A new flora of Fiji (spermatophytes only)*. Lawai, Pacific Tropical Botanical Garden, 5 vol.
- SOEPADMO (E.), 1972 – « Fagaceae ». In Van Steenis (C. G.), ed.: 7 (2): 265-403.
- SOERIANEGARA (I.), LEMMENS (R. H.), eds, 1994 – *Plant resources of South-East Asia, V-Timber trees: major commercial timbers*, Bogor, Prosea.
- ST JOHN (H.), 1951 – Plant records from Aur Atoll and Majuro atoll, Marshalls Islands, Micronesia. *Pacific sciences*, 5 (3): 279-286.
- ST JOHN (H.), 1953 – Plants of Marshalls Islands. *Pacific sciences*, 7: 166.
- ST JOHN (H.), 1960 – Flora of Eniwetok atoll. *Pacific sciences*, 14: 313-336.
- ST JOHN (H.), 1974 – The vernacular flora of Fanning islands, Line Islands, Pacific Ocean. *Pacific sciences*, 28 (3): 339-355.
- ST JOHN (H.), 1989 – Revision of the genus *Pandanus* Stickman, 60-*Pandanus* of the New Hebrides. Honolulu, published privately, 50.p.
- ST JOHN (H.), MASON (L. E.) 1953 – Vernacular names of the plants of Bikini, Marshalls Islands. *Pacific sciences*, 7 (2): 165-168.
- ST JOHN (H.), MASON (L. E.) 1960 – Plant names of Bikini. *Pacific sciences*, 14: 167.
- STONE (B. C.), 1959 – *Pacific sciences*, 13: 104.
- STONE (B. C.), 1967 – Notes on the plants of genus *Pandanus* in Fiji, Tonga, the New Hebrides, and Niue. *Proc. Biolog. Soc.*, 80: 47-60.
- STONE (B. C.), 1970 – The flora of Guam. A manual for the identification of the vascular plants of the island. *Journal of University of Guam*, 6: 1-659.
- STONE (B. C.), 1976 – The Pandanaceae of the New Hebrides, with an essay on intraspecific variation in *Pandanus tectorius*. *Kew Bulletin*, 31 (1): 47-70.
- STONE (B. C.), 1982 – « New Guinea Pandanaceae. First approach to ecology and biogeography ». In Gressitt (J. L.), ed: *Biogeography and Ecology in New Guinea, Monographiae Biologicae*, 42: 401-436.
- TAREPE (P.), BOURKE (R. M.), 1992 – « Fruit crops in the Papua New Guinea Highlands ». In Bourke (R. M.), Kesavan (V.), eds: 86-100.
- THAMAN (R. R.), 1976 – *The Tongan Agricultural System*. Suva, University of South Pacific, 432 p.
- THAMAN (R. R.), 1990 – « The evolution of the Fiji food system ». In Jansen (A. A. J.) et al., eds: *Food and Nutrition in Fiji. A historical review. I-Food production, composition and intake*, Suva, University of South Pacific: 23-107.



VAN BECK (A. G.), 1987 – *The way of all flesh: hunting and ideology of the Bedamuni of the great Papuan plateau (Papua New Guinea)*. Leiden, University of Leiden, 234 p.

VAN HEEL (W. A.), 1974 – Flowers and fruits in Flacourtiaceae. II-The seeds of *Pangium edule* Reinw. *Blumea*, 22: 15-19.

VAN ROYEN (P.), 1957 – Revision of the Sapotaceae of the Malaysian area in a wider sense; VII-*Planchonella* Pierre. *Blumea*, 8 (2): 235-445.

VAN ROYEN (P.), 1959 – Revision of the Sapotaceae of the Malaysian area in a wider sense. *Nova Guinea*, 10 (1): 131-142.

VAN ROYEN (P.), 1964 – *Manual of the Forest trees of Papua New Guinea*. 2-Sapindaceae, 3-Sterculiaceae, 4-Anacardiaceae. Lae. Department of Forests, Division of Botany.

VAN STEENIS (C. G.), 1951 – « *Corynocarpaceae* ». In Van Steenis (C. G.), ed: 4 (3): 262-264.

VAN STEENIS (C. G.), ed, 1951-1978 – *Flora Malesiana*, series I, vol. 4, 5, 7, 8.

VERHELJ (E. W.), CORONEL (R. E.), eds, 1992 – *Plant resources of South-East Asia, II- Edible fruits and nuts*. Bogor, Prosea, 446 p.

VIROT (R.), 1968 – *Flore de la Nouvelle-Calédonie et dépendances. 2-Protéacées*. Paris, Muséum national d'histoire naturelle, 254 p.



WALTER (A. E.), 1989 – Notes sur les cultivars d'arbre à pain dans le nord du Vanuatu. *Journal de la société des océanistes*, 88-89 (1-2): 3-18.

WALTER (A. E.), 1994 – « Knowledge for survival: traditional tree farming in Vanuatu ». In Morrison (J.), Gerathy (P.), Crowl (L.), eds: *Science of Pacific Island Peoples: fauna, flora, food and medicine*, Suva, University of the South Pacific, 3: 189-200.

WALTER (A. E.), SAM (C.), BOURDY (G.), 1994 – Étude ethnobotanique d'une noix comestible: les *Canarium* du Vanuatu. *Journal de la société des océanistes*, 98 (1): 81-98.

WALTER (A. E.), SAM (C.), 1996 – « Indigenous nut trees in Vanuatu: ethnobotany and variability ». In Stevens (M. L.), Bourke (R. M.), Evans (B. R.), eds: *South Pacific indigenous nuts, Proceedings of a workshop 31 October-4 November 1994, Port Vila, Vanuatu*, Canberra, ACIAR, 69: 56-66.



- WARD (R. G.), BROOKFIELD (M.), 1992 – The dispersal of the coconut: did it float or was it carried to Panama? *Journal of Biogeography*, 19: 467-480.
- WATT (G.), 1972 [1908] – *A dictionary of the economic products of India*. London, J. Murray. New Delhi, Cosmo Publications, 6 vol.
- The wealth of India. A dictionary of Indian raw materials and industrial products*, 1985 [1976] – New Delhi, CSIR.
- WEISLER (M.), 1991 – The use of Mountain apple (*Syzygium malaccense*) in a prehistoric Hawaiian domestic structure. *Economic Botany*, 45 (2): 281-285.
- WHEATLEY (J. I.), 1992 – *A guide to the common trees of Vanuatu, with lists of their traditional uses and ni-vanuatu names*. Port Vila, Department of Forestry, 308 p.
- WHISTLER (A.), 1983 – The flora and vegetation of Swains Island. *Atoll research Bulletin*, 262.
- WHISTLER (A.), 1984 a – Notes on the flora of Niue. *New Zealand Journal of Botany*, 22: 564-567.
- WHISTLER (A.), 1984 b – Annotated List of Samoan Plant Names. *Economic Botany*, 38 (4): 464-489.
- WHISTLER (A.), 1988 – A revision of *Syzygium* (Myrtaceae) in Samoa. *Journal of the Arnold Arboretum*, 69: 167-192.
- WHISTLER (A.), 1991 – *The ethnobotany of Tonga: the plants, their Tongan names and their uses*. Honolulu, Bishop Museum Press, 156 p.
- WHISTLER (A.), 1992 – *Flowers of the Pacific island seashore*. Honolulu, Isle Botanica, 154 p.
- WHITMORE (T. C.), 1966 – *Guide to the Forests of the British Solomon Islands*. Oxford. Oxford University Press, 208 p.
- WICHMAN (J. R.), ST JOHN (H.), 1990 – *A chronicle and flora of Niihau*. Lawai, National Tropical Botanical Garden, 158 p.
- WILDER (G. P.), 1934 – *The flora of Makatea*. Honolulu, The Museum Press, Bernice P. Bishop Museum, Bulletin 120, 50 p.
- WOMERSLEY (J.), ed, 1978 – *Handbooks of the flora of Papua New Guinea*. Carlton, Melbourne University Press, vol. 1 (vol. 2 by HENTY, ed, 1981; vol. 3 by Barry E. Conn.).



YEN (D. E.), 1973 – Ethnobotany from the voyages of Mendana and Quiros in the Pacific. *World Anthropology*, S-1: 32-43.

- YEN (D. E.), 1974 –
Arboriculture in the
subsistence of Santa Cruz,
Solomon Islands. *Economic
Botany*, 28: 247-284.
- YEN (D. E.), 1993 –
The origins of subsistence
agriculture in Oceania and
the potentials for future
tropical crops. *Economic
Botany*, 47 (1): 3-14.
- YOUNG (M.), 1971 – *Fighting
with food: leadership, values
and social control in a
Massim Society*. Cambridge,
Cambridge University
Press, 282 p.
- YUNCKER (T. G.), 1971 [1959]
– *Plants of Tonga*. Honolulu,
Kraus reprint, Bernice P.
Bishop Museum, Bulletin
220, 284 p.
- YUNCKER (T. G.), 1974 a
[1943] – *The flora of Niue
Island*. Honolulu, Kraus
reprint, Bernice P. Bishop
Museum, Bulletin 178, 126 p.
- YUNCKER (T. G.), 1974 b
[1945] – *Plants of Manua
islands*. Honolulu, Kraus
reprint, Bernice P. Bishop
Museum, Bulletin 184, 74 p.
-



Fruits and Nuts Eaten From New Guinea to the Cook Islands

Abbreviations:

NC	New Caledonia
NG	New Guinea
Sol	Solomon Islands
Van	Vanuatu

Other abbreviations:

E	endemic
N	native
In	native or introduced in very ancient times
ia	aboriginal introduction
le	European introduction
I	introduced at a time unknown
X	eaten within that country

This list is far from exhaustive, but simply reflects the extraordinary richness of local fruits in the Pacific. It is based partly on published sources and partly on our own field data. The systematic position of certain taxa still remains confused (as for example among the Sapotaceae) or poses problems of identification. The authors of the present work will receive with pleasure any additional information and any eventual corrections to this list. The species covered in the body of the work are shown in bold type.

Species	Part eaten	NG	Sol.	Van.	NC	Fiji	Samoa	Tonga	Cook
<i>Aceratium insulare</i>	fruit	N	N X						
<i>Aceratium oppositifolium</i>	fruit	N X	N	N X					
<i>Adenantha pavonina</i>	seed	la	la	la X	le	la X	le X	le X	le X ?
<i>Agathis hypoleuca</i>	seed				X				
<i>Agathis lanceolata</i>	seed				E X				
<i>Agathis macrophylla</i>	seed	N	N X	N	N X				
<i>Agathis moorei</i>	seed				E X				
<i>Agathis ovata</i>	seed				X				
<i>Agathis spinulosa</i>	seed				X				
<i>Aleurites moluccana</i>	seed	In X	In	In X	In	la	la	la	la
<i>Antidesma bunius</i>	fruit	N X	N						
<i>Artocarpus altilis</i>	fruit, seed	In X	In X	In X		In X	la X	la X	la X
<i>Artocarpus fretessii</i>	seed	N X							
<i>Artocarpus vriesianus</i>	fruit	N X	N X						
<i>Baccaurea papuana</i>	fruit	N X	N						
<i>Barringtonia edulis</i>	seed	In X	N X	N X		N X			
<i>Barringtonia niedenzuana</i>	seed	N	N X						
<i>Barringtonia novae-hiberniae</i>	seed	N X	N X	N X					
<i>Barringtonia procera</i>	seed	la X	N X	N X					
<i>Barringtonia seaturae</i>	seed					E X ?			
<i>Bruguiera cylindrica</i>	radicle, seed ?	N X							
<i>Bruguiera gymnorrhiza</i>	fruit	N X	N X	N		N	N	N	
<i>Bruguiera sexangula</i>	fruit	N X	N X		N X				
<i>Burckella fijiensis</i>	fruit, seed		In	la X		N X			
<i>Burckella obovata</i>	fruit	N X	N X	N X		le X			
<i>Burckella richii</i>	fruit					N	I	N X	
<i>Burckella sorei</i>	fruit		E X						
<i>Burckella</i> sp. (<i>Cassidispermum</i>)	fruit		N	N X					
<i>Canarium decumanum</i>	seed	N X							
<i>Canarium harveyi</i>	seed		N X	N X	X	N X	I X	In X	
<i>Canarium hirsutum</i>	seed	N X	N X						
<i>Canarium indicum</i>	seed	N X	N X	N X		le X	le X		le X
<i>Canarium kaniense</i>	seed	E X							
<i>Canarium oleiferum</i>	seed				E X				

Species	Part eaten	NG	Sol.	Van.	NC	Fiji	Samoa	Tonga	Cook
<i>Canarium salomonense</i>	seed	IX	EX						
<i>Canarium schlechteri</i>	seed	NX							
<i>Canarium vanikoroense</i>	seed		NX	In X		In			
<i>Canarium vulgare</i>	seed	NX	NX	In X?		N			In
<i>Castanopsis acuminatissima</i>	seed	NX							
<i>Castanospermum australe</i>	seed	IX	In	In X				I	
<i>Citrus macroptera</i>	juice	N	In	la X	la	la X	la	la	
<i>Clymenia polyantra</i>	fruit	EX							
<i>Cordia dichotoma</i>	fruit	NX		I?	I	le X			
<i>Cordia subcordata</i>		N	N	NX	N	NX	In X	In X	In
<i>Corynocarpus cribbianus</i>	fruit	NX	NX						
<i>Corynocarpus similis</i>	fruit			EX					
<i>Cryptocarya wilsonii</i>	seed			NX					
<i>Diospyros elliptica</i>	fruit		N?		N?	NX	NX	NX	
<i>Diospyros major</i>	fruit					NX	IX	la X	
<i>Dracontomelon dao</i>	fruit	NX	N						
<i>Dracontomelon lenticulatum</i>	fruit	EX							
<i>Dracontomelon vitiense</i>	fruit		N?	NX		NX	NX	IX	
<i>Elaeocarpus chelonimorphus</i>	seed			NX		NX			
<i>Elaeocarpus kambi</i>	fruit					EX?			
<i>Elaeocarpus polydactylus</i>	seed	EX							
<i>Elaeocarpus pullenii</i>	seed	NX							
<i>Elaeocarpus womersleyi</i>	seed	EX							
<i>Eriandra fragrans</i>	fruit	N	NX						
<i>Ficus adenosperma</i>	fruit	N	N	NX					
<i>Ficus arbuscula</i>	fruit	NX							
<i>Ficus aspera</i>	fruit			NX	N? X	N?	N?		
<i>Ficus austro-caledonica</i>	fruit				EX				
<i>Ficus bambusifolia</i>	fruit					EX			
<i>Ficus barclayana</i>	fruit					EX			
<i>Ficus barraui</i>	fruit				EX				
<i>Ficus botryocarpa</i>	fruit	NX							
<i>Ficus calopilina</i>	fruit	NX							

Species	Part eaten	NG	Sol.	Van.	NC	Fiji	Samoa	Tonga	Cook
<i>Ficus copiosa</i>	fruit	N X	N X ?						
<i>Ficus dammaropsis</i>	fruit	N X							
<i>Ficus granatum</i>	fruit			E X					
<i>Ficus gymnocrygma</i>	fruit	N X							
<i>Ficus itoana</i>	fruit	E X							
<i>Ficus masonii</i>	fruit					E X			
<i>Ficus obliqua</i>	fruit		N	N X ?		N	N	N	
<i>Ficus pritchardii</i>	fruit					E X			
<i>Ficus pungens</i>	fruit	N X							
<i>Ficus scabra</i>	fruit			N X	N	N	N	N	
<i>Ficus tinctoria</i>	fruit	N X	N	N X ?		N X	N X ?	N X ?	
<i>Ficus virgata</i>	fruit	N X	N	N X	N				
<i>Ficus vitiensis</i>	fruit					E X			
<i>Ficus wassa</i>	fruit	N X	N X ?	N X					
<i>Finschia chloroxantha</i>	seed	N X	N X	N X					
<i>Finschia ferruginiflora</i>	seed	E X							
<i>Flacourtia inermis</i>	fruit	I X							
<i>Flacourtia jangomas</i>	fruit	I X							
<i>Flacourtia rukam</i>	fruit	N X	N	I X		I X	I X	I	
<i>Galbulimima belgrayerana</i>	fruit	N X	N						
<i>Garcinia hollrungii</i>	fruit	N X	N						
<i>Garcinia jaweri</i>	fruit	N X	N						
<i>Garcinia pseudoguttifera</i>	fruit		N	N X		N X		In	
<i>Garuga floribunda</i>	fruit	N X	N X	N			N	N	
<i>Gnetum costatum</i>	seed	N X	N X						
<i>Gnetum gnemon</i>	seed	N X	N X	N ou la X			N X		
<i>Gnetum latifolium</i>	seed	N X	N X	N X					
<i>Grewia crenata</i>	fruit			N		N	N	N X	N
<i>Haplolobus floribundus</i>	seed, fruit	N	N X	N X		N			
<i>Heritiera littoralis</i>	seed	N X	N X	In	In	In		In	
<i>Heritiera trifoliata</i>	seed	N X							
<i>Horsfieldia spicata</i>	fruit	N	N X						
<i>Horsfieldia sylvestris</i>	fruit	E X							
<i>Inocarpus fagifer</i>	seed	N X	N X	N X		N X	N X	la X	la X
<i>Kermadecia sinuata</i>	seed				E X				
<i>Macadamia leptophylla</i>	seed				E X				
<i>Maesa ambrymensis</i>			E X						

Species	Part eaten	NC	Sol.	Van.	NC	Fiji	Samoa	Tonga	Cook
<i>Mangifera minor</i>	fruit	N X	N X						
<i>Mangifera mucronulata</i>	fruit	N X	N X						
<i>Morinda citrifolia</i>	fruit	N X	N X	N X		In X	In X	la X	In X
<i>Myristica hollrungii</i>	fruit	N X	N						
<i>Neisosperma oppositifolium</i>	seed	In	N	N X		N X	N	N X	
<i>Pandanus antaresensis</i>	seed	N X							
<i>Pandanus brosimos</i>	seed	E X							
<i>Pandanus conoideus</i>	oily pericarp	E X							
<i>Pandanus dubius</i>	seed	N X	N X ?	N X					
<i>Pandanus englerianus</i>	oily pericarp	E X							
<i>Pandanus foveolatus</i>	seed	E X							
<i>Pandanus jullianettii</i>	seed	E X							
<i>Pandanus magnificus</i>	oily pericarp	N X							
<i>Pandanus tectorius</i>	seed, sweet pericarp	N X	N X	N X		N	N	N X	N
<i>Pangium edule</i>	seed	N X	N X	In X					
<i>Parartocarpus venenosus</i>	fruit	N X	N X						
<i>Parinari salomonensis</i>	fruit	N X	N						
<i>Phyllocladus hypophyllus</i>	fruit	N X							
<i>Pipturus argenteus</i>	fruit	N X	N	N X		N	N X ?		
<i>Pittosporum pullifolium</i>	seed	N X	N						
<i>Planchonella grayana</i>	fruit			N X		N X	N X	N X	N X
<i>Pleiogynium timoriense</i>	fruit	N	N			N		N X	N
<i>Pometia pinnata</i>	fruit	N X	N X	N X	le	N X	N	la X	IX
<i>Pouteria campechiana</i>	fruit	E X							
<i>Pouteria endlicheri</i>	fruit					E X			
<i>Pouteria linggensis</i>	fruit	N	N	N X ?	N	N	N	N	N
<i>Pouteria maclayana</i>	fruit	N X							
<i>Scleropyrum aurantiacum</i>	seed	E X							
<i>Semecarpus atra</i>	seed					E X			
<i>Semecarpus</i>									

Species	Part eaten	NG	Sol.	Van.	NC	Fiji	Samoa	Tonga	Cook
<i>cassuvium</i>	fruit	N X							
<i>Sloanea tieghemii</i>	seed	E X							
<i>Sleumerodendron austro-caledonicum</i>	seed				E X				
<i>Spondias cytherea</i>	fruit	In X	In X	In X		la X	la X	la X	la X
<i>Spondias novoguineensis</i>	fruit	N X	N X						
<i>Sterculia foetida</i>	seed	N X							
<i>Sterculia vitiensis</i>	seed			N X		N X			
<i>Sterculia schumanniana</i>	seed	N X	N						
<i>Syzygium aqueum</i>	fruit	In X	In X						
<i>Syzygium clusifolium</i>	fruit	N	N X	N X			I	I X	
<i>Syzygium corynocarpum</i>	fruit					N X ?	la X	la X	
<i>Syzygium malaccense</i>	fruit	N X	In X	In X	le	In X	la X	le X	I X
<i>Syzygium nutans</i>	fruit	N	N X	N X ?					
<i>Syzygium richii</i>	fruit			N		N X	N	N X	
<i>Syzygium samarangense</i>	fruit	N X	N X	In		le X	I	I X	
<i>Terminalia catappa</i>	seed	N X	N X	N X		N X	In X	In X	le
<i>Terminalia copelandii</i>	seed ?	N	N X ?						
<i>Terminalia impediens</i>	seed	E X	I						
<i>Terminalia kaernbachii</i>	seed	N X	I X						
<i>Terminalia litoralis</i>	seed			N X		N X		N X	
<i>Terminalia megalocarpa</i>	fruit, seed	N X	N X						
<i>Terminalia samoensis</i>	seed	N	N	N X			N X		
<i>Terminalia sepicana</i>	fruit, seed	N	N X	N X					
<i>Ximenia americana</i>	fruit	In X	In	le X		In X	In X	In X	

In the literature a certain number of other plants have also been indicated as edible:

Alangium vitiense:

Vanuatu, Fiji, edible fruit (Guillaumin, 1954);

Archidendron sp.:

Solomon Islands, edible fruit (Henderson & Hancock, 1989);

Buchanania sp.: Papua New Guinea (Mogulu), edible seeds (eaten in December) (van Beck, 1987);

Burckella coco: if it turns out that this species from New Guinea and Solomon Islands is different from *B. obovata*;

Chelonespermum banikiense and *Chelonespermum majus*: Solomon Islands;

Chisocheton sp.:

New Guinea, edible seeds (Gorecki & Gillieson, 1989);

Cryptocarya sp.:

New Guinea, edible seeds (Gorecki & Gillieson, 1989);

Lithocarpus spp.:

New Guinea;

Maba buxifolia: Vanuatu, edible nut (Guillaumin, 1954); this plant actually appears to be a *Diospyros* that has not been able to be identified;

Macaranga spp.:

New Guinea;

Madhuca spp.: New Guinea;

Manilkara spp.:

New Guinea;

Mimusops elengi: Vanuatu (Wheatley, 1992);

Murraya crenulata: Vanuatu;

Myristica sp.: New Guinea (Purari Delta), edible fruit (Gorecki & Gillieson, 1989);

Myristica aff. *globosa*:

Solomon Islands, edible seeds (Henderson & Hancock, 1989);

Niemeyera balansae:

New Caledonia, edible fruit;

Ochrosia elliptica:

Solomon Islands, edible seeds (Henderson & Hancock, 1989);

Pandanus iwen:

New Guinea, edible seeds;

Pandanus limbatus:

New Guinea, edible seeds;

Pandanus costaneus:

New Guinea, edible fruit;

Pittosporum spp.:

New Guinea;

Semecarpus sp.:

New Guinea (Western Province), edible seeds.

Species
Names
and Main
Synonyms



Aceratium oppositifolium
Elaeocarpus edulis T. & B.,
E. oppositifolius Miq.

Aleurites moluccana
A. lobata Blanco,
A. triloba Forster,
Jatropa moluccana L.

Artocarpus altilis
A. camansi Blanco,
A. communis J. R. & G.
Forster

Barringtonia procera
B. edulis (non Seemann)
Bailey,
B. excelsa (non Bl.) Benth.,
B. guppyana Knuth,
B. magnifica Laut.,
B. schuchardtiana K. Schum.,
B. speciosa K. Schum.,
Butonica procera Miers

Burckella fijiensis
B. macrantha Lam,
B. macropoda var. *macrantha*
Lam & van Royen,
B. multinervis Lam,
B. thurstonii sensu Gillespie,
Chelonespermum fijiense
Hemsley

Burckella obovata
Bassia obovata Forster,
Burckella hollrungii Pierre,
Burckella kajiewskii
(Guillaumin) Lam,
and doubtless *Burckella*
coco (Scheffer) Pierre

Burckella sp.
(*Cassidispermum*
megahilum Hemsley)
Cassidispermum
megahilum Hemsley



Barringtonia edulis
Butonica edulis (Seemann)
Miers,
Butonica samoensis Miers,
Barringtonia excelsa
sensu Seemann,
Barringtonia seaturae
sensu Payens,
Huttum edule (Miers)
Brittons

Barringtonia novae-
hiberniae
B. brosimos Merrill & Perry,
B. oblongifolia Knuth



Canarium harveyi
For *C. harveyi* var. *harveyi*:
C. harveyi sensu Seemann,
C. mafoa Christophersen.
For *C. harveyi* var. *nova-*
hebridense Leenhouts:
no synonym.

Canarium indicum
C. commune Linné,
C. nungi Guillaumin

Citrus macroptera
C. aurantium subsp.
saponacea Safford,

C. hystrix sensu
Christophersen,
C. vulgaris sensu Seemann

Cordia subcordata

C. campanulata Roxburgh,
C. hexandra Roem & Schult.,
C. orientalis R. Br.



Diospyros elliptica
Maba elliptica J. R. &
G. Forst.

Diospyros major

D. andersonii (Soland.
ex. Hiern.) Green,
D. ferrea (Willd.) Bakh.
var. *lateriflora* (Hiern.
ex. Baker),
D. lateriflora (Hiern. ex.
Baker) Bakhuizen.,
Maba andersonii Solander
ex. Hiern.,
M. lateriflora Hiern. ex. Baker,
M. major Forst.

Dracontomelon vitiense

D. sylvestre Seemann,
D. vitiense Engl. ex.
Guillaumin



Finschia chloroxantha

F. densiflora White ex.
Walker,
F. micronesica Kanehira,
F. waterhousiana Burtt,
Grevillea elaeocarpifolia
Guillaumin,
G. micronesica Kanehira



Garcinia pseudoguttifera

G. echinocarpa Seemann,
G. pancheri Guillaumin

Gnetum gnemon

G. acutatum Miq.,
G. ovalifolium Poir.,
G. sylvestris Brongn.,
G. vinosum Elmer



Inocarpus fagifer

I. edulis J. R. & J. G. Forster,
I. fagiferus Parkinson



Morinda citrifolia

M. bracteata Roxburgh,
M. litoralis Blanco



Neisosperma

oppositifolium
Cerbera oppositifolia Lam.,
C. parvifolia Forster,
Ochrosia oppositifolia
K. Schum.,
O. parviflora Hensl.



Pandanus conoideus

P. butyrophorus Kurz

Pandanus dubius

P. hombronii F. Muell.

Pandanus tectorius

P. odoratissimus L. f.

Pipturus argenteus

P. propinquus Seemann,

P. velutinus Seemann,

Urtica argenteus

(Forster f.) Weddell

Planchonella grayana

Lucuma vitiensis Gillespie,

Planchonella costata

(Endlicher) Pierre var.

vitiensis Lam,

Pouteria costata var.

vitiensis Baehni,

Sapota vitiensis A. Gray,

Sideroxylon vitiense

Benth. & Hook

Pometia pinnata

Aphania neo-ebudica

Guillaumin,

Nephelium pinnatum Camb.,

Pometia alnifolia (Blume)

Radlk.,

P. coriacea Radlk.,

P. tomentosa Teysm.

& Binnend

Pouteria maclayana

Lucuma navicularis Lam.



Spondias cytherea

Evia dulcis (Parkinson)

Kostermans.

Spondias dulcis Solander

ex. Forster f.

Sterculia vitiensis

S. tannaensis Guillaumin

Syzygium aqueum

Eugenia aquea Burm. f.,

Jambosa subsessilis Miq.

Syzygium clusiiifolium

Eugenia clusiaefolia A. Gray

Syzygium corynocarpum

Eugenia corynocarpa A. Gray,

E. paniculata Forster,

Syzygium amicorum sensu

Yuncker

Syzygium malaccense

Eugenia malaccensis L.,

E. richii sensu Guillaumin,

non A. Gray,

Jambosa domestica

Rumph.,

J. malaccensis (L.) D. C.

Syzygium richii

Eugenia richii A. Gray,

E. ritchei A. Gray ex. Seem,

Jambosa richii Mueller

Syzygium samarangense

Eugenia javanica Lamk.,

E. mananquil Blanco,

Jambosa alba Blume,

J. samarangensis D. C.,

Myrtus samarangensis

Blume



Terminalia fernandiana

T. latipes subsp. *psilocarpa*

Terminalia kaernbachii

T. okari C. T. White



Vernacular Names in Detail

For Papua New Guinea (PNG): the names are given in the Ankave and Baruya languages, partly because they are unpublished and partly because their transcription has been verified. The name in Melanesian Pidgin (tok pisin) is likewise given, if it exists.

For Solomon Islands: the names are given in the local pidgin as well as in Kwara'ae.

For Vanuatu: for this country we give the names in one language picked for each of the islands of the archipelago of Vanuatu.

For Fiji: the names are given in standard Fijian and in Wayan, a dialect of western Fiji.

For Samoa and Tonga: the names are those found in the literature.

Each language is indicated in parentheses before the vernacular plant name.



Adenanthera pavonina

- Vanuatu:
 - Ambae (nduindui): *pi-bixhu*
 - Erromango (sie): *nadup*
 - Efate (North-Efate): *mar*
 - Maewo (sungwadaxa): *sida*
 - Malekula (wala rano): *nuwunwun*
 - Pentecost (apma): *bisbis*
 - Santo (nokuku): *bizur*
 - Tongoa (namakura): *na-mwar*
 - Torres (roh): *nø-witurtur*
- Solomons (kwara'ae): *tatarabebe*
- Fiji (wayan): *vaivai drisi*
- Samoa: *lopa*
- Tonga: *lopa*

Aleurites moluccana

- Vanuatu:
 - Ambae (nduindui): *fange*
 - Ambrym (olal): *wopliu*
 - Aneityum: *in-hac*
 - Efate (pango): *naseslam*
 - Erromango (sie): *ne-tuo*
 - Maewo (sungwadaxa): *fange*
 - Malekula (wala rano): *naru*
 - Malo (malo): *fu-fanke*
 - Santo (butmas): *ne-pa*
 - Tongoa (namakura): *nasibonbon*
 - Torres (toga): *nø-vak*
- Fiji (fijian): *lauci* (wayan): *toto*
- Samoa: *lama*
- Tonga: *tuitui*

Artocarpus altilis

- Vanuatu:
 - Ambae (nduindui): *beko*
 - Ambrym (dakaka): *beta*
 - Aneityum: *in-ma*
 - Banks (mosina¹⁵): *o-pex*
 - Efate (North-Efate): *petam*
 - Epi (kanamanga): *nø-batau*
 - Erromango (potnarvin): *mar*
 - Futuna (futuna): *kuru*
 - Maewo (sungwadaxa): *batau*

¹⁵ Mosina is the language spoken on Vanua Lava.

- Malekula (wala rano):
beteu
 Pentecost (apma): (*butsu*)
beta
 Santo (nukuku): *pek*
 Tanna (lenakel): *nim*
 Tongoa (namakura): *na-*
bata
 Torres (lo): *nø-pex*
 – PNG: (tok pisin): *kapiak*
 (ankave): *kwii*
 – Fiji: (fijian): *uto* (wayan):
kulu
 – Samoa: *'ulu*
 – Tonga: *mei*



Barringtonia edulis

- Vanuatu:
 Ambae (nduindui): *na-pele*
 Ambrym (dakaka): *tubu*
 Ambrym (South-East-Ambrym): *tavarsal*
 Aneytium (futuna): *fetofeto*
 Banks (mosina): *wotax*
 Efate (North-Efate): *fil*
 Emae (kanamanga): *na-vila*
 Epi (lewo): *tep lop*
 Erromango (sie): *velnga*
 Futuna (futuna): *fofoto*
 Maewo (sungwadaxa):
wotaxa
 Malekula (wala): *dapwi*
nevlangis
 Malekula (ninde): *namase*
 Malo (malo): *xorota*
 Pentecost (apma): (*butsu*) *vel*
 Santo (butmas): *xot*
 Tanna (lenakel): *nülnga*
 Tongoa (namakura): *na-*
tabwe
 Torres (lo): *nø-votaxa*
 – Solomons (kwara'ae):
fala ou aikenu
 – Fiji:
 (fijian): *vutu*
 (wayan): *kutu*

Barringtonia novae-hiberniae

- Vanuatu:
 Ambae (nduindui): *na-pele*
 Ambrym (South-East-Ambrym): *tabu*
 Banks (mosina): *wotax*
 Efate (North-Efate): *fil*
 Emae (kanamanga): *na-vila*
 Epi (lewo): *kurgi*
 Maewo (sungwadaxa):
wotaxa
 Malekula (wala): *dapwi*
 Malekula (ninde): *namase*
 Malo (malo): *xorota*
 Pentecost (apma):
 (*butsu*) *vel*
 Torres (lo): *nø-votaxa*
 – PNG (tok pisin): *pao*

Barringtonia procera

- Vanuatu:
 Ambae (nduindui): *na-pele*
 Ambrym (dakaka): *tubu*
 Ambrym (South-East-Ambrym): *talep*
 Banks (mosina): *wotax*
 Efate (North-Efate): *bugor*
 Emae (kanamanga): *na-vila*
 Epi (lewo): *tep*
 Futuna (futuna): *fofoto*
 Maewo (sungwadaxa):
wotaxa
 Malekula (wala): *dapwi*
 Malekula (ninde):
namase tari
 Malo (malo): *fale*
 Pentecost (apma):
 (*butsu*) *vel*
 Torres (lo): *nø-votaxa*
 – PNG (tok pisin): *pao*

Burckella fijiensis

- Vanuatu (futuna): *bau*
 – Fiji (fijian): *mbau*

Burckella obovata

- Vanuatu:
 Ambae (nduindui): *na-*
duledule
 Ambrym (dakaka): *taviro*
 Ambrym (South-East-Ambrym): *na-at*
 Banks (mosina): *not*
 Efate (North-Efate): *nat*
 Epi (lewo): *nar*
 Erromango (sie): *yetu*

- Maewo (sungwadaxa): *natu*
 Malekula (nale): *ni-ur*
 Malo (malo): *sowowa*
 Pentecost (apma): *butsu-wanet*
 Tanna (lenakel): *kwa-nier*
 Tongoa (namakura): *na-nat*
 Torres (lo): *nø-not*
 – PNG (tok pisin): *bukabuk*
 – Solomons (kwara'ae): *kona*

Burckella sp.

See *Cassidispermum megahilum* Hemsley (*Cassidispermum*)

- Vanuatu:
 Malekula (lawa): *nenet doxoé lapwe*



Canarium harveyi

- Vanuatu:
 Ambae (nduindui): *na-ngai*
 Ambrym (dakaka): *wowele*
 Ambrym (South-East-Ambrym): *ngae*
 Aneytium: *n-angai*
 Banks (mosina): *nge*
 Efate (North-Efate): *angae*
 Emae (kanamanga): *na-ngay*
 Epi (lewo): *ngi*
 Erromango (sie): *na-ngai*
 Futuna (futuna): *ngai*
 Maewo (sungwadaxa): *ngangai*
 Malekula (wala): *nenga*
 Malekula (ninde): *nengi*
 Malo (malo): *gaigai*
 Pentecost (apma): (*butsu waknga*)
 Tanna (lenakel): *na-ngai*
 Tongoa (namakura): *na-anga*
 Torres (lo): *nø-nger*
 This species, clearly distinct, is perceived as a variety of *C. indicum* (cf. p. 128) whose name it bears.

In order to distinguish it the villagers always use a binary name, comprising the general name for *Canarium* followed by the name of the variety.

- Solomons (kwara'ae): *mala adoa*
 – Samoa: *mafoa*
 – Tonga: *'ai*

Canarium indicum

- Vanuatu:
 Ambae (nduindui): *na-ngai*
 Ambrym (dakaka): *wowele*
 Ambrym (South-East-Ambrym): *ngae*
 Aneytium: *n-angai*
 Banks (mosina): *nge*
 Efate (Nord-Efate): *angae*
 Emae (kanamanga): *na-ngay*
 Epi (lewo): *ngi*
 Erromango (sie): *na-ngai*
 Futuna (futuna): *ngai*
 Maewo (sungwadaxa): *ngangai*
 Malekula (wala): *nenga*
 Malekula (ninde): *nengi*
 Malo (malo): *gaigai*
 Pentecost (apma): (*butsu waknga*)
 Tanna (lenakel): *na-ngai*
 Tongoa (namakura): *na-anga*
 Torres (lo): *nø-nger*
 – PNG (tok pisin): *galip*
 – Solomons:
 (tok pisin): *ngali*
 (kwara'ae): *ngali*

Castanopsis acuminatissima

- Papua New Guinea:
 (ankave): *suZø'*
 (baruya): *ønanø'*

Citrus macroptera

- Vanuatu:
 Ambae (nduindui): *moli*
 Efate (Nord-Efate): *mol*
 Maewo (sungwadaxa): *ngoli*
 Malo (malo): *moli*
 Pentecost (apma): *mol*
 Santo (butmas): *mol*
 Tongoa (namakura): *na-moli*

Cordia subcordata

- Vanuatu:
Ambae (nduindui):
pitangwakara
Ambrym (dakaka): *wopa*
Aneytium: *in-ma-xanas*
Banks (Gaua; Nume):
nba nade pat
Efate (North-Efate): *nefak*
Emae (kanamanga):
namokosei
Epi (lewo): *purvinu*
Maewo (sungwadaxa):
tarotas
Malekula (wala rano):
brout
Malo (malo): *fu-tabweya*
Pentecost (apma):
malmalsebwek
Tanna (lenakel): *na-mak*
Tongoa (namakura): *na-
vanule*
Torres (roh): *nø-varla*
– Solomons (kwara'ae):
*uaua asi/uauwa
asi/fofotasi/bili'bili asi*
– Fiji:
(fijian): *nawanawa*
(wayan): *nawanawa*
– Samoa: *tauangave*
– Tonga: *pua taukanave*

In Polynesia, the species is well-known under the name of *kou*.

Corynocarpus similis

- Vanuatu:
Banks (on Gaua; nume):
wotokpo
Efate (North-Efate): *kirim*
Erromango (sie): *walavse*
Maewo (baetora): *memelu*
Malo (malo): *tabwea*
Pentecost (apma): (*butsu*)
tabwi
Santo (butmas): *ftomboh*
Tongoa (namakura):
na-kavikoak
Torres (lo): *nø-ngirngir*



Diospyros elliptica

- Tonga: *kanume*

Diospyros major

- Tonga: *mapa*

Dracontomelon vitiense

- Vanuatu:
Ambae (nduindui): *na-
katabolo*
Ambrym (dakaka): *mel*
Ambrym (South-East-
Ambrym): *mal*
Aneytium: *in-huri*
Banks (mosina): *wara*
Efate (North-Efate): *ne-rou*
Emae (kanamanga): *ne-xau*
Epi (lewo): *lu*
Erromango (sie): *na-ra*
Futuna (futuna): *tavexao*
Maewo (sungwadaxa):
tangola
Malekula (wala): *netapol*
Malekula (ninde): *na-xu*
Malo (malo): *xatabola*
Pentecost (apma): (*butsu*)
katpol
Santo (butmas): *atapol*
Tanna (lenakel): *kwan-fur*
Tongoa (namakura): *na-ra*
Torres (lo): *nø-xro*
– Fiji:
(fijian): *tarawau*
(wayan): *tawarau*
– Tonga: *sangato*



Ficus adenosperma

- Vanuatu:
Maewo (sungwadaxa):
nunue
Tanna: *na-neri*
– Solomons (kwara'ae):
alangia

Ficus granatum

- Vanuatu:
Erromango (sie, dialect of Dillons Bay): *uwairan*
Erromango (sie, dialect of Potnarvin): *tobi*
Tanna (lenakel): *na-ring*
Tongoa (namakura):
na-nunubwi ilam
Torres (roh): *nø-mihø*

Ficus scabra

- Vanuatu:
Epi (lewo): *puru-biluva*
Erromango (sie): *tobi*
Malekula (wala rano):
mbliu
Maewo (sungwadaxa):
ngwiliva
Pentecost (apma): (*butsu*)
bwilip
Tanna (lenakel): *ma-nim*
Tongoa (namakura): *na-biliv*
- Tonga: *masi'ata*

Ficus tinctoria

- Vanuatu:
Maewo (sungwadaxa): *fires*
Tongoa (namakura): *na-lo*
- Solomons (kwara'ae):
baolasususus
- Samoa: *mati*
- Tonga: *masi'ata*

Ficus wassa

- Vanuatu:
Ambae (nduindui): *fi-fofoxhe*
Ambrym (dakaka): *veaxh*
Banks (mosina): *balak*
Efate (North-Efate): *ait*
Epi (lewo): *lu mak namarai*
Erromango (sie): *lait*
Futuna (futuna): *feimatchi*
Maewo (sungwadaxa):
xwoxwosa ou balago
Malekula (wala rano): *blak*
Pentecost (apma): (*butsu*)
wowos
Tanna (lenakel): *manasis*
Tongoa (namakura): *na-balang*
Torres (roh): *nø-wo*

- PNG:
(tok pisin): *fikus*
(ankave): *exwaje*
- Solomons (kwara'ae):
ngo'ongo'o

Finschia chloroxantha

- Vanuatu:
Ambrym (South-East-Ambrym): *onganga*
Erromango (sie): *neikom*
Maewo (sungwadaxa):
ngiama
Malekula (espigle bay):
bëtsixh
Malo (malo): *fu-kame*
Pentecost (apma): (*butsu*)
vakam
Tanna (lenakel):
kwankwanikwai
Tongoa (namakura): *na-mang*
Torres (roh): *naxalaxax*
- PNG (ankave): *kierobairø*
- Solomons (kwara'ae): *akama*

Flacourtia rukam

- Vanuatu:
Banks (mosina):
rangrangmarxe
- Samoa: *filimoto*
- Tonga: *filimoti, filimoto*

Garcinia pseudoguttifera

- Vanuatu:
Ambae (nduindui): *bilekara*
Banks (mosina): *womun*
Erromango (sie): *ne-aiven*
Maewo (sungwadaxa):
nunuwelelaba
Malekula (unmet): *xhëla*
Pentecost (apma): *bilnga*
Tanna (lenakel):
kwan-kiliakei
Tongoa (namakura):
na-bangiraka
Torres (lo): *nø-pørpor*
- Solomons (kwara'ae):
kwa'efanefane / koafanefane
- Fiji (wayan): *suweru ou sueru*
- Tonga: *mo'ononia*



Gnetum costatum

- PNG: (tok pisin): *tulip* (ankave): *kwi'wø'xweeNwø*
- Solomons (kwara'ae): *dae*

Gnetum gnemon

- Vanuatu: Ambae (nduindui): *popoxhe* Maewo (sungwadaxa): *xwoxwosa tabua* Pentecost (apma): *(butsu) wesu* Torres (lo): *nø-vax*
- PNG: (tok pisin): *tulip* (ankave): *kwi'wø*
- Solomons (kwara'ae): *dae fasia / dae malefo*
- Fiji (fijian): *sukau*



Inocarpus fagifer

- Vanuatu: Ambae (nduindui): *na-mangwe* Ambrym (dakaka): *map* Ambrym (South-East-Ambrym): *map* Aneytium: *in-mop* Banks (mosina): *mak* Efate (North-Efate): *ne-mwak* Emae (kanamanga): *na-mabwe* Epi (lewo): *kenai* Erromango (sie): *nowane* Futuna (futuna): *ifi* Maewo (sungwadaxa): *mangwe* Malekula (wala): *nies* Malekula (ninde): *nambwe* Malo (malo): *mabwe* Pentecost (apma): *(butsu) maba*

- Santo (nokuku): *mab* Tanna (lenakel): *nukwanai* Tongoa (namakura): *na-mu* Torres (lo): *nømeuk*

- PNG (tok pisin): *aila*
- Solomons (kwara'ae): *ailali*
- Fiji: (fijian): *ivi* (wayan): *ivi*
- Samoa: *ifi*
- Tonga: *ifi*



Morinda citrifolia

- Vanuatu: Ambae (nduindui): *pi-kura* Ambrym (dakaka): *(wo)hokon* Ambrym (North-Ambrym): *lioxkon* Aneytium: *n-auras* Banks (mosina): *wur* Efate (North-Efate): *kur* Emae (kanamanga): *na-kura* Epi (lewo): *guri* Erromango (sie): *norat* Futuna (futuna): *nonu* Maewo (sungwadaxa): *lombe* Malekula (wala): *na-urui* Malekula (ninde): *nan goxo* Malo (malo): *fu bwexura* Pentecost (apma): *(butsu) kutsi* Tanna (lenakel): *nauyas* Tongoa (namakura): *na-kira* Torres (roh): *nø-lop*
- Fiji (fijian): *kura*
- Solomons (kwara'ae): *kikiri* (cultivated types with large fruits), *dilo* (wild type with small fruits)
- Samoa: *nonu*
- Tonga: *nonu*



Neisosperma oppositifolium

- Vanuatu:
 - Ambae (nduindui): *pi-parapara*
 - Ambrym (olal): *pwar*
 - Aneytium: *penwiru*
 - Epi (lewo): *maraveve*
 - Efate (epao): *fato*
 - Erromango (sie): *yevat*
 - Maewo: *varovaro*
 - Malekula (wala): *bivarvar*
 - Malo (malo): *fu farofaro xolo*
 - Pentecost (apma): *(butsu) va:va*
 - Santo (nokuku): *wozau*
 - Tongoa (namakura): *na-varivar*
 - Tanna (lenakel): *nëwanëk keikai*
 - Torres (lo): *vø-va*
- Solomons (kwara'ae): *aikikiru*
- Fiji (wayan): *vao*
- Tonga: *fao*



Pandanus conoideus

- PNG:
 - (tok pisin): *marita*
 - (ankave): *simahø'*

Pandanus dubius

- Vanuatu:
 - Banks (mosina): *wovax*
 - Tongoa (namakura): *na-vak*

Pandanus julianettii

- PNG:
 - (tok pisin): *karuka*
 - (ankave): *Xweebø*
 - (baruya): *yase*

Pandanus tectorius

- Vanuatu:
 - Banks (mosina): *xer*
 - Maexo (sungwadaxa): *feveo*
 - Pentecost (apma): *(butsu) vip*
 - Tongoa (namakura): *na-barau*
 - Torres (Hiu): *nø-xixø*
- Fiji:
 - (fijian): *vadra*
 - (wayan): *vadra*
- Tonga: *fafa*

Pangium edule

- Vanuatu:
 - Ambae (nduindui): *pi-lake*
 - Ambrym (olal): *wongpal*
 - Banks (ureparapara): *woviak*
 - Efate (mele): *te-waire*
 - Epi (lewo): *puru-nuapwepwe*
 - Malekula (vao): *nalaxh*
 - Malo (malo): *varange*
 - Pentecost (apma): *(butsu)dodo*
 - Tongoa (namakura): *na-waes*
 - Torres (roh): *nø-varak*
- PNG:
 - (tok pisin): *sis ; tombo*
 - (ankave): *amø'*
- Solomons (kwara'ae): *falake / ra*

Pipturus argenteus

- Vanuatu:
 - Maewo (ninde): *dongea*
 - Malekula (wala rano): *nimlili*
 - Malekula (ninde): *narame*
 - Pentecost (apma): *(butsu)odoma*
 - Tanna (lenakel): *numiang*
 - Tongoa (namakura): *na-damwa*
- PNG (ankave): *Sjo'ø*
- Solomons (kwara'ae): *sungasunga*
- Samoa: *songa*
- Tonga: *olonga*

Pittosporum pullifolium

- PNG (baruya): *jotSuwanlwøka*



Planchonella grayana

- Vanuatu:
 - Erromango (sie): *noraxo*
 - Maewo (sungwadaxa): *baxura xan gwaratu*
 - Malekula (atchin): *norvat*
 - Malo (malo): *fu-sowasowa*
 - Santo (tasmate): *ala'a*
 - Tanna (lenakel): *nēkalaga*
 - Tongoa (namakura): *na-kalak*
 - Torres (toga): *nøxaxøloxø*
- Solomons (kwara'ae): *riru*
- Fiji: *nggalaka*
- Tonga: *kalaka*

Pleiogynium timoriense

- Tonga: *tangato*

Pometia pinnata

- Vanuatu:
 - Ambae (nduindui): *na-dao*
 - Ambrym (dakaka): *da*
 - Ambrym (South-East-Ambrym): *rao*
 - Aneytium: *n-itva*
 - Banks (mosina): *tewen*
 - Efate (North-Efate): *da*
 - Emae (kanamanga): *na-tao*
 - Epi (lewo): *kilata*
 - Erromango (sie): *dau*
 - Futuna (futuna): *tauwa*
 - Maewo (sungwadaxa): *dalawa*
 - Malekula (wala): *ra*
 - Malekula (ninde): *ne-ndi*
 - Malo (malo): *tsaria*
 - Pentecost (apma): *(butsu) lislis*
 - Santo (butmas): *tsiri*
 - Tanna (lenakel): *natom*
 - Torres (lo): *nø-tawø*
 - PNG:
 - (tok pisin): *taun, ton*
 - (ankave): *weenø'*
 - Solomons (kwara'ae): *ako/dawa*
 - Fiji:
 - (fijian): *dawa*
 - (wayan): *tawa*
 - Samoa: *tava*
 - Tonga: *tava*
- Pouteria maelayana*
- PNG (tok pisin): *wail popo*



Scleropyrum aurantiacum

- PNG (ankave): *tøkørukwapē abøxø*

Spondias cytherea

- Vanuatu:
 - Ambae (nduindui): *auxhi-poxhoki*
 - Ambrym (dakaka): *baor*
 - Ambrym (South-East-Ambrym): *homal*
 - Aneytium: *n-amal*
 - Banks (mosina): *ur*
 - Efate (North-Efate): *ne-mal*
 - Emae (kanamanga): *na-mali*
 - Epi (lewo): *malmal*
 - Erromango (sie): *ne-vi*
 - Futuna (futuna): *na-vi*
 - Maewo (sungwadaxa): *wisa*
 - Malekula (wala): *naus-borton*
 - Malekula (ninde): *nan tsoxwoi*
 - Malo (malo): *xesi*
 - Pentecost (apma): *ba:rus*
 - Santo (butmas): *wi*
 - Tanna (lenakel): *naus*
 - Tongoa (namakura): *na-mal*
 - Torres (lo): *nur*
- Solomons (kwara'ae): *aioo-kwai / uuli-auki*
- Fiji (fijian): *wi*
- Samoa: *vi*
- Tonga: *vi*

Sterculia vitiensis

- anuatu:
 - Aneytium: *in-wadwad*
 - Erromango (sie): *wowo*
 - Maewo (sungwadaxa): *xai rovirovi*
 - Malekula (wala rano): *na-itwang*
 - Malo (malo): *fu-xuruxu*
 - Tanna (lenakel): *nuwawa*
 - Tongoa (namakura): *na-sisivak*
- Fiji (fijian): *waciwaci*

Syzygium malaccense

- Vanuatu:
 - Ambae (nduindui):
na-kavika
 - Ambrym (dakaka): *have*
 - Ambrym (South-East-Ambrym): *ahi*
 - Banks (mosina): *xevex*
 - Efate (North-Efate): *kafik*
 - Emae (kanamanga):
na-kavika
 - Epi (lewo): *kavika*
 - Erromango (sie): *weve*
 - Futuna (futuna): *kavika*
 - Maewo (sungwadaxa):
xavixa
 - Malekula (wala): *navi*
 - Malekula (ninde): *neweke*
 - Malo (malo): *xavixa*
 - Pentecost (apma): (*butsu*)
kavik
 - Santo (nokuku): *kevika*
 - Tanna (lenakel): *navë*
 - Tongoa (namakura):
na-kavik
 - Torres (lo): *nøgøviga*
- PNG:
 - (tok pisin): *laulau*
 - (ankave): *orø'wa*
- Solomons (kwara'ae):
afio / kabirai / sa'au
- Fiji:
 - (fijian): *kavika*
 - (wayan): *kavika*
- Samoa: *nonu fi'a fi'a ; nonu vao*
- Tonga: *fekika kai*

- Efate (North-Efate): *tali*
- Emae (kanamanga):
na-talie
- Epi (lewo): *tawo ou sawo*
- Erromango (sie): *tehi*
- Futuna (futuna): *tarie*
- Maewo (sungwadaxa):
talise
- Malekula (wala): *dawo*
- Malekula (ninde): *nei-tiktik*
- Malo (malo): *tafoa*
- Pentecost (apma): (*butsu*)
towo / (butsu) telis
- Santo (nokuku): *wosae*
- Tanna (lenakel): *tël*
- Tongoa (namakura):
na-tawo
- Torres (lo): *nøtilihø*
- PNG (tok pisin): *talis*
- Solomons:
 - (tok pisin): *alite*
 - (kwara'ae): *alita / alite*
- Fiji (fijian): *tivi*
- Samoa: *talie*
- Tonga: *telie*

Terminalia kaernbachii

- PNG:
 - (tok pisin): *okari*
 - (ankave): *wa'ue*
- Solomons:
 - (tok pisin): *Bush alite*
 - (kwara'ae): *alita fasia*



Terminalia catappa

- Vanuatu:
 - Ambae (nduindui):
na-tokwa
 - Ambrym (dakaka): *wuke*
 - Ambrym (South-East-Ambrym): *hoe*
 - Aneytium: *in-teceth*
 - Banks (mosina): *telis*

Index of Scientific Names

Names in colour are those recognised as valid. Names not in bold are synonyms or are names not recognised as valid. Page numbers in bold refer to photographs.

A	Abelmoschus manihot Medic.	41
	Aceratium oppositifolium D. C.	83, 278, 285, 315
	Adenanthera	86
	<i>Adenanthera microsperma</i> T. & B.	85
	Adenanthera pavonina Linné	84, 85, 91, 278, 289, 315
	var. <i>microsperma</i>	85
	var. <i>pavonina</i>	85
	Aleurites	90
	Aleurites cordata (Thunb.) R. Br. ex. Steud.	90
	Aleurites fordii Hemsl.	90
	Aleurites lobata Blanco	285
	Aleurites moluccana (L.) Willdenow	33, 87, 88, 91, 278, 285, 289, 315
	var. <i>moluccana</i>	88
	var. <i>rockinghamensis</i>	88
	Aleurites montana (Lour.) Wils.	90
	Aleurites triloba Forster	285
	Aleurites trisperma Blco.	90
	Alocasia macrorrhiza Schott.	39
	Amorphophallus campanulatus (Roxb.)	40
	Anacardiaceae	156, 243
	Anisoptera	178
	Aphania neo-ebudica Guillaumin	287
	Apocynaceae	208
	Artocarpus altilis (Parkinson) Fosberg	41, 70, 73, 92, 93, 107, 278, 285, 289

B

<i>Artocarpus camansi</i> Blanco	285
<i>Artocarpus communis</i> J. R. & G. Forster	285
<i>Australimusa</i>	429
Barringtonia	115, 116, 118
Barringtonia asiatica (L.) Kurz	115
<i>Barringtonia brosimos</i> Merrill et Perry	285
Barringtonia edulis (Miers)	
Seemann.....	73, 94, 95, 96, 97, 100, 111, 114, 115, 116, 119, 278, 285, 290, 315
<i>Barringtonia edulis</i> (non Seemann) Bailey.....	285
<i>Barringtonia excelsa</i> (non Bl.) Benth.	285
<i>Barringtonia guppyana</i> Knuth.....	285
<i>Barringtonia magnifica</i> Laut.....	285
Barringtonia novae-hiberniae	
Lauterbach.....	73, 98, 99, 101, 113, 114, 278, 285, 290, 315
<i>Barringtonia oblongifolia</i> Knuth.....	285
Barringtonia procera (Miers) Knuth.....	73, 100, 101, 102, 103, 113, 117, 278, 285, 290, 315
<i>Barringtonia schuchardtiana</i> K. Schum.	285
Barringtonia seaturae Guppy.....	113, 278
<i>Barringtonia seaturae</i> sensu Payens.....	285
<i>Barringtonia speciosa</i> K. Schum.....	285
Barringtonia spp.	70
Bishofia javanica	89
Boraginaceae	149
Burckella	121, 122
<i>Burckella coco</i> (Scheffer) Pierre.....	283, 285
Burckella fijiensis (Hemsley) A. C. Smith & S. Darwin.....	104, 120, 126, 128, 278, 285, 290, 315
<i>Burckella hollrungii</i> Pierre	285
<i>Burckella kajiewskii</i> (Guillaumin) Lam	285
<i>Burckella macrantha</i> Lam	285
<i>Burckella macropoda</i> var. <i>macrantha</i> Lam & van Royen.....	285
<i>Burckella multinervis</i> Lam	285
Burckella obovata (G. Forster) Pierre.....	73, 105, 122, 123, 128, 278, 285, 290, 315
Burckella richii (A. Gray) Lam	106, 122, 278
Burckella sorei Van Royen	122, 278

<i>Burckella</i> sp. (<i>Cassidispermum megahilum</i> Hemsley)	106, 127, 278, 285, 291, 315
<i>Burckella thurstonii</i> (Hemsley) Lam	122
<i>Burckella thurstonii</i> sensu Gillespie	285
Burseraceae	129
<i>Butonica edulis</i> (Seemann) Miers	285
<i>Butonica procera</i> Miers	285
<i>Butonica samoensis</i> Miers	285
C <i>Canarium</i>	131
<i>Canarium album</i> (Lour.) Raeuschel	131
<i>Canarium commune</i> L.	285
<i>Canarium decumanum</i> (Rumph.) Gaertn.	131, 278
<i>Canarium harveyi</i> Seemann	60, 73, 129, 135, 141, 142, 278, 285, 291, 315
var. <i>harveyi</i>	129
var. <i>nova-hebridiense</i>	129, 285
<i>Canarium harveyi</i> sensu Seemann	285
<i>Canarium hirsutum</i> Willd.	131, 278
<i>Canarium indicum</i> Linné	33, 61, 73, 130, 131, 132, 143, 278, 285, 291, 316
<i>Canarium kaniense</i> Lauterbach	131, 278
<i>Canarium iuzonicum</i> (Blume) A. Gray	131
<i>Canarium mafoa</i> Christophersen	285
<i>Canarium nungi</i> Guillaumin	285
<i>Canarium oleiferum</i> Baillon	131, 278
<i>Canarium patentinervum</i> Miq.	131
<i>Canarium pilosum</i> Bennett	131
<i>Canarium pimela</i> Leenh.	131
<i>Canarium salomonense</i> Burt.	131, 279, 316
<i>Canarium schlechteri</i> Lauterbach	131, 279
<i>Canarium</i> spp.	70, 73
<i>Canarium vanikorøense</i> Leenhouts	131, 279, 316
<i>Canarium vitiense</i> Gray	131, 316
<i>Canarium vrieseanum</i> Engl.	131
<i>Canarium vulgare</i> Leenhouts	131, 279, 316
<i>Cassidispermum megahilum</i> Hemsley	122, 285, 291
<i>Castanopsis</i>	136, 137

<i>Castanopsis acuminatissima</i> Blanco.....	72, 136, 279, 291
<i>Castanopsis costata</i> (Blume) A. D. C.....	137
<i>Castanopsis inermis</i> (Lindley ex. Wallich) Benth.....	137
<i>Castanopsis lucida</i> (Nees) Soepadmo.....	137
<i>Castanopsis malaccensis</i> Gamble	137
<i>Castanopsis megacarpa</i> Gamble	137
<i>Castanopsis philippensis</i> (Blanco) Vidal.....	137
<i>Castanopsis wallichii</i> King ex. Hook. f.....	137
<i>Castanospermum australe</i> Cunn. & Frazer ex. Hook.	138, 279, 316
<i>Cerbera oppositifolia</i> Lam.....	286
<i>Cerbera parvifolia</i> Forster	286
<i>Chelonespermum</i>	122
<i>Chelonespermum fijiense</i> Hemsley.....	122, 285
<i>Citrus</i>	139, 140
<i>Citrus aurantium saponacea</i> Safford.....	286
<i>Citrus hystrix</i> D. C.	140
<i>Citrus hystrix</i> sensu Christophersen.....	286
<i>Citrus macroptera</i> Montrouzier	139, 144, 279, 286, 291, 316
<i>Citrus vulgaris</i> sensu Seemann.....	286
Clusiaceae	176
<i>Cocos nucifera</i> L.....	42
<i>Colocasia esculenta</i> (L.) Schott.	39, 40
Combretaceae	254
<i>Cominsia gigantea</i>	52
<i>Cordia campanulata</i> Roxburgh	286
<i>Cordia dichotoma</i> Forster f.	151, 279
<i>Cordia hexandra</i> Roem & Schult.....	286
<i>Cordia myxa</i> L.....	151
<i>Cordia orientalis</i> R. Br.....	286
<i>Cordia sebestena</i> L.....	151
<i>Cordia subcordata</i> Lamarck	144, 149, 279, 286, 292, 316
<i>Cordyline fructicosa</i> (L.) A. Cheval.....	40
Corynocarpaceae	152
<i>Corynocarpus australasica</i> C. T. White	153



<i>Corynocarpus cribbianus</i> (F. M. Bail.) L. S. Sm.	153, 279
<i>Corynocarpus laevigata</i> Forster & Forster f.	153
<i>Corynocarpus similis</i> Hemsley	152, 279, 292, 316
<i>Curcuma longa</i>	50
<i>Cycas rumphii</i> Miq.	47
<i>Cyrtosperma</i>	39, 40
D <i>Dioscorea alata</i> L.	38
<i>Dioscorea bulbifera</i> L.	39, 40
<i>Dioscorea esculenta</i> (Lour.) Burk.	39
<i>Dioscorea nummularia</i>	39
<i>Dioscorea pentaphylla</i> L.	39
<i>Dioscorea trifida</i>	39
<i>Diospyros andersonii</i> (Soland. ex. Hiern.) Green	286
<i>Diospyros elliptica</i> (Forster) Green	154, 279, 286, 292
<i>Diospyros ferrea</i> (Willd.) Bakh. var. <i>lateriflora</i> (Hiern. ex. Baker)	286
<i>Diospyros lateriflora</i> (Hiern. ex. Baker) Bakhuizen.	286
<i>Diospyros major</i> (Forster) Bakh.	155, 279, 286, 292
<i>Diospyros</i> spp.	154
<i>Dracontomelon</i>	158
<i>Dracontomelon dao</i> (Blanco) Merr. & Rolfe	158, 279
<i>Dracontomelon duperreanum</i>	158
<i>Dracontomelon edule</i> (Blanco) Skeels Royen	158
<i>Dracontomelon lenticulatum</i> Wilkinson	158, 279
<i>Dracontomelon mangiferum</i> Bl.	158
<i>Dracontomelon sylvestre</i> Seemann	286
<i>Dracontomelon vitiense</i> Engler	33, 49, 73, 145, 156, 279, 286, 292, 316
<i>Dracontomelum vitiense</i> Engl. ex. Guillaumin	286
E <i>Ebenaceae</i>	154
<i>Elaeocarpaceae</i>	83, 159

<i>Elaeocarpus</i>	72
<i>Elaeocarpus chelonimorphus</i>	
Gillespie	159, 279, 316
<i>Elaeocarpus edulis</i> T. & B.	285
<i>Elaeocarpus oppositifolius</i> Miq.	285
<i>Elaeocarpus pullenii</i> Weibel	153, 279
<i>Elaeocarpus</i> spp.	147, 159
<i>Entada phaseoloides</i> (L.) Merr.	47
<i>Eugenia aquea</i> Burm. f.	287
<i>Eugenia clusiaefolia</i> A. Gray	287
<i>Eugenia corynocarpa</i> A. Gray	287
<i>Eugenia javanica</i> Lamk.	287
<i>Eugenia malaccensis</i> L.	287
<i>Eugenia mananquil</i> Blanco	287
<i>Eugenia paniculata</i> Forster	287
<i>Eugenia richii</i> A. Gray	287
<i>Eugenia richii</i> sensu Guillaumin, non A. Gray	287
<i>Eugenia ritchei</i> A. Gray ex. Seem.	287
<i>Eumusa</i>	42
Euphorbiaceae	87
<i>Evia dulcis</i> (Parkinson) Kostermans.	287
<i>Excavatia littoralis</i> (Merr.) Markgraf	209
Fabaceae	183
Fagaceae	136
<i>Ficus</i>	72, 150, 161, 169
<i>Ficus adenosperma</i> Miquel	169, 279, 292, 316
<i>Ficus aspera</i> Forster f.	146, 161, 279, 316
<i>Ficus copiosa</i> Steud.	169, 317
<i>Ficus granatum</i>	
Forster f.	33, 146, 163, 280, 293, 316
<i>Ficus scabra</i>	
Forster f.	33, 147, 161, 165, 280, 293, 317
<i>Ficus</i> spp.	41
<i>Ficus tinctoria</i> Forster f.	169, 280, 293, 317
<i>Ficus virgata</i> Reinw. ex. Bl.	148, 169, 280, 317
<i>Ficus wassa</i> Roxburgh	33, 148, 162, 164, 166, 167, 280, 293, 317



Finschia chloroxantha	
Diels.....	72, 171, 187, 280, 286, 293, 317
var. <i>chloroxantha</i>	171
var. <i>macrocarpa</i>	171
<i>Finschia densiflora</i> White ex. Walker.....	286
Finschia ferruginiflora White.....	172, 280
<i>Finschia micronesica</i> Kanehira.....	286
<i>Finschia waterhousiana</i> Burt.....	286
Flacourtia	175
<i>Flacourtia cataphracta</i> Roxb. & Willd.....	174
<i>Flacourtia euphlebia</i> Merr.....	175
<i>Flacourtia indica</i> (Burm. f.) Merr.....	174, 175
<i>Flacourtia inermis</i> Roxb.....	175, 280
Flacourtia jangomas (Lour.) Raeusch.....	174, 175, 280
<i>Flacourtia ramontchi</i> L'Hér.....	174
Flacourtia rukam Zollinger & Morritzi.....	174, 187, 280, 293, 317
Flacourtiaceae	173, 219
G Garcinia	177
<i>Garcinia dulcis</i> (Roxb.) Kurz.....	177
<i>Garcinia echinocarpa</i> Seemann.....	286
<i>Garcinia hollrungii</i> Laut.....	177, 280
<i>Garcinia mangostana</i> L.....	177
<i>Garcinia pancheri</i> Guillaumin.....	286
Garcinia pseudoguttifera Seemann.....	33, 176, 280, 286, 293, 317
Gnetaceae	178, 180
Gnetum	179
<i>Gnetum acutatum</i> Miq.....	286
Gnetum costatum K. Schumann.....	178, 181, 280, 294, 317
Gnetum gnemon Linné....	33, 41, 72, 178, 179, 180, 187, 280, 286, 294, 317
var. <i>brunonianum</i>	180
var. <i>gnemon</i>	180
var. <i>gracile</i>	180
var. <i>griffithii</i>	180

	var. <i>ovalifolium</i>	180
	var. <i>tenerum</i>	180
	<i>Gnetum indicum</i> (Lour.) Merr.	179
	Gnetum latifolium Bl.	179, 280
	<i>Gnetum ovalifolium</i> Poir.	286
	<i>Gnetum sylvestris</i> Brongn.....	286
	Gnetum tenuifolium Ridley 179	
	<i>Gnetum vinosum</i> Elmer.....	286
	<i>Grevillea elaeocarpifolia</i> Guillaumin 286	
	<i>Grevillea micronesica</i> Kanehira..... 286	
H	Heliconia	62
	Heliconia spp.	49
	Hibiscus tiliaceus	113
	Hopea	178
	<i>Huttum edule</i> (Miers) Britton 285	
I	Inocarpus edulis J. R. & J. G. Forster 286	
	Inocarpus fagifer (Parkinson ex. Zollinger) Fosberg..... 33, 42, 73, 183, 188, 189, 280, 286, 294, 317	
	<i>Inocarpus fagiferus</i> Parkinson..... 286	
	Ipomoea batatas (L.) Lamk.	40
J	Jambosa alba Blume	287
	Jambosa domestica Rumph..... 287	
	Jambosa malaccensis (L.) A. P. de Candolle..... 287	
	Jambosa richii Mueller..... 287	
	Jambosa samarangensis D. C..... 287	
	Jambosa subsessilis Miq.	287
	Jatropha moluccana L.....	285
L	Lecythydaceae	111
	Lithocarpus	178
	Lucuma vitiensis Gillespie.....	287
	Lucuma navicularis Lam.	287
M	Maba andersonii Solander ex. Hiern..... 286	
	Maba elliptica J. R. & G. Forst..... 286	
	Maba lateriflora Hiern. ex. Baker 286	
	Maba major Forst.....	286
	Maesa ambrymensis Guillaumin 203, 280, 317	
	Manihot esculenta	40

Melothria spp.....	41
Metroxylon spp.....	43
Moraceae	107, 161
<i>Morinda bracteata</i> Roxburgh	286
<i>Morinda citrifolia</i> Linné.....	33, 190, 191, 204, 281 286, 294, 317
<i>Morinda littoralis</i> Blanco	286
<i>Musa nana</i> Lour.....	42
<i>Musa troglodytarum</i> L.....	42
Myrsinaceae.....	203
Myrtaceae.....	249
<i>Myrtus samarangensis</i> Blume	287
N <i>Neisosperma oppositifolium</i> (Lamark) Fosberg & Sacht.....	190, 208, 281, 286, 295, 318
<i>Nephelium pinnatum</i> Camb	287
O <i>Ochrosia akkeringae</i> (Teysm. & Binnend) Miq.....	209
<i>Ochrosia littoralis</i> Merr.	209
<i>Ochrosia oppositifolia</i> K. Schum.....	286
<i>Ochrosia parviflora</i> Hensl.....	286
P Pandanaceae.....	210
<i>Pandanus brosimos</i> Merr. & Perry	218, 281
<i>Pandanus butyrophorus</i> Kurz	287
<i>Pandanus conoideus</i> Lamarck.....	42, 50, 70, 168, 181, 192, 193, 210, 281, 287, 295
<i>Pandanus dubius</i> Sprengler.....	42, 194, 212, 281, 287, 295, 318
<i>Pandanus hombronii</i> F. Muell.....	287
<i>Pandanus houlettei</i> Ridley	218
<i>Pandanus julianettii</i> Martelli	42, 195, 196, 197, 214, 281, 295
<i>Pandanus leram</i> Jones ex. Fontana.....	218
<i>Pandanus odoratissimus</i> L. f.	217, 287
<i>Pandanus tectorius</i> Parkinson.....	42, 198, 211, 213, 215, 216, 281, 287, 295, 318
<i>Pandanus ysabelensis</i> St John	218
<i>Pangium edule</i> Reinwardt... 46, 47, 50, 70, 73, 74, 200, 201, 202, 219, 281, 295, 318	
Papilionaceae.....	138
<i>Parartocarpus venenosus</i>	242, 281


Pipturus	223
Pipturus argenteus (Forster f.)	
Weddell	222, 281, 287, 295, 318
var. <i>lanosus</i>	222
<i>Pipturus propinquus</i> Seemann	287
<i>Pipturus velutinus</i> Seemann	287
Pittosporaceae	224
Pittosporum	225
Pittosporum pullifolium Burkill	34, 224, 281, 295
Planchonella	226, 227
<i>Planchonella costata</i> (Endlicher) Pierre	
var. <i>vitiensis</i> Lam	287
<i>Planchonella grayana</i>	
St John	226, 235, 281, 287, 296, 318
Pleiogynium timoriense (D. C.)	
Leenhouts	281, 296
Pometia	231
<i>Pometia alnifolia</i> (Blume) Radlk.	287
<i>Pometia coriacea</i> Radlk.	287
<i>Pometia pinnata</i> J. R. & G.	
Forster	70, 73, 228, 235, 281, 287, 296, 318
f. <i>acuminata</i>	228
f. <i>alnifolia</i>	228
f. <i>cuspidata</i>	228
f. <i>glabra</i>	228
f. <i>macrocarpa</i>	228
f. <i>pinnata</i>	228
f. <i>repandra</i>	228
f. <i>tomentosa</i>	228
<i>Pometia ridley</i> King	231
<i>Pometia tomentosa</i> Teysm. & Binnend.	287
Pouteria	227, 232
<i>Pouteria campechiana</i> (H. B. K.)	
Baehni	232, 281
<i>Pouteria costata</i> (Endler) Pierre ex. Lam	
var. <i>vitiensis</i>	226
<i>Pouteria costata</i> (Endlicher) Baehni	226
<i>Pouteria costata</i> Baehni	
var. <i>vitiensis</i>	287
<i>Pouteria duclitan</i> (Blanco) Baehni	232
<i>Pouteria maclayana</i>	
(F. Muell.) Baehni	232, 237, 281, 287, 296
<i>Pouteria sapota</i> (Jacq.) Moore & Stearn	232





Proteaceae	171
<i>Pterocarpus santalinus</i> L. f.....	86
Rubiaceae	204
Rutaceae	139
<i>Saccharum edule</i> Hassk.....	41
<i>Saccharum officinarum</i> Burk.....	41
Sapindaceae.....	228
<i>Sapota vitiensis</i> A. Gray	287
Sapotaceae.....	120, 226, 232
Santalaceae.....	234
<i>Scleropyrum aurantiacum</i> (Laut. & K. Sch.) Pilger	234, 281, 296, 318
<i>Setaria palmifolia</i> Stapf.....	41
<i>Sideroxylon vitiense</i> Benth. & Hook.....	287
Spondias	245
<i>Spondias acida</i> Bl.....	245
<i>Spondias cytherea</i> Sonnerat.....	45, 73, 236, 243, 282, 287, 296, 318
<i>Spondias dulcis</i> Solander ex. Forster f.....	287
<i>Spondias mombin</i> L.....	245
<i>Spondias novoguineensis</i> Kostermans	245, 282
<i>Spondias pinnata</i> (Koenig ex. Linn. f.) Kurz	245
<i>Spondias purpurea</i> L.....	245
<i>Spondias tuberosa</i> Arruda	246
<i>Sterculia</i>	72, 248
<i>Sterculia foetida</i> L.....	248, 282
<i>Sterculia oblongata</i> R. Br.....	248
<i>Sterculia parkinsonii</i>	248
<i>Sterculia schumanniana</i> (Laut.) Mildbr.....	248, 282, 318
<i>Sterculia tannaensis</i> Guillaumin.....	287
<i>Sterculia treubii</i> Hochr.....	248
<i>Sterculia urceolata</i> J. E. Smith.....	248
<i>Sterculia vitiensis</i> Seemann	237, 247, 282, 287, 296, 318
Sterculiaceae	247
<i>Syzygium</i>	251, 252

<i>Syzygium amicum</i> sensu Yuncker	287
<i>Syzygium aqueum</i> (Burm.) Alston	251, 253, 282, 287
<i>Syzygium cf. nutans</i>	252, 282, 318
<i>Syzygium clusiifolium</i> (A. Gray) Mueller	251, 253, 282, 287, 318
<i>Syzygium corynocarpum</i> (A. Gray) Mueller	252, 253, 282, 287
<i>Syzygium malaccense</i> (L.) Merrill & Perry	73, 238, 249, 282, 287, 297, 318
<i>Syzygium richii</i> (A. Gray) Merrill & Perry	239, 252, 253, 282, 287, 318
<i>Syzygium samarangense</i> (Blume) Merr. & Perry	252, 253, 282, 287, 318
<i>Syzygium</i> sp.	239, 318
T <i>Tacca leontopetaloides</i> L.	40
<i>Terminalia</i>	256, 260
<i>Terminalia catappa</i> Linné	33, 73, 240, 241, 254, 257, 260, 282, 297, 319
<i>Terminalia ferdinandiana</i> Exell	256, 258, 287
<i>Terminalia impediens</i> Coode	257, 258, 282
<i>Terminalia kaernbachii</i> Warburg	74, 257, 259, 282, 287, 297
<i>Terminalia latipes</i> subsp. <i>psilocarpa</i>	287
<i>Terminalia litoralis</i> Seemann	257, 258, 282
<i>Terminalia microcarpa</i> Decne	257
<i>Terminalia okari</i> C. T. White	287
<i>Terminalia samoensis</i> Rechinger	242, 257, 258, 282, 319
<i>Terminalia sepicana</i> Diels	242, 257, 282, 319
<i>Trichosanthes</i> spp.	41
U <i>Urtica argenteus</i> (Forster f.) Weddell	287
<i>Xanthosoma sagittifolium</i>	39, 211
<i>Xanthosoma sagittifolium</i> (L.) Schott	39
<i>Ximenia americana</i> L.	282, 319
Z <i>Zingiber zerumbet</i> Sm	50



Index of Common Names

This lists the common names in English (e), French (f) and Bislama (b) which is the lingua franca of Vanuatu.

The English and French names in bold type are those that are the most firmly established in the literature.

Page numbers in bold refer to illustrations.


A	Ambarella (e)	243
B	Badame (f).....	254
	Bell fruit (e)	251
	Billygoat plum (e)	256
	Bisa (b).....	84
	Bois de pieu (f)	228
	Bourao blong soltwata (b).....	149
	Breadfruit (e).....38, 41, 44, 45, 47, 50, 67,70, 73, 75, 76, 92, 93 , 107	
	Bredfruit (b)	107
	Burckella (e).....67, 73, 78, 104 , 123	
C	Canarium nut (e).....33, 55, 58, 60, 61 , 67, 70, 73, 78, 129, 132, 142	
	Candleberry tree (e).....	87
	Candlenut (e)	63, 87, 91
	Cardinale (f)	84
	Cassava (e)	40, 41, 45, 50, 71
	Castanopsis chestnut (e).....	136
	Châtaigne de Tahiti (f).....	183
	Chrysocarpe (f).....	171
	Coconut (e)	42, 45, 67, 76

Cocoyam (e)	39
<i>Comb tree</i> (e)	226
Coral pea (e)	84
Cordyline (e)	40, 47
Cut nut (e)	62, 70, 78, 94, 95, 96, 99, 101, 102, 104, 111, 114, 117
D Doule (f)	123
E Dragon plum (e)	33, 49, 55, 73, 145, 156
F Evi (f)	243
F Fiquette (f)	161
F Fiquette de Mélanésie (f)	167
F Fiquette d'Océanie (f)	165
F Fiquette vanuataise (f)	163
F Finschia (e)	78, 171
F Fruit à pain (f)	107
G Ghost-lime (e)	139
G Ginger (e)	50
G Golden apple (e)	45, 67, 74, 76, 78, 236, 243
G Gommier (f)	149
H Highland pandanus (e)	195, 197, 214
H <i>Indian almond</i> (e)	254
I <i>Indian mulberry</i> (e)	33, 190, 191, 204
I <i>Indian plum</i> (e)	173
I <i>Indian prune</i> (e)	173
J Jamalac (f)	249
J Jambose de Malacca (f)	249
J Jambose de Semarang (f)	252
J <i>Java almond</i> (e)	132
J <i>Java apple</i> (e)	252
K <i>Kandeltri</i> (b)	87
K Knob-fruited screwpine (e)	212
K Macabo (f)	39
N Maize (e)	40, 69
N Malay apple (e)	238, 239, 249
N Melanesian fig (e)	33, 148, 167
N Moreton Bay chestnut (e)	138

	Morinde (f)	204
	Mountain apple (e)	249
N	Nabalango (b).....	161, 163, 165, 167
	Naduledule (b)	123
	Nagavika (b)	249
	Nakatambol (b)	156
	Namambe (b)	183
	Nandao (b)	228
	Nangai (b)	129, 132
	Nangaille (f).....	129, 132
	Natavoia (b)	254
	Navele (b).....	111, 114, 117
	Noix de Bancoul (f)	87
	Noix de Kanari (f).....	129, 132
	Noix d'Okari (f)	259
O	Oceanian fig (e)	33, 147, 165
	Ochrosia (f)	208
	Okari nut (e)	259
	Otaheite apple (e).....	243
	Otaheite chestnut (e).....	183
P	Pacific lychee (e)	228
	Pandanas (b)	216
	Pandanus (e, f, b).....	42, 199, 212, 216
	Pandanus des hautes terres (f)	214
	Pandanus rouge (f)	210
	Pangi (e, f)	219
	Papaya (e)	55
	Pili nut (e)	129, 131, 132
	Pipturus (e, f)	222
	Poire-tortue (f)	120
	Polynesian chestnut (e)	183
	Pomet (f)	228
	Pomme d'eau (f)	251
	Pomme de Cythère (f)	243
	Pomme malac (f).....	249
	Pomme-cire (f)	252
	Prune café (f).....	173
	Prune de Chine (f).....	173

	Prune dragon (f)	156
R	<i>Red bead tree</i> (e)	84
	<i>Red pandanus</i> (e).....	42, 46, 50, 52, 62, 70, 74, 192, 193, 210
	<i>Red sandalwood</i> (e)	84
	<i>Rough-leaved fig</i> (e)	146, 161
	<i>Rukam</i> (e)	173
S	<i>Sago</i> (e)	43, 44, 61
	<i>Sandpaper cabbage</i> (e).....	167
	<i>Screwpine</i> (e).....	210, 214, 216
	<i>Sea almond</i> (e).....	33, 64, 67, 73, 76, 78, 241, 254
	<i>Sea trumpet</i> (e)	149
	<i>Sébestier en cœur</i> (f)	149
	<i>Sterculia</i> (e, f).....	247
	<i>Sugar cane</i> (e)	41, 69
	<i>Sweet potato</i> (e).....	40, 41, 52, 54, 71, 196
T	<i>Tahitian apple</i> (e).....	243
	<i>Tahitian chestnut</i> (e).....	33, 38, 42, 49, 62, 67, 73, 74, 75, 76, 78, 183, 188, 189
	<i>Tambol</i> (f)	55, 156
	<i>Tannia</i> (e)	39
	<i>Taro</i> (e).....	39, 40, 41, 44, 45, 46, 47, 50, 52, 54, 55, 69, 71
	<i>Taun tree</i> (e).....	67, 70, 228, 235
	<i>Tropical almond</i> (e)	254
	<i>Turmeric</i> (e).....	50
	<i>Twin apple</i> (é)	208
	<i>Two leaf</i> (e)	178, 180
V	<i>Vacouet</i> (f)	216
	<i>Vanuatu fig</i> (e)	33, 146, 163
	<i>Velle</i> (f).....	111, 114, 117
	<i>Vi</i> (e).....	243
W	<i>Water apple</i> (e)	251
	<i>Wax jambu</i> (e)	252
	<i>Wi</i> (e)	243
	<i>Wild fig</i> (e).....	33, 146, 147, 148, 161, 163, 165, 167
Y	<i>Yalotri</i> (b)	204
	<i>Yam</i> (e).....	38, 40, 41, 44, 45, 51, 54, 69, 71





List of Herbarium Specimens

Reference specimens
deposited in the Herbarium
in Port Vila, Vanuatu
(curator: C. Sam).



Aceratium oppositifolium

GB651 ; PCV967, 1200,
1542, 1657, 2181, 2689,
3051 ; PaCu604 ; RSNH116,
1271, 3177 ; CSV175 ;
JWV265, 865

Adenanthera pavonina

PCV1049, 2222 ; SLGNH86,
175 ; DSW158 ; JWV682,
876

Aleurites moluccana

PCV2894 ; PaCu339, 1221 ;
SLGNH129 ; RSNH307 ;
CSV320, 884, 1012 ;
JWV310



Barringtonia edulis

AM002 ; CSV421, 429, 443,
454, 475, 524, 527, 544, 550,
557, 614, 634, 689, 700, 701,
704, 705, 708, 709, 710, 760,
762, 767, 788, 798, 800, 802,
803, 817, 818, 821, 827, 840,

861, 862, 863, 866, 867, 874,
875, 876, 888, 889, 892, 894,
900, 922, 923, 935, 938, 940,
965, 981, 984, 985, 988,
1004, 1005, 1008, 1009,
1010, 1041

Barringtonia novae- hiberniae

CSV1036, 424, 425, 439,
440, 451, 496, 519, 552, 592,
596, 600, 605, 606, 612, 613,
615, 618, 619, 628, 630, 633,
635, 643, 688, 692, 693, 758,
761, 764, 770, 771, 772, 775,
776, 777, 778, 782, 784, 804,
806, 864

Barringtonia procera

CSV420, 422, 447, 474, 476,
477, 478, 482, 492, 517, 522,
528, 553, 560, 570, 571, 584,
585, 611, 616, 617, 621, 622,
672, 673, 674, 676, 690, 781,
799, 814, 815, 816, 823, 824,
835, 838, 859, 860, 890, 891,
893, 895, 896, 941, 964, 997,
1038, 1039, 1040, 1042,
1043

Burckella fijiensis

CSV960

Burckella obovata

CSV473 485, 538, 541, 572,
573, 624, 625, 696, 699, 769,
774, 906, 973, 989, 1006

Burckella sp.

(*Cassidispermum*)

CSV1026 -



Canarium harveyi

CSV1018, 456, 491, 525,
549, 558, 559, 575, 578, 586,
657, 682, 683, 684, 691, 807,
877, 878, 879, 880, 882, 897,
898, 936, 937, 961, 980 ;
RMV1, 2, 3, 4, 6, 7

Canarium indicum

CSV430, 434, 442, 452, 457,
467, 468, 469, 479, 481, 490,
495, 543, 551, 561, 574, 579,
580, 595, 603, 626, 631, 632,
644, 647, 655, 656, 685, 687,
697, 765, 792, 797, 825, 831,
832, 833, 834, 865, 869, 872,
883, 899, 901, 902, 907, 907,
943, 974, 983, 998, 1003,
1019, 1021, 1022, 1023,
1024, 1027, 1028, 1030,
1031, 1033, 1034, 1035,
1037, 1044, 1045, 1046,
1047, 1048

*Canarium cf.
salomonense*

CSV870

Canarium vanikoroense

CSV945

Canarium vitiense

CSV453 ; JWV479, 482, 559

Canarium vulgare

RMV5 ; CSV686

*Castanospermum
australe*

PCV685 ; SLGNH38 ;
CSV908 ; DSW188 ;
JWV296

Citrus macroptera

PCV752, 1467 ; PaCu576 ;
CSV414 ; DSW30

Cordia subcordata

GB1176 ; PaCu669, 744,
856 ; SLGNH99 ; RSNH38,
1579, 16265 ; CSV406, 837

Corynocarpus similis

CSV413, 913, 950bis



Dracontomelon vitiense

CSV437, 449, 463, 497, 498,
521, 554, 598, 604, 620, 639,
641, 740, 773, 785, 790, 791,
831, 871, 977, 986, 1000,
1001



Elaeocarpus

chelonimorphus

PCV2548 ; RSNH3858 ;
CSV927 ; AW168 ; JWV404,
675



Ficus adenosperma

GB230, 703, 878 ; PCV1148,
1172, 1347, 2029, 2406 ;
PaCu601, 1005, 1016, 1342,
1667 ; PhM7468 ;
SLGNH52, 148 ; RSNH31,
364, 1067, 1141, 1201,
16252, 16288, 24133,
24242 ; CSV224, 392 ;
DSW026 ; AW258 ; JWV187

Ficus aspera

GB1265 ; PCV1792, 2216,
2305, 2460 ; PaCu571, 1102,
1497 ; RSNH15, 55, 268,
385, 16029, 24243 ; CSV403,
408 ; DSW106

Ficus granatum

GB441, 912 ; PCV1487,
3060, 3061 ; PaCu1456 ;
IG15 ; SLGNH108 ;
CSV137, 962 ; RSNH136,
1286, 3862

Ficus scabra

GB76, 488, 637, 782, 1127,
1312 ; PCV2403, 2532,
3031 ; PaCu808, 917, 1281,
1400, 1438, 1542 ;
RSNH196, 1311, 16215,
16253, 16369 ; CSV470, 623,
721, 963, 972, 1015

Ficus tinctoria

GB855 ; PCV1195, 1762,
2685 ; PaCu785, 812, 913,
915, 945, 1097, 1136, 1360 ;
RSNH1118, 1205, 1209,
24154, 24271 ; DSW105 ;
JWV284

Ficus virgata

GB719, 1269 ; PCV2071,
2427 ; PaCu530, 976 ;
RSNH105, 167 ; CSV905 ;
AW188

Ficus wassa

GB1145 ; CSV725, 967,
1011bis

Finschia chloroxantha

PB3 ; GB154, 156, 344, 666 ;
PCV1605, 3083 ;
CSV451bis, 745, 950 ;
AW278 ; JWV546

Flacourtia rukam

PCV1038, 1096 ; PaCu522,
1312, 13083 ; RSNH132 ;
CSV77



Garcinia pseudoguttifera

CSV731

Gnetum costatum

PB2

Gnetum gnemon

PB1 ; PaCu1265, 1289,
1298 ; CSV917, 1007 ;
DSW41, 171 ; AW121



Inocarpus fagifer

CSV427, 448, 450, 458bis,
462, 465, 526, 545, 548, 555,
562, 563, 581, 583, 593, 594,
599, 629, 636, 638, 706, 711,
712, 713, 714, 715, 716, 733,
741, 759, 763, 766, 768, 786,
787, 789, 793, 794, 808, 975,
976, 987, 990, 1016



Maesa ambrymensis

GB105 ; PCV734, 1671bis,
2120 ; PhM 7467 ;
RSNH1020, 16062, 24070 ;
CSV203 ; SS18 ; DSW126 ;
JWV665

Morinda citrifolia

GB541, 500, 788, 1136,
1227 ; PaCu324, 755, 839 ;
SLGNH143 ; RSNH1101,
16024 ; CSV540, 916 ; SS7 ;
AW46, 497 ; JWV165, 551



*Neisosperma
oppositifolium*
SLGNH16 ; SS5 ; PCV2494 ;
JWV515, 681



Pandanus dubius
CSV547

Pandanus tectorius
RSNH1219, 16209, 1072

Pangium edule
GB1013 ; PCV257, 1781 ;
PaCu1098 ; SLGNH134 ;
RSNH384, 4535 ; CSV310,
944 ; DSW209 ; AW116 ;
JWV317

Pipturus argenteus
PB38 ; CSV730

Planchonella grayana
GB129 ; PCV1015, 1789,
1883, 2319 ; PaCu732, 923,
1550, 1565 ; SLGNH82,
139 ; RSNH1203, 24100 ;
CSV405, 970 ; DSW121 ;
JWV709

Pometia pinnata
PB15 ; CSV534, 660, 734, 735



*Scleropyrum
aurantiacum*
PB6, 41

Spondias cytherea
CSV459, 460, 461, 471, 472,
484, 506, 507, 508, 509, 510,
511, 512, 513, 514, 515, 516,
537, 556, 567, 577, 650, 651,
652, 661, 662, 665, 666, 667,
668, 669, 670, 679, 680, 681,
779, 822, 829, 830, 873, 978,
663, 664, 1002

Sterculia schumanniana
PB25, 71

Sterculia vitiensis
GB157 ; PCV1635 ;
PaCu1454 ; SLGNH115 ;
CSV994 ; JWV782

Syzygium clusiifolium
PCV1128 ; PaCu1275, 1290,
1396, 1459 ; AG3543 ;
CSV969 ; DSW114 ;
JWV608

Syzygium malaccense
CSV428, 431, 432, 436, 444,
464, 480, 520, 523, 590, 591,
597, 703, 707, 819, 820, 909,
966, 982

Syzygium cf. nutans
CSV438, 1029

Syzygium richii
PCV2277, 2599 ;
PaCu1461 ; SLGNH156 ;
RSNH1216 ; CSV87, 881 ;
SS42 ; JWV611

Syzygium samarangense
JWV620 ; PG & JWV114

Syzygium sp.
CSV494, 566



Terminalia samoensis

PCV2209 ; PaCu1420 ;
CSV488, 531, 539, 836

Terminalia sepicana

GB421, 843 ; PCV1785 ;
CSV248, 911, 932, 946,
1014 ; DSW216 ; JWV405,
489, 791

Terminalia catappa

AM003 ; CSV423, 445, 446,
466, 486, 487, 489, 493, 499,
518, 532, 533, 535, 536, 569,
576, 607, 608, 609, 610, 627,
637, 642, 659, 677, 678, 694,
695, 698, 757, 780, 783, 795,
796, 811, 868, 968, 979, 999,
1013, 1017




Ximения americana

PaCu1448

**Names of
collectors**

PB Pascale Bonnemère
GB Geneviève Bourdy
PCV Pierre Cabalion
PaCu Patricia Curry
IG Igor de Garinne
SLGNH Sheila Gowers
AG A. Guillaumin
AM Alfreda Mabonlala
RMV Roger Malapa
PhM Philippe Morat
RSNH Royal Society
Expedition
CSV Chanel Sam
SS Siri Seoule
DSW D.S. Walsh
AW Annie Walter
JWV Joss Wheatley






Index of Species Distribution Maps

<i>Adenanthera pavonina</i>	p. 85
<i>Aleurites moluccana</i>	p. 88
<i>Artocarpus altilis</i>	p. 109
<i>Barringtonia edulis</i>	p. 112
<i>Barringtonia novae-hiberniae</i>	p. 115
<i>Barringtonia procera</i>	p. 119
<i>Burckella fijiensis</i>	p. 121
<i>Burckella obovata</i>	p. 125
<i>Canarium harveyi</i>	p. 130
<i>Canarium indicum</i>	p. 133
<i>Castanopsis acuminatissima</i>	p. 137
<i>Cordia subcordata</i>	p. 150
<i>Corynocarpus similis</i>	p. 153
<i>Dracontomelon vitiense</i>	p. 157
<i>Ficus granatum</i>	p. 164
<i>Ficus scabra</i>	p. 166
<i>Ficus wassa</i>	p. 168
<i>Finschia chloroxantha</i>	p. 172
<i>Flacourtia rukam</i>	p. 174
<i>Garcinia pseudoguttifera</i>	p. 177
<i>Gnetum costatum</i>	p. 179
<i>Gnetum gnemon</i>	p. 181
<i>Inocarpus fagifer</i>	p. 184
<i>Maesa ambrymensis</i>	p. 203
<i>Morinda citrifolia</i>	p. 205
<i>Neisosperma oppositifolium</i>	p. 209
<i>Pandanus conoideus</i>	p. 211


<i>Pandanus dubius</i>	p. 213
<i>Pandanus julianettii</i>	p. 215
<i>Pandanus tectorius</i>	p. 217
<i>Pangium edule</i>	p. 220
<i>Pipturus argenteus</i>	p. 223
<i>Pittosporum pullifolium</i>	p. 224
<i>Planchonella grayana</i>	p. 227
<i>Pometia pinnata</i>	p. 229
<i>Pouteria maclayana</i>	p. 233
<i>Spondias cytherea</i>	p. 245
<i>Sterculia vitiensis</i>	p. 248
<i>Syzygium malaccense</i>	p. 251
<i>Terminalia catappa</i>	p. 256
<i>Terminalia kaernbachii</i>	p. 260





Index of Botanical Illustrations

<i>Adenanthera pavonina</i>	p. 84
<i>Artocarpus altilis</i> : type with round fruits.....	p. 108
<i>Artocarpus altilis</i> : type with ovoid fruits.....	p. 108
<i>Barringtonia edulis</i>	p. 111
<i>Barringtonia novae-hiberniae</i>	p. 114
<i>Barringtonia procera</i>	p. 117
<i>Burckella fijiensis</i>	p. 121
Seeds of <i>Burckella fijiensis</i>	p. 121
<i>Burckella obovata</i> : type with round, crenate fruits.....	p. 124
<i>Burckella obovata</i> : type with round, non-crenate fruits.....	p. 124
<i>Burckella obovata</i> : type with elongate fruits.....	p. 124
<i>Burckella</i> sp.	p. 127
Seeds of <i>Burckella</i> sp.....	p. 127
<i>Canarium harveyi</i>	p. 130
<i>Canarium indicum</i>	p. 133
<i>Corynocarpus similis</i>	p. 152
<i>Dracontomelon vitiense</i>	p. 157
<i>Ficus granatum</i>	p. 163
<i>Inocarpus fagifer</i>	p. 184
<i>Morinda citrifolia</i>	p. 205
<i>Neisosperma oppositifolium</i>	p. 209
<i>Pangium edule</i>	p. 221
<i>Pipturus argenteus</i>	p. 222
<i>Pometia pinnata</i>	p. 229
<i>Pouteria maclayana</i>	p. 233
<i>Spondias cytherea</i>	p. 244
<i>Syzygium malaccense</i>	p. 252
<i>Terminalia catappa</i>	p. 256
<i>Terminalia samoensis</i>	p. 257



Index of Photographic Plates

- First group of photos*(pp 57-64)
- Chief Joseph Vira (Malo, Vanuatu).....p.57
- Mela Ruigi (Erromango, Vanuatu).p.57
- Jenny Vira (Malo, Vanuatu).p.57
- Enock Saro (standing on left) and the
informants of Maewo (Vanuatu).p.57
- Chanel Sam, curator of the Herbarium
in Port Vila.p.57
- Nangai nuts (Canarium) are broken
one at a time between two stones.p.58
- They may then be grated to obtain
a powder that is sprinkled on lap-lap.p.58
- Arthur Kalokul (left) and Richard (right)
(Efate, Vanuatu)p.59
- Ekimani Taufu (Tonga).....p.59
- William (Ankave, Papua New Guinea).....p.59
- Assorted food dishes.p.60
- In Solomon Islands and in Vanuatu,
Canarium nuts are dried and packed
in sachets (Solomons) or jars (Vanuatu),
then sold in local cash stores.p.60
- Children eating Canarium nuts on
the island of Vava'u (Tonga).p.60
- On the island of Boisa (Papua New Guinea),
galip nuts (Canarium) are broken open in
large numbers before being taken to the
mainland to be exchanged for sago.....p.61
- Assorted nuts. Port Vila Market.p.61
- Among the forest-dwelling Ankave,
the sauce of red pandanus (*Pandanus
conoideus*) is collected in a *Heliconia* leaf
and then poured over pieces of root crop,
usually during communal meals.....p.62
- Skewers of fresh cut nuts (*Barringtonia*)
and of Tahitian chestnuts (*Incarpus*)p.62

In Gaua (Vanuatu), nangai nuts are dried in their shells and kept in special baskets for years.....	p.63
Child breaking open sea almonds (Terminalia catappa) between two stones, Milne Bay (Papua New Guinea).	p.64
In coastal regions, the sauce of red pandanus is prepared in a metal cooking pot and then spread over the root crops with the help of a spoon or ladle.....	p.64
 <i>Second group of photos(pp 91-106)</i>	
Candlenuts for sale in a market in Tonga. Oil is extracted from these nuts.	p.91
Candlenuts (Aleurites moluccana).....	p.91
Coral pea (Adenanthera pavonina).	p.91
Wild form of breadfruit (Artocarpus altilis) from Papua New Guinea (Ankave).....	p.92
Cultivars from Vanua-Lava (Vanuatu): fruits and detail of the epidermis.....	p.92, 93
Breadfruits for sale in the market in Apia (variety ulu aveloloa).	p.92
Cut nut with red foliage, typical of Vanuatu (Barringtonia edulis).....	p.94
Inflorescence of Barringtonia edulis. Note how the calyx splits into several lobes.....	p.95
Barringtonia edulis, magnified views of nut: end-on, detail of groove, lateral view.	p.95
Barringtonia edulis. Fruit red and elongate, with a red endocarp.....	p.96
Barringtonia edulis. Green fruit, elongate with a red endocarp.....	p.96
Wild Barringtonia edulis from Fiji.	p.97
Barringtonia edulis. Very elongate fruits from Maewo.....	p.97
Barringtonia edulis. Form found in Tanna.....	p.97
Barringtonia novae-hiberniae. Note the round shape of the fruit, typical of Vanuatu, and the long petiole of the leaves.	p.98

Different types of <i>Barringtonia novae- hiberniae</i> fruit observed on Lamén Island (Vanuatu). Note the ring-shaped calyx of the fruits.	p.98
<i>Barringtonia novae-hiberniae</i> , magnified views of nut: end-on, detail of groove, lateral view.	p.99
Fruits and inflorescence of <i>B. novae- hiberniae</i> showing the large apical pore of the flower buds.	p.99
<i>Barringtonia edulis</i> . Round fruits, resembling those of <i>B. novae-hiberniae</i>	p.100
Infrutescence of <i>Barringtonia procera</i> (in the absence of leaves and flower buds, it can be confused with that of <i>B. edulis</i>).	p.100
<i>Barringtonia novae-hiberniae</i> . Fruits of very small size observed on Lamén Island (Vanuatu).	p.101
Edible cut nuts of Vanuatu, not identified and growing spontaneously, very close to <i>B. novae-hiberniae</i> from Solomon Islands.	p.101
<i>Barringtonia procera</i> , magnified views of nut: end-on, detail of groove, lateral view.	p.101
<i>Barringtonia procera</i> : cylindrical red fruits with white endocarp.	p.102
<i>Barringtonia procera</i> : cylindrical red fruits with red endocarp.	p.103
<i>Barringtonia procera</i> : pear-shaped green fruits with red endocarp.	p.103
Bundles of smoked cut nuts (<i>Barringtonia</i>) are hung under the eaves of houses where they keep for several months.	p.104
Fruit of <i>Burckella fijiensis</i>	p.104
<i>Burckella</i> fruit of elongate shape.	p.105
<i>Burckella</i> fruit (<i>Burckella obovata</i>) round in shape and smooth-skinned, cultivated and quite rare.	p.105
Fruits of <i>Burckella</i> sp. (<i>Cassidispermum megahilum</i>).	p.106
<i>Burckella richii</i> . Found at Mataika, Vava'u, Tonga.	p.106



Third group of photos.....(pp 141-148)

- Stipule of *Canarium harveyi*: ear-shaped, it is situated near the base of the petiole....p.141
- Fruits of *Canarium harveyi*.....p.141
- Nuts of *Canarium harveyi* smoked and kept in special baskets (Gaua: Vanuatu).....p.142
- Fruit of *Canarium harveyi* in transverse section.p.142
- Canarium indicum* of ovoid shape with two kernels.p.143
- Canarium indicum* with a yellow epidermis, found on Emae (Vanuatu).p.143
- Stipule of *Canarium indicum* situated at the junction of the petiole and the branch.....p.143
- Citrus macroptera.....p.144
- Sea trumpet (*Cordia subcordata*).p.144
- Bundles of dragon plums (*Dracontomelon vitiense*) for sale in the market of Luganville (Vanuatu).p.145
- Dragon plums cut across to show the nutp.145
- Bunches of dragon plums.p.145
- Wild figs of Vanuatu (*Ficus granatum*).....p.146
- Wild figs (*Ficus aspera*).....p.146
- Elaeocarpus* sp., the flesh of which is eaten (Santo, Vanuatu).....p.147
- Wild figs of Oceania (*Ficus scabra*).....p.147
- Ficus virgata*.....p.148
- Wild figs of Melanesia (*Ficus wassa*).p.148

Fourth group of photos(pp 187-202)

- Indian plum (*Flacourtia rukam*).....p.187
- Finschia chloroxantha*: fruits and inflorescence.p.187
- Infrutescence of *Gnetum gnemon*.....p.187
- Different forms of Tahitian chestnuts found in Vanua-Lava (Vanuatu).....p.188

Detail of above.....	p.188
Collection of Tahitian chestnuts in western Samoa.....	p.189
Tahitian chestnuts in Samoa.....	p.189
Indian mulberry (<i>Morinda citrifolia</i>) cultivated on Malo (Vanuatu).....	p.190
<i>Neisosperma oppositifolium</i>	p.190
Wild Indian mulberry tree in Vanuatu.....	p.191
Red pandanus: cooking in bamboos.....	p.192
Infrutescence of red pandanus.....	p.193
Long pieces of the fruits of red pandanus (<i>Pandanus conoideus</i>) are cooked on heated stones (cooking in a hot stone oven) with leafy vegetables.....	p.193
Infrutescence of pandanus (<i>Pandanus dubius</i>).....	p.194
Fruit of <i>Pandanus dubius</i> opened up to show the edible seed.....	p.194
Orchard of Highland pandanus (<i>Pandanus julianettii</i>).....	p.195
Highland pandanus (<i>Pandanus julianettii</i>):	
Picking of the infrutescences.....	p.196
Transport of the infrutescences, passing by a garden of sweet potatoes.....	p.196
The fruits are baked in an oven of hot stones.....	p.197
The nuts are extracted from the cooked fruits and cut into pieces.....	p.197
Pandanus <i>tectorius</i> in a coastal village of Papua New Guinea (Umboi Island).....	p.198
Infrutescence of <i>Pandanus tectorius</i>	p.198
Mats woven from pandanus (<i>Pentecost</i> , Vanuatu):	
Large mat (<i>sese</i>).....	p.199
Small mat (<i>tsip</i>).....	p.199
In New Guinea the Ankave tip the seeds of <i>Pangium edule</i> into a wooden device tightly lined with leaves, which they immerse in stagnant water. This maceration lasts for three or four weeks.....	p.200

Seeds of <i>Pangium edule</i> in their shells. Papua New Guinea (southern coast of West New Britain).	p.200
<i>Pangium edule</i>	p.201
After maceration, the sauce obtained is stored in long internodes of bamboo, then distributed according to strictly defined rules over portions of root crops during communal meals.....	p.202
 <i>Fifth group of photos</i> (pp 235-242)	
<i>Planchonella grayana</i>	p.235
Taun tree (<i>Pometia pinnata</i>) from Tanna (Vanuatu).	p.235
Different types of golden apple (<i>Spondias cytherea</i>) from Wala-Rano (Malekula, Vanuatu).....	p.236
Cut fruit and endocarp of a wild fruit from the forest (vikar, from Santo, Vanuatu).....	p.236
Cut fruit and endocarp of a cultivated fruit.....	p.236
<i>Sterculia vitiensis</i>	p.237
<i>Pouteria maclayana</i>	p.237
Malay apples. The white fruits here have not yet reached maturity.	p.238
The two types of inflorescence, white and red, of the Malay apple.....	p.238
Type of Malay apple (<i>Syzygium malaccense</i>) with white fruits.	p.238
Edible <i>Syzygium</i> sp. from Vanuatu.	p.239
<i>Syzygium richii</i>	p.239
Cultivated sea almonds from Papua New Guinea (Normanby Island).	p.240
Children breaking open sea almonds, <i>Terminalia catappa</i> (Milne Bay).	p.241
Infructescence of sea almond.	p.241
<i>Terminalia sepicana</i>	p.242
<i>Parartocarpus venenosus</i>	p.242
<i>Terminalia samoensis</i>	p.242



Annie Walter, medical doctor and ethnobotanist with IRD (formerly ORSTOM), and **Chanel Sam**, curator of the Herbarium in Port Vila (Vanuatu), worked together to study the food plants of Vanuatu, in particular the fruiting trees.

Oceania, a vast ocean area dotted with tiny islands, is home to a large number of fruiting trees, which are symbols of the legendary life of paradise and plenty in the region. Species grow there that are not well known outside Oceania, but which provide the island communities with varied and tasty foods. Eaten for thousands of years in that region of the world, they are nowadays making their appearance in the international marketplace.

From Melanesia to Polynesia women and men, heirs to an ancient knowledge and experts on their own flora, were questioned and were listened to. This work, which covers about fifty of the commoner fruiting species, is based upon the knowledge and teaching of these people. Richly illustrated with photographic plates, botanical drawings and distribution maps, it provides a comprehensive guide to these foods.

Each species is the subject of an individual dossier of assorted information: Latin name, common names, botanical description, ecology and exploitation, alimentary usages, other uses, etc.

To peruse this manual, discovering the tropical nuts and fruits, is like travelling from island to island, from the Highlands of New Guinea to the Polynesian shores, along the way becoming acquainted with the Oceanian way of life.

Key Words

Fruits - Océania - Tropical forest - Ethnobotany - Alimentation

ISBN 1 86320 331 1