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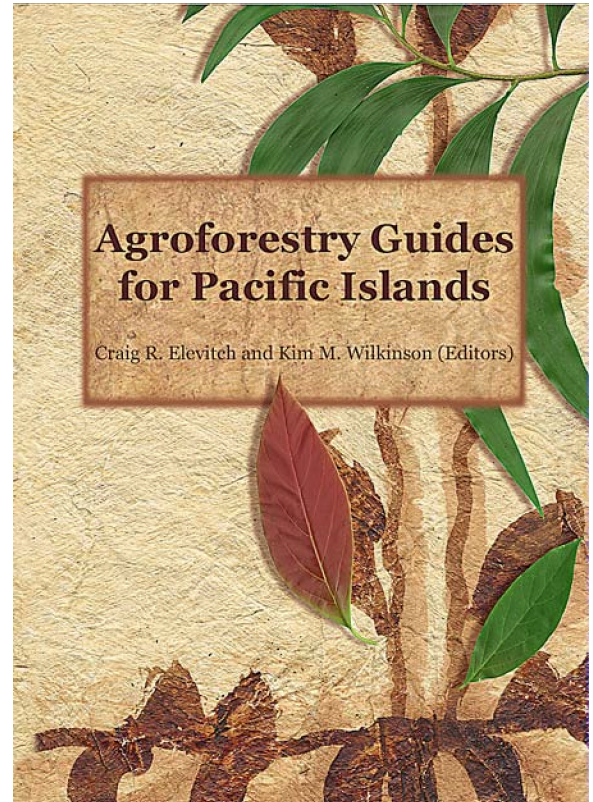
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Multipurpose Trees for Agroforestry in the Pacific Islands

by Randolph R. Thaman, Craig R. Elevitch, and Kim M. Wilkinson



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Abstract: The protection and planting of trees in agroforestry systems can serve as an important, locally achievable, and cost-effective step in sustainable development in the Pacific Islands. Traditional agroforestry practices once made Pacific Islanders among the most self-sufficient and well-nourished peoples in the world. Time-tested, locally available species are the most effective foundation for future agroforestry development. This guide introduces some traditional Pacific Island agroforestry systems and principles, and examines important multipurpose trees used in the region.

Keywords: agroforestry, agrodeforestation, diversity, ethnobotany, indigenous knowledge, multipurpose, Pacific Islands, sustainable, trees

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Authors: Randolph R. Thaman, Craig R. Elevitch and Kim M. Wilkinson, **Illustrator:** Christi A. Sobel

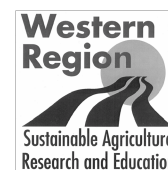
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Introduction

This guide provides an introduction to Pacific Island agroforestry for extension agents and growers. Species and systems that are time-tested and successful in the Pacific Island region are examined as a foundation for future development.

Several lists and tables are included in appendices, providing details for 130 multipurpose trees that are important components of existing agroforestry systems throughout the Pacific Islands.

Pacific Island Trees and Their Importance

Traditional Pacific Island agricultural and land use systems were built on a foundation of protecting and planting trees.

Trees are essential to the life support systems for humans, plants, and animals. Trees protect the land from erosion, and homes, farms and coastlines from strong winds and waves. They make soils fertile and keep streams, lagoons, and coral reefs clean and clear. Trees also provide food and countless other products for humans, animals, and plants. Most of these products and services are impossible to replace or purchase. Table 1 presents some of the benefits and of trees.

Table 1. Some ecological and cultural functions and uses of trees in the Pacific islands

Ecological		
Shade	Soil Improvement	Animal/Plant Habitats
Erosion Control	Frost Protection	Flood/Runoff Control
Wind Protection	Air Purification	Weed/Disease Control
Water Pollution Control	Wild Animal Food	Marine Animal Food
Cultural/Economic		
Timber (commercial)	Cages/Roosts	Prop or Nurse Plants
Timber (subsistence)	Parcelization/Wrapping	Staple foods
Fuel wood	Abrasives	Supplementary Foods
Illumination/Torches	Fertility Control	Emergency Foods
Rubber	Insulation	Wild Foods
Tools	Decoration	Preservatives
Weapons Hunting	Body Ornamentation	Oils
Containers	Cordage/Lashing	Beverages
Woodcarving	Glues/Adhesives	Insect Repellents
Handicrafts	Caulking	Scents/Perfumes
Fishing Equipment	Fiber/Fabric	Deodorants
Weaving/Plaiting	Commercial Products	Dyes
Toys	Export Products	Medicines
Musical Instruments	Ritual Exchange	Poisons
Tannin	Secret Meeting Sites	Recreation

Adapted from Thaman and Clarke 1987

Because of the importance of trees, Pacific Island peoples have always planted and protected trees as a part of their multi-species agroforestry and land use systems. They have also always been willing to accept new trees that can improve their lives and their island environments.

Challenges of the 21st Century

As we enter the 21st Century, modern development has led to a net loss of trees in agricultural systems throughout the Pacific Islands. This process has been referred to as agrodeforestation.

There is an urgent need for the protection and planting of trees as integral parts of agricultural systems. For the Pacific Islands, appropriate agroforestry development can play a key role in reversing the trends of deforestation, forest degradation, and agrodeforestation.

The emphasis on the protection, as well as the planting, of these species and agroforestry systems is of utmost importance. Experience has shown that it is far more difficult to replace forests, agroforests, trees, and rare cultivars (cultivated varieties) of trees than it is to protect what already exists.

It is stressed that agroforestry development should not be imposed from outside the Pacific Islands on the basis of exotic species. Rather, it should be multi-species agroforestry (MSA) based firmly on the many time-tested agroforestry species that already exist in the Pacific Islands, strengthened, where appropriate, with some new introduced trees and technologies. The protection and planting of these and other appropriate trees could serve as an important, locally achievable, and cost-effective first step in promoting sustainable development in the rapidly modernizing island countries of the tropical Pacific.

Definition of Agroforestry

The main objectives of agroforestry activities are to plant and protect trees and forests, and to ensure the continued provision of the services and economic products they provide. Although there are numerous definitions of agroforestry, one that reflects the nature of existing Pacific Island agroforestry systems is:

Agroforestry is the deliberate planting and protection of trees and forests in and around agricultural systems in both rural and urban areas, in order to improve or maintain the short-term and long-term economic productivity, cultural utility, and ecological stability of agricultural systems (adapted from Thaman and Clarke 1993a).

Phases in Traditional Pacific Island Agroforestry Systems

Thousands of years of observation, study, and experimentation by Pacific Island peoples produced a diversity of highly sophisticated multi-species agroforestry systems. A large body of traditional knowledge relating to these systems was also developed. The term “traditional,” rather than “indigenous,” is used to stress that Pacific agroforestry systems have also been developed by nonindigenous peoples who have acquired valuable agroforestry knowledge and skills through hands-on experience living in the Pacific Island environment.

The evolution of these traditional systems has taken place over a number of relatively distinct periods of growth or change. These include:

- agriculturalization of the forest
- indigenous agroforestry enrichment and deforestation
- colonial agroforestry enrichment and agrodeforestation
- post-World War II agroforestry enrichment and accelerated agrodeforestation
- 21st Century agroforestry re-enrichment.

Table 2. Periods of the growth or change in Pacific Island agroforestry systems since the first colonization of the islands by indigenous Pacific Islanders.

Period	Time Frame
Agriculturalization of the Forest	40,000 – 1000 B.P.
Indigenous Agroforestry Enrichment and deforestation	40,000 – 1,000 B.P.*
Colonial Agroforestry Enrichment and Agrodeforestation	1600 A.D. – late 20th Century**
Post-World War II Agroforestry Enrichment late and Accelerated Agrodeforestation	1940s - present
21st Century Agroforestry Re-enrichment and 2000 A.D. onwards	Multi-species Agroforestry Development
Notes: B.P. = years before present; * indicates that, because different island groups were settled at different times, this period began at different times in different island groups; ** the colonial period varies in length, and continues in some cases, for different Pacific Island nations and territories	

Agriculturalization of the Forest

With the first human settlement of the Pacific Islands, there began the selective modification of natural forests. This period commenced in Papua New Guinea, and probably Solomon Islands, some 40,000 years ago, just under 4,000 years ago in Eastern Melanesia, Western Polynesia and Western Micronesia, and as recently as 1,000 years ago or less in parts Eastern Polynesia and Eastern Micronesia. These first settlers selectively cleared, protected, and used different species from their inland and coastal forests. They also deliberately or accidentally introduced a range of plant and animal species.

During this period of low population densities, coastal and inland forests were cleared for settlements and cropping. Trees and other plants were used for construction, boat building, firewood, medicine, and other purposes. The use of fire for agricultural clearance, hunting, and recreation led to some deforestation and the expansion of grasslands and scrublands.

Indigenous Agroforestry Enrichment and Deforestation

After the first settlements were well-established, there was a period of indigenous agroforestry enrichment and deforestation. This period lasted for tens of thousands of years in Papua New Guinea, and from about eight hundred to over three thousand years for most of the islands of Melanesia, Polynesia and Micronesia. During this era, successive waves of new Pacific Islanders voyaging to the islands, settlement of new islands by existing islanders, and inter-island trade between islands occurred. This led to the introduction of new trees, plants, and animals and the continued enrichment of existing agroforestry systems by the Pacific Island inhabitants. Addition, rather than elimination, of species and cultivars took place. Existing multi-species systems were enriched, rather than eroded.



Figure 1. Indigenous Pacific Island agroforestry system depicting breadfruit, coconut, banana, *Cananga odorata*, *Inocarpus fagifer*, *Hibiscus tiliaceus* with: taro, sweet potatoes, yams (*Dioscorea spp.*), and kava.

Growing population also brought increasing deforestation and forest degradation, the spread of treeless grasslands, and increasing environmental degradation. These losses occurred from the highlands of New Guinea to Hawaii and Easter Island in Eastern Polynesia. There was also the extinction of birds, insects, and other plants and animals that depended on trees and forests as habitats and sources of food. Agricultural intensification began to take place. Extensive multi-species (polycultural) agricultural systems were replaced by more intensive single-species (monocultural) production of crops such as *Colocasia* taro and sweet potato. However, the planting and protection of a wide range of useful multipurpose trees remained an integral component of these systems.

Colonial Agroforestry Enrichment and Agrodeforestation

For most of the past 200 years, colonial governments actively promoted small- and large-scale monocultural export cropping and livestock grazing. Particularly in the 20th Century until the end of World War II, there was very little emphasis on the promotion or the maintenance of existing MSA systems.

Major export crops included coconut, cocoa, sugarcane, coffee, bananas, and pineapple. Citrus trees, tea, passion fruit, black pepper, oil palm, rubber, and a range of vegetables and fruits were also grown as minor export crops in some areas. Livestock schemes, mainly involving beef cattle, were widely promoted during the colonial era.

On one hand, the introduction of these new crops and animals enriched existing indigenous Pacific Island agroforestry systems, particularly indigenous smallholder farms. However, the drive to encourage a narrow range of cash crops and livestock grazing, plus the development of colonial towns, led to accelerated clearance of forest lands, and the destruction of valuable trees in and around existing agricultural lands (i.e., agrodeforestation). Because export crops

commonly occupied the best agricultural lands nearest settlements, food gardens (often gardens tended by women) were pushed farther from settlements and onto increasingly marginal lands.

During this period, most Pacific Island agroforesters were able to selectively adopt plants, animals, and technologies that they saw as beneficial. Adopted species included tropical American crops, such as cassava, pineapple, and avocado, as well as other post-European contact introductions from Asia, such as eggplant, onions, mango, and tamarind. These species were integrated into and enriched existing systems, rather than replacing traditional crops and trees. Even cattle, horses, and goats were integrated into many smallholder systems with limited disruption.

At the same time, some crops or cultivars and wild or cultivated trees lost importance relative to the new cash crops and pastures, and began to disappear from the Pacific Island agricultural landscape.

Post-World War II Agroforestry Enrichment and Accelerated Agrodeforestation

World War II brought the Pacific Islands into greater contact with the outside world. Links were also strengthened with main islands, capital cities, and overseas metropolitan areas. This led to increasing desire for consumer goods and cash incomes, and increasing access to markets. Pressures to plant cash crops and to promote monocultural plantation agriculture and forestry intensified.

Agricultural departments almost exclusively promoted export cropping, at the expense of the traditional systems. There was an expansion of monocultures of export crops such as coffee, sugarcane, coconut palms, bananas, and pineapple. Forestry departments promoted the unsustainable felling of indigenous timber trees for export and local milling, or the planting of exotic plantation forests.

Monocultures replaced coastal and inland forests and trees and food crops in many countries. In some cases (including Fiji, Tonga, the Cook Islands, Hawaii, and Kiribati), traditional agroforestry practices were actively discouraged while export cropping was encouraged. As a result, traditional agroforestry-based food systems have deteriorated. Urbanized Pacific Island populations now have some of the highest rates of nutritional disorders and nutrition-related noncommunicable diseases in the world.



Figure 2. Post-colonial/plantation agroforestry showing coconut with understory of coffee, kava, taro, pineapple, and cassava.

Formal schooling in agriculture and forestry ignored the traditional agroforestry systems and the importance of multipurpose trees. As a result, as the older people passed away, there occurred a widespread loss of traditional agroforestry knowledge among the younger generations.

21st Century MSA

The active promotion of MSA into the 21st Century may be the most economically, culturally, and ecologically effective means of addressing the serious trends of deforestation and agrodeforestation. This would be in contrast to the monocultural models now often promoted (Clarke and Thaman 1993). Instead, new sources of cash income, new technologies, and new crops and trees would add to, rather than replace, degrade or destroy the trees and forests that already exist in agricultural areas. The emphasis of MSA is to ensure that additions or improvements maximize the existing plant resources and agroforestry practices as a foundation for sustainable development, while at the same time minimizing the loss of the existing trees and agroforestry resources and knowledge.



Figure 3. Modern/urban agroforest home garden. Upper story: mango, breadfruit. Middle story: banana, citrus, papaya, avocado. Lower story/edge: taro, cassava, Pacific spinach, sugarcane, pineapple, chili pepper, tomato.

Agroforestry Development: Seven Principles Of Traditional Pacific Island Agroforestry Systems

Creating agroforestry systems in the 21st century requires an appreciation of the success of these systems, and the ability to expand on their success for productive plantings to meet modern needs. Traditional Pacific Island MSA systems rested on seven principles that made their continuous operation possible over centuries or millennia. As stressed by Clarke (1977), the systems:

- Did not depend on external energy subsidies or extra-system nutrient sources—i.e., no imported fuel, fertilizers, or other imports were required;
- Did not receive applications of poisonous agricultural chemicals or other pollutants;
- Had strongly positive net energy yields—i.e., for every joule of energy invested, 18-20 joules of food energy were returned;
- Used only renewable resources as inputs—e.g., trees for fencing, ash as

fertilizer—rather than imported, often nonrenewable, inputs such as inorganic fertilizers derived from phosphate deposits or fossil fuels that took millions of years to form;

- Were structured so that the resources supporting agriculture (energy, land, vegetation) were equitably spread throughout the community rather than being concentrated in the hands of a few or in urban areas;
- Contained resources that were looked upon as productive capital to be preserved—i.e., attempts were made to preserve for future generations a habitat and set of resources only slightly modified from what parents had themselves inherited; and
- Were based on a diversity of tree and nontree crops, wild plants, and animals rather than on monocultures or specialized animal production.

Multipurpose Trees: Definition and Examples

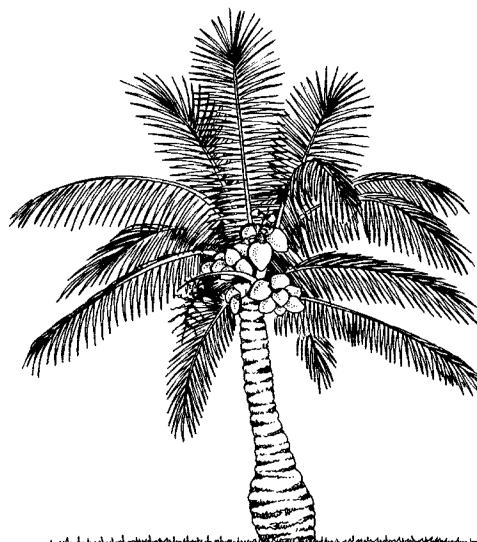
While all trees can be said to serve several purposes, such as shade, soil protection, and wildlife habitat, some trees are especially valued for their many uses and products. Such trees are called multipurpose trees. Pacific Island peoples discovered many ways to make efficient use of the different parts of useful trees. They also learned to value the many ecological functions of trees and the services they provide. Multipurpose trees are favored in traditional agroforestry systems because of their ability to provide many different products, improve the overall yields on a single piece of land, increase economic security (by providing a continuous supply of both cash and subsistence products), and improve agricultural sustainability due to the relatively permanent nature of trees.

Examples of Three Pacific Island Multipurpose Trees

To illustrate the concept of multipurpose trees, brief examples of the uses and products from three Pacific Island agroforestry trees are provided. Greater detail for these trees and other important multipurpose trees is included in the tables below.

Coconut Palm (*Cocos nucifera*)

The flesh from the mature brown nut is a major staple food and animal food. It is also dried and made into copra, which is an important export product from most island countries. Juice from inside the immature green nut is an important drink and source of safe drinking water on dry islands and in times of drought. The sap from the flower stalk is used to make fresh and fermented toddy. The fresh toddy is an important nutritious beverage on atolls and the fermented toddy is a locally available alcoholic beverage. The timber is used for many purposes. The trunk, fronds, shells, and husks are a major source of fuel. The roots are used for making fish traps, and the husk fiber is used to make sennit (cord) used for lashing canoes and houses and for other purposes. The shell is used to make drinking cups, contain-

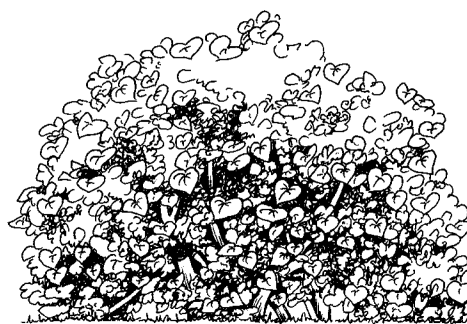


Coconut (*Cocos nucifera*)

ers, fishhooks, charcoal, and other useful items. The leaves and fronds are used for weaving baskets, hats, fans, floor mats, food containers, roofing for thatched houses, and for shade and mulching in taro gardens. The midribs of leaflets are used in brooms, as toothpicks, and for other purposes. The sheath of flower stalk is used as a torch. Almost all parts of the coconut palm are used medicinally. The tree also features in many Pacific Islands legends, and is a religious plant of spiritual and ritual importance in many areas. As a result of its many uses, the coconut palm is known as the Pacific Islands' "tree of life."

Beach Hibiscus, Hau (*Hibiscus tiliaceus*)

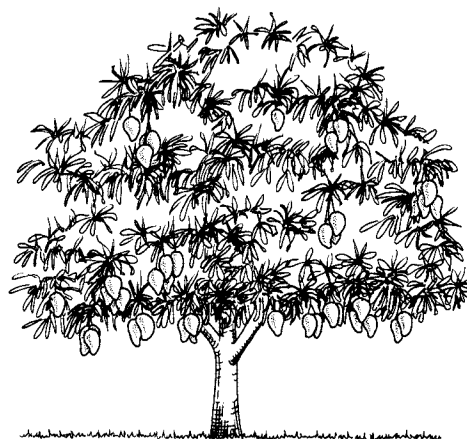
The beach hibiscus is planted as living fencing and as a windbreak. The timber and branches are used in light construction and in boat building, for making tools and as an important source of firewood. The inner bark is processed and used as fiber in dancing skirts and other handicrafts, for stringing fish, leis, and garlands, and for straining kava and coconut cream. The leaves are used as mulch and fertilizer, for wrapping food, particularly seafood, and for lining and covering the earthen oven. The leaves are also used medicinally to treat broken bones, torn ligaments, and sprains.



Beach hibiscus (*Hibiscus tiliaceus*)

Mango (*Mangifera indica*)

The mango is planted as a windbreak and ornamental street tree. The wood is used in construction and for firewood. The leaves are used to flavor foods in earthen oven cooking, and the leaves and bark are used medicinally. The ripe fruit is eaten raw and used to make jam, chutneys, and deserts, and sold locally as a major source of income. The juice, puree, and ripe and green fruit are exported from some countries. The green fruit is used to make pickles or *achar* by Indians in Fiji. The mango is also an important Hindu religious plant, and its leaves are used in Indian religious ceremonies.



Mango (*Mangifera indica*)

Pacific Island Examples of Agroforestry Systems

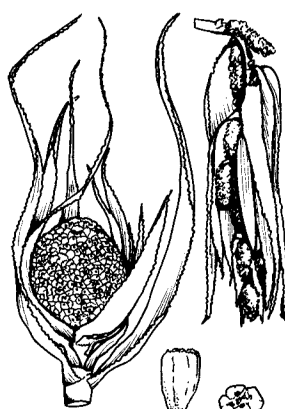
Traditional Pacific Island agroforests were developed and managed to meet not only people's needs for food and other products, but also the needs of the system as a whole for fertilizer, mulch, animal food, shade. The trees in the system also provide protection from erosion, wind, and salt spray. In other words, an agroforest is not a mere mixed planting of species and cultivars. The plants are assem-

bled in a system where the trees, other plants, animals (both vertebrates and invertebrates), and people form beneficial connections to support the system as a whole. In this way, replanting and re-enrichment of MSA development involves more than simply planting and protecting different kinds of species. It involves creating connections between these species and the environment to form a sustainable agricultural system that will continue to provide many different products and services for many years.

Examples from traditional Pacific Island MSA include:

Kiribati Atoll Agroforestry Example

Coconut palms, usually of a number of different varieties, are planted as a major cash and multipurpose crop. Sometimes they are planted in rows and sometimes allowed to grow in irregular patterns. Other multipurpose trees, such as pandanus, *Guetarda speciosa*, *Tournefortia argentea*, and the shrub *Sida fallax* (*te kaura* in Kiribati or *ilima* in Hawaii) are protected or planted to provide soil improvement and leaves or mulch (fertilizer) for the swamp taro (*Cyrtosperma chamissonis*) pits that have been excavated down to the water table. The pandanus is also a very important staple food plant on the atolls, as well as being the source of timber for house building, thatch, fibre for mat and basket making, medicines, and many other products. Because of the many uses that the people of Kiribati have for the pandanus tree, they have been referred to as the “Pandanus People.”



Pandanus species

Breadfruit, papaya, native fig (*Ficus tinctoria*), and sometimes bananas and taro (*Colocasia esculenta*) are also planted in or around pits. The coastal forest on both the ocean and lagoon sides of the garden area, and the mangroves on the lagoon side, are protected to shelter the inland from salt spray, high waves, extremely high tides, and from coastal erosion. The protection of these forests and other trees also ensures that wood, medicine, and many other products are available. This practice also ensures the continued availability the fish, shellfish, crabs, birds, and other animals and small plants that depend on these forests and trees will be protected for future generations.

Tongan Agroforestry Example

In Tonga the multispecies agroforestry system is a very complex mixture of trees, shrubs, and short-term ground crops. It is usually practiced as a short-term shifting agriculture system on pieces of land averaging 8 acres (3.2 hectares) or less in size. When the land is prepared for a new garden, some of the fast-growing pioneer tree species, most shrubs, and grasses are cut and allowed to dry. The dried material is placed in piles for burning. Other valuable trees that are present in the fallow, such as breadfruit, mangoes, avocado, citrus trees, Malay apple (*Syzygium malaccense*), Polynesian plum (*Spondias dulcis*), perfume tree or ylang-ylang (*Cananga odorata*), and, of course, coconut palms, are protected or, in some cases, slightly pruned to allow the sunlight to enter the garden area. Other culturally important trees, like koka



Breadfruit
(*Artocarpus altilis*)

(*Bischofia javanica*), Pacific litchi (*Pometia pinnata*), mauulu (*Glochidion ramiflorum*), and toi (*Alphitonia zizyphoides*) are then pruned or, in some cases, cut back severely by cutting almost all of the branches off. This practice does not kill the tree, and accomplishes a number of objectives. It allows the entry of sunlight needed by the first crop to be planted, which is usually yams (*Dioscorea alata*). It also allows the leaves to fall providing organic material to the soil, and allows for fresh new branches to grow as the garden matures. The larger branches that have been cut from the trees are used as trellises (*felei*) over each yam mound. Yams climbing off the hot volcanic soils on these trellises have higher yields, are more disease free, and are more easily weeded.

Because Tonga has frequent tropical cyclones, the lower *felei* trellises are much more appropriate than higher trellises on poles used elsewhere. Finally, when the yams are harvested, after 7 to 9 months, the branches make perfect firewood for the underground oven.



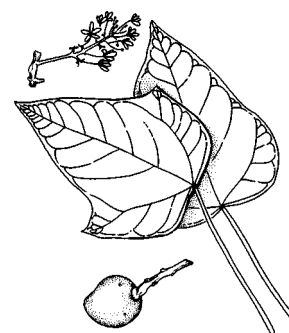
Ti (*Cordyline terminalis*)

In the garden, the yams are usually intercropped with rows of giant taro (*Alocasia macrorrhiza*), plantains (*Musa* cultivars), and taro (*Colocasia esculenta*). Along the borders, sweet yams (*Dioscorea esculenta*) are often planted next to the fence posts, and pandanus for weaving. Sugarcane or bush hibiscus spinach (*Abelmoschus manihot*), a very important leafy green vegetable, are often planted along the borders or fence lines of the garden. The living fences are often candlenut tree (*Aleurites moluccana*), beach hibiscus (*Hibiscus tiliaceus*) or coral tree (*Erythrina variegata*). In some cases, timber trees, such as *Casuarina equisetifolia* or introduced species, such as Australian

kauri (*Agathis robusta*) or West Indian mahogany (*Swietenia macrophylla*), are planted in a few rows along the perimeter or along the roadside border of the allotment, or sometimes as a small woodlot on part of the allotment. Other short-term crops such as green onions (*Allium fistulosum* and *A. ascalonicum*), Chinese cabbage (*Brassica chinensis*), and corn (*Zea mays*) are often planted, or bird-sown chili peppers (*Capsicum frutescens*) are protected in the garden.

After the yams are harvested, taro or tannia (*Xanthosoma* species) is planted as the next crop in the soft soil left over after the yam harvest. The giant taro and taro that were planted with the yams are then harvested. The second crop of taro or tannia and the bananas remain. After this crop is harvested, sweet potatoes are planted. Another crop, usually cassava, is planted after sweet potato, completing the three to four-year shifting agricultural cycle.

Sometimes, the cycle is extended for a further three to five years by planting kava (*Piper methysticum*), the important social beverage plant, or paper mulberry (*Broussonetia papyrifera*), so important for the making of tapa cloth. Whereas men plant most crops, the women usually look after the paper mulberry. Sometimes new coconut palms are also planted as part of the cropping cycle to ensure that there will be young productive palms in the future. As the garden is allowed to slowly return to fallow for four to up to ten years, the plantains continue to bear fruit, the fruit trees and other multipurpose trees



**Candlenut
(*Aleurites moluccana*)**

continue to provide food, medicines, and other products. Other pioneer tree and shrub species that were cleared or cut down when the garden was prepared begin to grow again or recolonize the garden, and along with those trees that were protected, again provide organic material and recycle nutrients in the garden. The trees also provide medicines, firewood, and other products of value to the Tongan people.

Marquesan Agroforestry Example

Village or home-garden agroforestry in the Marquesas Islands of French Polynesia is another example of MSA characterized by a great diversity of mainly exotic plants that have been introduced during the 1,500 years since the first arrival of people (Decker 1971). Many of these plants have been added since European contact. Dominant species include the important staple food trees coconut, breadfruit, mango, and kapok (*Ceiba pentandra*) which are both very common, and the ubiquitous beach hibiscus tree (*Hibiscus tiliaceus*), which forms part of the backdrop of every village. Common spreading ornamental shade trees include the raintree (*Albizia saman*), and the flame tree (*Delonix regia*), with albizia (*Albizia lebbbeck*) also present in dwelling areas.

Home gardens also include a wide variety of staple plants and important fruit trees. These include banana cultivars, mango, papaya, lime, avocado, soursop, and sweetsop (*Annona muricata* and *A. squamosa*), guava, and tamarind. Sugarcane is also common. The cultivated pandanus (*Pandanus tectorius* var. *laevis*), so important in the production of plaited ware, and kapok are also common in home gardens. Ornamentals planted as hedges or along borders, which are commonly used for garlands and fragrant flowers, include *Gardenia taitensis*, ylang-ylang (*Cananga odorata*), the common hibiscus (*Hibiscus rosa-sinensis*), and the hedge panax (*Polyscias guilfoylei*).

Immediately surrounding dwelling areas and in fallow places on the islands of Nukuhiva and Uapou, are extensive stands of leucaena (*Leucaena leucocephala*). These stands of trees provide the main source of lowland fodder for horses, which are highly useful and abundant draught animals in the Marquesas. The horses are grazed on limited areas of upland pasture, and their diet is supplemented by rotationally feeding on leucaena in the lowlands.

Restoring MSA Systems and Species

As discussed in the examples above, traditional MSA is actively practiced in many regions of the Pacific Islands. In other areas, however, MSA may only be found in limited areas, surrounded by a sea of modern single-species agriculture (such as sugarcane fields) or urban development. Sometimes the only evidence of traditional MSA may be individual species in the landscape or a home garden. These remaining trees or agroforestry systems are usually found in home gardens or on the farms of older or more traditional members of the community, or in abandoned areas such as in ravines in grasslands or near abandoned village sites.

The presence of these remaining trees and old plantings can provide important information about successful MSA systems. They may also be a key source of plant materials for future plantings. These existing systems can be identified, protected, and rehabilitated so they can continue to be productive and useful for the future.

Purpose: To identify, protect, and rehabilitate existing MSA systems or species to enhance their use and productivity

1 Field Surveys. Conduct in-the-field surveys of the local environment, existing gardens, and agroforests and communities to see what trees already successfully grow in a given area, and what trees are already known and

culturally acceptable to the local community.

- 2 Inventory.** Create an inventory or listing of existing trees, their habitats, associated trees, plants, animals, and uses or functions. This is, perhaps the best way of finding out what trees will work best. Also include an inventory of seedlings and planting materials that might be available for planting or transplanting.
- 3 Traditional Knowledge.** Collect traditional knowledge from both men and women in local communities about the characteristics and use of different trees and their environmental requirements and pests or diseases. This should also include information about important local tree species or varieties that the people would like to see planted and protected and species or varieties that are now rare, endangered, locally extinct or in short supply, the reasons for the loss of these trees, and possible actions that can be taken to protect or re-establish these trees.
- 4 Species Potential.** Determine what existing species could provide for some current or future needs of the local community. Is there some product that is currently being purchased that could be provided instead by this tree? Is there an important function this tree could serve on the farm? Could this tree be managed to provide a future economic product, such as seeds, timber, handicrafts, animal feed, firewood, etc.? (Use tables in this guide as an aid)
- 5 Prioritize.** Based on the results of steps 1–4, identify the priorities with respect to what trees should be protected, rehabilitated, planted or re-introduced into a given area.
- 6 Identify Constraints.** Identify the threats or constraints to the protection and planting/rehabilitation of these species or systems. Are there competition problems from invading weeds, grasses or weedy tree species that are inhibiting the productivity of the tree? Are there animals, such as livestock, that are damaging the tree? Are the trees in decline due to lack of maintenance such as pruning, weeding, mulching, or fertilizing? Are there new pests, diseases, climatic changes, etc. that could affect the trees?
- 7 Implement.** Conduct the maintenance necessary to enhance productivity and remove threats.
- 8 Supplement/Enhance.** Identify species that can be added to enhance the existing system and improve its productivity. Perhaps some traditional plants can be added to the understory for garlands (leis) or other ornamental materials, etc.
- 9 Trials.** Test species, new varieties, and the different mixtures of multipurpose species to see what works best.
- 10 Expand on Successes.** Share species and strategies with neighbors and the community, publicize them to the public. It may be valuable to highlight a “target agroforestry system” that is appropriate for a given environmental setting or a given size of urban or rural piece of land.

Selecting Trees for New MSA Systems

Some Pacific Island regions may have experienced a great reduction or even total loss of the MSA systems that thrived there in the past. Severe agrodeforestation has probably occurred in these areas, usually to make room for industrial agriculture or urban development. In these areas, very few trees remain, and local knowledge of the effective species and systems for the area may also have been greatly reduced.

In such cases, local growers and farmers must select and test species and strategies in order to determine how to best develop MSA systems. They should also talk to the few remaining men and women in the local community who still have knowledge about the trees and traditional systems that may have been important in the past, before agroforestation took place.

Purpose: To create an MSA system in an area where traditional plantings and knowledge have been reduced or depleted

The process of selecting appropriate multipurpose tree species for a specific need, site, and situation is both interesting and challenging. For MSA, the goal in the selection process is not to narrow down the choices to one idealized “perfect” tree. Rather, the goal is to choose a diversity of tree species whose products, functions, and seasons may overlap to provide a range of products and services that satisfy the environmental, social, and economic needs of the family or local community.

For new plantings involving multipurpose trees, there are several general steps that could be followed to select and properly manage the trees that can best satisfy the local needs, goals, and site conditions. As stressed above, these same trees should also receive the highest priority for protection.

- 1 Determine Needs.** The first step is to determine the products or services that are desired from the trees. Products may include fruits, nuts, or other food products, timber, animal fodder, firewood, medicines, garlands, tools, handicrafts, and other economic or farm products. Services from trees include the kinds of connections that can be formed between the trees and the other elements of the system, such as providing animal shelter, improving soil, protecting food gardens from salt spray and storm waves, stopping soil erosion, providing materials for handicrafts for social occasions, etc.
- 2 Site Assessment.** Next, the site conditions should be considered, as these will affect the growth of the trees. Site conditions include rainfall, windiness, temperature, frequency of drought, and tropical cyclones (hurricanes or typhoons), soil conditions, distance to the sea, and exposure to salt spray, nature of ground water resources, types of weeds, pests, and diseases (including wild or feral animals), and other environmental factors.
- 3 Inventory.** Third, and perhaps most important, is the need for in-the-field surveys of the local environment and communities to see what trees already successfully grow in a given area, or what trees are already known and culturally acceptable to the local community. This can include an inventory or listing of existing trees, their habitats, associated trees, plants, animals, and uses or functions. This is, perhaps the best way to find out what trees will work best. This should include the collection of traditional knowledge of local communities about the characteristics and use of different trees and their environmental requirements. It should also include information about important local tree species or varieties that the people would like to see planted and protected. Species or varieties that are now rare, endangered, locally extinct or in short supply, the reasons for the loss of these trees, and possible actions that can be taken to protect or re-establish these trees should be taken into account.
- 4 Research.** When possible, information about successful plantings of potential species from similar environments (e.g., on other Pacific Islands) should be gathered through literature reviews, the internet, consultation with appropriate persons or from other sources of information (see Resources and Recommended Reading)
- 5 Potential Species.** After this information is obtained (i.e., after steps 1–4

are completed), a preliminary list of potential tree species candidates should be prepared. This initial list may be quite long. Once it is compiled, the farmer or local community can then choose which of these species have the most potential for a given situation. Often, the list can be narrowed down significantly based on local availability of the planting materials, costs, local experience, etc. (Use enclosed tables as an aid.)

6 Species Trials. Finally, if desired, a few promising new species can be trialed on a small scale for a year or more. Alternatively, a temporary or permanent local nursery can be established for the propagation of selected tree species. The most successful species from these trials can be distributed, sold or outplanted to individual farms or appropriate sites.

Planning for the Future: A Note on Genetic Diversity

After selecting the tree species that are most promising, a farmer will need to obtain the planting materials. This may involve the purchase or local collection of seeds, seedlings or small trees. It is important to work toward selecting trees and planting materials that will preserve genetic diversity. Tree species need a wide, rigorous, genetically diverse base if the species is to thrive and be valuable to future generations.

The genetic quality of tree seed used in plantings is a major factor in the economic success and productivity of a project. High quality seed may produce plants that are more productive, better adapted to local site conditions, and better suited to achieve the results planned for the project. Projects should contain enough diversity of mother trees to reproduce healthy and productive offspring for future generations, while remaining resistant to environmental stresses. The short and long term impacts of genetic seed quality, and the identification of different cultivars or genetic types requires careful consideration and planning when collecting or purchasing seeds.



Koa (*Acacia koa*)

Unfortunately, much genetic diversity has been lost through deforestation and agrodeforestation. Modern agriculture and forestry development have overemphasized the planting of monocultures of a single variety of food or timber tree. As a result, hundreds of forestry and agroforestry tree species have suffered severe genetic loss. For example, important traditional varieties have been lost for many species, such as coconuts, pandanus, breadfruit, bananas, and plantains. Once lost, these varieties can probably never be developed again. It is impossible to know how many named varieties of traditional agroforestry tree species have been lost over the past century.

It is, thus, important that MSA projects include efforts to improve the gene pool by propagating seed from carefully selected trees, and by ensuring that a wide range of genetic types or cultivars are planted. By utilizing the highest quality selected seed and planting materials, and by planting more than one variety or genetic type of a given species, people can begin to reverse the trends of genetic degradation while improving the productivity and health of our plantings.

A Note on Potentially Invasive Species

Ideally, species chosen for agroforestry plantings are of traditional importance in the region, and have long been part of the island environment. However, in some

situations a newer species may be considered. In these cases, great care must be taken not to introduce a species that may be invasive or potentially weedy.

The species table below has a category that denotes if a species is known to be weedy or to have naturalized. It should be noted that some of these species may be native or indigenous to a number of Pacific Islands, but may not yet be present or tested in other regions.

When considering new species, it is recommended to research and monitor the potential invasiveness of the plant.

Important Agroforestry Species

The following species tables compile information on agroforestry species that are used in the Pacific Islands. The 130 species detailed in the tables below have been selected out of more than 500 species that are found in MSA systems in the Pacific Islands. These agroforestry species may offer the greatest potential to provide a foundation for the promotion of MSA in most Pacific Islands. There are undoubtedly other trees not described here that can also improve existing systems. All of these species either remain of economic, cultural, and ecological importance in Pacific Island rural and urban agroforestry systems, or offer considerable potential for enriching agroforestry systems in the Pacific Islands.

Because of the diverse climates and soil types found in the Pacific Islands, the environmental data such as elevation and rainfall should be used only as a general guide. Information on multiple uses was compiled from throughout the Pacific in order to provide the reader with details about products or functions available from the species. Some of the information in the table is incomplete, as indicated by blank areas.

Products/Use Table

Important products and uses of selected agroforestry species found in Pacific Island land use systems

5 = very important throughout most island countries;

4 = very important in some countries, or of some importance in many island countries;

3 = important in some island countries or of minor importance in a number of island countries;

2 = minor importance in some countries;

1 = suited for this purpose, offering potential, for increased planting in some areas of the Pacific Islands; includes under-utilized, new or unrecognized species

blank space = of no current importance in any islands for a given use or environmental service, or no information available;

Multipurpose Species Pacific Island Uses

Species	Export Cash Crop	Local Cash Crop	Staple Food	Fruit/Nut	Home Garden	Leaf Vegetable	Beverage/Drink/Tea	Fragrant/Beautiful Flowers	Flavoring/Spice	Stimulant/Masticant	Medicinal	Domestic Animal Fodder	Wild Animal/Bird Food	Bee Forage	Fish/Marine Food Chain	Organic Matter/Mulch	Wood/Timber	Fallow Improvement/Pioneer	Nitrogen fixation	Windbreak	Shade	Erosion Control	Coastal Protection	Protection from Salt-spray	Animal Habitat	Woodcarving/Tools/Weapons	Canoe/Boat/Raft Making	Fishing Equipment	Fibre/Weaving/Clothing	Rope/Cordage/String	Wrapping/Parcelization	Thatch/Roofing/Mats	Body Ornamentation/Garlands	Resin/Gum/Glue/Latex	Tannin/Dye	Toxin/Insecticide/Fish Poison	Cosmetic/Soap/Perfume	Oil/Lubricant	Illumination/Torches	Ceremonial/Religious Import.	Host Plant/Trellising	Fencing/Hedges/Boundary	Reforestation/Agroforestation	Planted Ornamental																																																																																																																																																																																																																																																																																						
Acacia auriculiformis	3	2								2		1	1	1	1	2	2	2	2	2	1	2			1	1	1	3							2									1																																																																																																																																																																																																																																																																																						
Acacia koa													2	1	1	2	2	3	3	2	3	3			4	4	3																	4	2																																																																																																																																																																																																																																																																																					
Acacia koaia																2	2	2	1	2	1	2			1	1	3																		2	3																																																																																																																																																																																																																																																																																				
Acacia mangium		2														2	3	3	3	2	1	2			2	3																			1	1																																																																																																																																																																																																																																																																																				
Adenanthera pavonina	2					1					2	3				2	4	2	3	1	2	2			2	2							4												2	2																																																																																																																																																																																																																																																																																				
Agathis macrophylla	4	4								2		2	2	2		2	2	2	2			2			2	2								3											3	2																																																																																																																																																																																																																																																																																				
Agathis robusta	2											2	2	2		2	2	2	2			2			1	1								1											2	2																																																																																																																																																																																																																																																																																				
Agathis vitiensis	4	4									2	2	2	2		2	4	2	2			2			2	2								4											3	2																																																																																																																																																																																																																																																																																				
Albizia lebbeck		3									1	1	1	2		2	3	3	2	3	2	2		1	2	2								1												3	3																																																																																																																																																																																																																																																																																			
Albizia saman	2	3		1			1				2	1	2	1	2	2	3	4	3	3	2	4			2	4								1												2	4																																																																																																																																																																																																																																																																																			
Aleurites moluccana	2	3	2					2			3	2	2	2	2	2	2	2	2	3	3	3			2	3																					3	2																																																																																																																																																																																																																																																																																		
Alphitonia zizyphoides		2									4	2	2	2	2	3	4	4	3			3	2			3																																																																																																																																																																																																																																																																																																								
Anacardium occidentale		2	2	1	1						1						1			1																												2																																																																																																																																																																																																																																																																																		
Annona muricata	1	2	4	2	2						2	2	2							1																																																																																																																																																																																																																																																																																																														
Annona squamosa	2		3	2																																																																																																																																																																																																																																																																																																																														
Araucaria cunninghamii	3	3										2	2			2	4	2	2	2	3	2																																																																																																																																																																																																																																																																																																												
Araucaria heterophylla																2	2	2	2	3	2	2																																																																																																																																																																																																																																																																																																												
Areca catechu	2	4	4						4	3		2	2	2		2	2	2	2	1	3	2																																																																																																																																																																																																																																																																																																												

1 = potential, underutilized; 2 = minor importance; 3 = important; 4 = very important some areas; 5 = very important, widespread; blank = no importance or information unavailable

Multipurpose Species Pacific Island Uses (continued)

Species	Export Cash Crop	Local Cash Crop	Staple Food	Fruit/Nut	Home Garden	Leaf Vegetable	Beverage/Drink/Tea	Fragrant/Beautiful Flowers	Flavoring/Spice	Stimulant/Masticant	Medicinal	Domestic Animal Fodder	Wild Animal/Bird Food	Bee Forage	Fish/Marine Food Chain	Organic Matter/Mulch	Wood/Timber	Fuel Wood	Fallow Improvement/Pioneer	Nitrogen fixation	Windbreak	Shade	Erosion Control	Coastal Protection	Protection from Salt-spray	Animal Habitat	Woodcarving/Tools/Weapons	Canoe/Boat/Raft Making	Fishing Equipment	Fibre/Weaving/Clothing	Rope/Cordage/String	Wrapping/Parcelization	Thatch/Roofing/Mats	Body Ornamentation/Garlands	Resin/Gum/Glue/Latex	Tannin/Dye	Toxin/Insecticide/Fish Poison	Cosmetic/Soap/Perfume	Oil/Lubricant	Illumination/Torches	Ceremonial/Religious Import.	Host Plant/Trellising	Fencing/Hedges/Boundary	Reforestation/Agroforestation	Planted Ornamental							
Bruguiera gymnorhiza		2		2				2			3	2	2	2	3	5	4	4	4	2	2	5	2	2	5		4	2	2																	1						
Calliandra calothyrsus												1	2	2	1	2	4	2	2	2	2	1	2	3	5	3	3	4	4																	2	2					
Calophyllum inophyllum	1	2						2			3	3	2	2	2	2	4	3	2			3	4	3	5	3	3	4	4																	2	2					
Cananga odorata	2	3						4			3	3	2	2		2	2	2	2			2					2	1	2																	3						
Canarium indicum	2	3	2	4							2	2	3	3		2	2	2	2																																	
Canarium spp./harveyi	2	2	3	3							2	2	3	3		2	3	2	2																																	
Carica papaya	4	5		5	5	1	2	2			2	4	5	3	3	1	2	2	2																																	
Cassia fistula							2	2			1	2		2	2	1	2	2	2			2	2																							4						
Cassia grandis							2	2								1	2	2	2			2	2																								3					
Cassia javanica							2							1		1	2	2	2			2	2																								3					
Casuarina equisetifolia	1	3									2		2			4	3	4	4	2	4	4	3	2	3	3	2	3																			2	2				
Ceiba pentandra	2	2			1						2	2	2				1					2	1	3	3																						2					
Chrysophyllum cainito				2	3						1											2																										2				
Citrus aurantifolia	2	3	4	4	4		3		3		2	2	2	2	2			2				2																									2					
Citrus aurantium	2	3	3	3		3	1		2		2		2	2	2			2	2																																	
Citrus hystrix	4	4	4	4		4		4		3		3	2	2	2	2		2	2																																	
Citrus limon	1	3	3	3		3	3		3		2																																					2				
Citrus maxima	2	2	3	3	4	1					3							3																														2				
Citrus mitis	2	2	2	2	2	2	2		2		1		1		1																																	2				
Citrus paradisi	2	3	3	3	2	3					1																																						2			
Citrus reticulata	2	5	5	5	3	3	3		2		2							2																																		
Citrus sinensis	3	5	5	5	5	5	2											2																																		
Cocos nucifera	5	5	5	5	5	5		5		5	5	4	5	5	5	5	4	5	2																																	
Cordia subcordata	2	3					3				2	2	2			3	2	2	2	3																																
Dodonaea viscosa							2				2					3	2	2	2	3																																
Delonix regia							3								1		2	2	2																																	
Dracontomelon vitiense		2		3							2	2	2				2	2	2																																	

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Multipurpose Species Characteristics and Tolerances

Species	Common Names	Elevation (meters)	Climatic Zones	Means of Propagation	Growth Rate	Height at Maturity (meters)	Weediness/Invasiveness	Salt Tolerance	Drought Tolerance (months)	Waterlogging Tolerance
Acacia auriculiformis	northern black wattle	0-400 m	H, SH	S	F	20-30 m			7	yes
Acacia koa	koa	600-2000 m	U	S	F	20-40 m	P	no	3-4	no
Acacia koaia	koaia	300-1500 m	U	S	S	3-5 m			5-8	no
Acacia mangium	mangium; brown salwood	0-700 m	H	S	F	15-30 m	P		1-2	
Adenanthera pavonina	red bead tree	0-400 m	H	S	F	20-30 m	P		3-4	
Agathis macrophylla	kauri; kauri pine	50-550 m	H	S	M	30-40 m				
Agathis robusta	Queenland kauri	0-900 m	U	S,C	S	20-35 m			2-3	
Agathis vitiensis	Fiji kauri	0-1150 m	H	S	M	25-33 m				
Albizia lebeck	albizia; siris tree	0-1500 m	H, SH, A	S	M	25-30 m	P	yes	4-6	
Albizia saman	rain tree; monkeypod	0-1000 m	H, A	S	M	20-35 m	P		2-4	
Aleurites moluccana	candlenut	0-2500 m	H, SH	S	M	20-30 m	P		3-6	
Alphitonia zizyphoides	toi	0-300 m	H, SH	S	M	20-30 m	P			
Anacardium occidentale	cashew	0-500 m	H, SH, A	S	S	10-12 m			3-6	
Annona muricata	soursop	0-1000 m	H, SH	S	S	5-7 m	P		3-5	
Annona squamosa	sugarapple; sweetsop	0-1000 m	H, SH, U	S,G	S	3-10 m	P			no
Araucaria cunninghamii	hoop pine; Moreton Bay pine	0-1500 m	H, SH, U	S	M	40-50 m				
Araucaria heterophylla	Norfolk Island pine	0-1500 m	H, SH, C	S,C	M	20-40 m		yes	3-4	
Areca catechu	betel-nut; betel-nut palm	0-800 m	H, SH	S	M	10-25 m				
Artocarpus altilis	breadfruit	0-800 m	H, SH	S,R,V	S	20-30 m			3-4	
Artocarpus heterophyllus	jakfruit; jackfruit	400-1000 m	H, SH	S,G	M	30-40 m			2-4	
Averrhoa carambola	carambola; star fruit	0-700 m	H, SH	S,G	S	10-15 m		no	1-2	no
Azadirachta indica	neem	0-1500 m	H, SH, A	S,C,G	F	20-30 m	P	no	3-6	no
Bambusa vulgaris	common bamboo	0-1000 m	H, SH	S,C,R	F	10-20 m			3-6	yes
Barringtonia asiatica	fish-poison tree	0-20 m	C	S	M	15-25 m		yes		
Barringtonia edulis	cut nut; katnut	0-400 m	H	S	M	10-25 m				
Bischofia javanica	Java cedar	0-900 m	H, SH	S	M	20-30 m		no		yes
Broussonetia papyrifera	paper mulberry	0-1500 m	H, SH, U	C	M	5-15 m	P		3-4	

Elevation

in meters (1 foot = 0.3 meters)

Climatic Zones

H = Humid tropics (>1000 mm rainfall;

>20 C° mean temp.; >40 inches; >68°F)

SH = sub-humid (>500 mm rainfall; >20

C° mean temp.; >20 inches; >68°F)

A = Arid/semi-arid (<500 mm rainfall;

>20 C° mean temp.; <20 inches; >68°F)

U = Upland (>1000 mm rainfall; <20 C°

mean temp.; >40 inches; <68°F)

C = Coastal

Means of Propagation

S = Seeds

C = Cuttings

G = Grafting

A = Air layering

B = Budding

V = suckers

R = Root cutting

Growth Rate

S = Slow growth rate, less than 0.75

meters (2 ft) per year

M = Medium, 0.75-1.5 meters (2-5 ft) per

year

F = Fast, 1.5+ meters (5+ ft) per year

Height at Maturity

in meters (1 foot = 0.3 meters)

Potential Invasiveness

W = Weedy or extremely invasive in

some areas; often problematic

P = Potentially weedy; naturalized in

some areas, but rarely causing problems

Salt tolerance

yes or no

Drought tolerance

in months

Waterlogging tolerance

yes or no

blank

information unavailable

Multipurpose Species Characteristics and Tolerances (continued)

Species	Common Names	Elevation (meters)	Climatic Zones	Means of Propagation	Growth Rate	Height at Maturity (meters)	Weediness/Invasiveness	Salt Tolerance	Drought Tolerance (months)	Waterlogging Tolerance
<i>Bruguiera gymnorrhiza</i>	Oriental mangrove	0 m	C	S	M	15–20 m		yes		yes
<i>Calliandra calothyrsus</i>	calliandra	0–1500 m	H, SH	S	F	6–10 m	P	yes	3–4	no
<i>Calophyllum inophyllum</i>	portia tree	0–100 m	C	S	S	20–25 m		yes		
<i>Cananga odorata</i>	ylang-ylang; perfume tree	0–800 m	H, SH	S	F	10–20 m	P			
<i>Canarium indicum</i>	red canarium; galip	0–600 m	H	S	S	40 m				
<i>Canarium spp./harveyi</i>	pili nut; canarium almond	0–600 m	H, SH	S	S	15–25 m				
<i>Carica papaya</i>	papaya; pawpaw	0–1000 m	H, SH	S	F	4–6 m	P		4–6	no
<i>Cassia fistula</i>	golden shower tree	0–1000 m	H, SH	S	M	10–20 m				
<i>Cassia grandis</i>	pink shower tree	0–1000 m	H, SH	S	M	15–20 m				
<i>Cassia javanica</i>	pink and white shower tree	0–1000 m	H, SH	S	M	15–25 m				
<i>Casuarina equisetifolia</i>	ironwood; she oak	0–1500 m	H, SH, A, C	S	F	25–30 m	W	yes	4–6	no
<i>Ceiba pentandra</i>	kapok tree; silk-cotton tree	0–500 m	H, SH	S, C	M	30–50 m		yes	4–6	
<i>Chrysophyllum cainito</i>	calmito; starapple	0–400 m	H, SH	S, G	M	25–30 m			3–4	
<i>Citrus aurantifolia</i>	lime; West Indian lime	0–1800 m	H, SH, U	S, A	S	4–5 m				
<i>Citrus aurantium</i>	sour orange; Seville orange	0–1800 m	H, SH, U	S	S	10 m				no
<i>Citrus hystrix</i>	kaffir lime; rough lemon	0–1500 m	H, SH, U	S	M	12 m				
<i>Citrus limon</i>	lemon	0–2000 m	H, SH, U	S, A, B	S	3–6 m				
<i>Citrus maxima</i>	pummelo; pomelo; shaddock	0–800 m	H, SH	S, A, B	S	5–10 m			3–4	
<i>Citrus mitis</i>	calamondin	0–1000 m	H, SH	S, C, B	S	2–7.5 m			3–4	
<i>Citrus paradisi</i>	grapefruit; pumelo	0–800 m	H, SH	S, A, B	S	10–15 m				
<i>Citrus reticulata</i>	tangerine; mandarin orange	0–1000 m	H, SH	S, A, B	S	5–10 m			3–4	
<i>Citrus sinensis</i>	orange; sweet orange	200–1000 m	U	S, B	S	6–15 m				
<i>Cocos nucifera</i>	coconut palm; coconut	0–800 m	C, H	S	M	10–20 m		yes	3–4	yes
<i>Cordia subcordata</i>	beach cordia; sea trumpet	0–300 m	C, H	S	M	10 m		yes	3–4	
<i>Dodonaea viscosa</i>	native hop bush	0–1100 m	SH	S	M	2–8 m				
<i>Delonix regia</i>	poinciana; royal poinciana	0–500 m	H, SH, A, C	S	S	15 m			6–12	
<i>Dracontomelon vitiense</i>		0–300 m	H, Sh	S	M	10–20 m				

Elevation

in meters (1 foot = 0.3 meters)

Climatic Zones

H = Humid tropics (>1000 mm rainfall; >20 C° mean temp.; >40 inches; >68°F)
 SH = sub-humid (>500 mm rainfall; >20 C° mean temp.; >20 inches; >68°F)
 A = Arid/semi-arid (<500 mm rainfall; >20 C° mean temp.; <20 inches; >68°F)
 U = Upland (>1000 mm rainfall; <20 C° mean temp.; >40 inches; <68°F)
 C = Coastal

Means of Propagation

S = Seeds
 C = Cuttings
 G = Grafting
 A = Air layering
 B = Budding
 V = suckers
 R = Root cutting

Growth Rate

S = Slow growth rate; less than 0.75 meters (2 ft) per year
 M = Medium, 0.75–1.5 meters (2–5 ft) per year
 F = Fast, 1.5+ meters (5+ ft) per year

Height at Maturity

in meters (1 foot = 0.3 meters)

Potential Invasiveness

W = Weedy or extremely invasive in some areas; often problematic
 P = Potentially weedy; naturalized in some areas, but rarely causing problems

Salt tolerance

yes or no

Drought tolerance

in months

Waterlogging tolerance

yes or no

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information unavailable

Multipurpose Species Characteristics and Tolerances (continued)

Species	Common Names	Elevation (meters)	Climatic Zones	Means of Propagation	Growth Rate	Height at Maturity (meters)	Weediness/Invasiveness	Salt Tolerance	Drought Tolerance (months)	Waterlogging Tolerance
<i>Erythrina variegata</i>	coral tree; Indian coral tree	0–1000 m	H, SH, A	S, C	F	15–20 m			5–7	yes
<i>Erythrina subumbrans</i>		0–200 m	H, SH	C	F	10–20 m			yes	yes
<i>Eucalyptus citriodora</i>	lemon-scented gum	0–200 m	H, SH	S	F	15–20 m				
<i>Eucalyptus deglupta</i>	Mindanao gum	0–1200 m	H	S, C	F	30–50 m			2–3	no
<i>Eucalyptus saligna</i>	flooded gum	500–2000 m	U	S	F	40–55 m				
<i>Eucalyptus tereticornis</i>	forest red gum	0–800 m	SH, C, U	S	F	30–50 m		yes	3–5	yes
<i>Fagraea berteriana</i>	pua tree	0–900 m	H, SH	S	S	5–20 m		yes	yes	yes
<i>Ficus bengalensis</i>	banyan; Indian banyan	0–1000 m	H	S	F	15–20 m		yes		
<i>Ficus benjamina</i>	weeping fig; Benjamin tree	0–700 m	H, SH	S	F	10–15 m		yes		
<i>Ficus carica</i>	fig; piku; fiku	300–1800 m	SH, A	S	M	5–10 m		yes		
<i>Ficus tinctoria</i>	Dyer's fig	1–500 m	H, SH, C	S	M	15–20 m		yes		
<i>Flueggea flexuosa</i>		5–350 m	H	S	F	3–10 m				
<i>Gliricidia sepium</i>	gliricidia; madre de cacao	0–800 m	H, SH	S, C	F	10 m	P	yes	6–8	yes
<i>Glochidion ramiflorum</i> /spp.		0–1350 m	H, SH	S	M	2–15 m				
<i>Gnetum gnemon</i>	gnetum; joint fir	30–850 m	H	S	M	5–15 m				
<i>Guettarda speciosa</i>	guettarda	0–10 m	C	S	S	5–20 m		yes		
<i>Gyrocarpus americanus</i>		1–300 m	H, SH, C	S	M	15–25 m		yes		
<i>Hernandia nymphaeifolia</i>	lantern tree	1–20 m	C	S	M	15–20 m		yes		
<i>Hibiscus tiliaceus</i>	beach hibiscus tree	1–800 m	C, H, SH	C	M	4–10 m		yes	3–4	yes
<i>Inga edulis</i>	inga; ice cream bean	0–1500 m	H, SH	S	F	20–30 m		yes	3–4	
<i>Inocarpus fagifer</i>	Tahitian chestnut	1–400 m	H, C	S	S	15–25 m		yes		yes
<i>Intsia bijuga</i>	ipili; Borneo teak; island teak	0–600 m	C, H	S	S	30–50 m		yes		yes
<i>Kleinhovia hospita</i>	Kleinhovia; guest tree	10–100 m	H, SH	S	F	10–15 m				
<i>Leucaena leucocephala</i>	leucaena; wild tamarind	0–1000 m	H, SH, A	S, C	F	3–10 m	W		6–8	
<i>Litchi chinensis</i>	litchi; lychee	100–1000 m	H, SH	S, A	S	20–30 m		yes	2–4	
<i>Lumnitzera littorea</i>		0 m	C	S	S	5–10 m				
<i>Macadamia integrifolia</i>	Macadamia nut	100–1000 m	H, SH	S, G	S	15–18 m			3–4	

Elevation

in meters (1 foot = 0.3 meters)

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 C = Coastal
 A = Arid/semi-arid (<500 mm rainfall; >20 C° mean temp.; <20 inches; >68°F)
 U = Upland (>1000 mm rainfall; <20 C° mean temp.; >40 inches; <68°F)
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Means of Propagation

S = Seeds
 C = Cuttings
 G = Grafting
 A = Air layering
 B = Budding
 V = suckers
 R = Root cutting

Growth Rate

S = Slow growth rate, less than 0.75 meters (2 ft) per year
 M = Medium, 0.75–1.5 meters (2–5 ft) per year
 F = Fast, 1.5+ meters (5+ ft) per year

Height at Maturity

in meters (1 foot = 0.3 meters)

Potential Invasiveness

W = Weedy or extremely invasive in some areas; often problematic
 P = Potentially weedy; naturalized in some areas, but rarely causing problems

Salt tolerance

yes or no

Drought tolerance

in months

Waterlogging tolerance

yes or no

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information unavailable

Multipurpose Species Characteristics and Tolerances (continued)

Species	Common Names	Elevation (meters)	Climatic Zones	Means of Propagation	Growth Rate	Height at Maturity (meters)	Weediness/Invasiveness	Salt Tolerance	Drought Tolerance (months)	Waterlogging Tolerance
Macaranga spp.	macaranga	3–500 m	H, SH	S	F	10–15 m				
Mangifera indica	mango	0–1000 m	H, SH	S,B,G	S	15–45 m			4–6	yes
Melia azedarach	Chinaberry; pride of India	0–1000 m	H, SH, A	S	M	10–20 m	P		4–6	
Metroxylon spp.	sago palm; ivory-nut palm	0–200 m	H	S	S	10–15 m				yes
Morinda citrifolia	Indian mulberry	0–600 m	C, A, SH	S	S	3–5 m		yes	4–6	
Moringa oleifera	horseradish tree	0–1200 m	H, SH, A	S,C	M	10–12 m			6–8	
Musa spp.	banana	0–1200 m	H, SH	V	F	2–9 m			2–3	yes
Neisosperma oppositifolium		0–50 m	C	S	M	10–15 m		yes		
Pandanus dubius	screw pine	0–50 m	H, C	C,S	M	5–10 m				
Pandanus tectorius	pandanus; screw pine	0–400 m	H, SH, C	C,S	M	5–15 m		yes		yes
Pandanus cultivars	screw pine cultivars	0–1500 m	H, SH, C, U	C,S	M	2–10 m		yes		yes
Paraserianthes falcataria	albizia; white albizia	0–120 m	H, SH, U	S	F	20–30 m	W		2–3	
Pemphis acidula	pemphis	0–10 m	C	S	S	2–6 m		yes		yes
Persea americana	avocado	0–1000 m	H, SH	S,B,G	M	10–20 m			2–3	no
Pimenta racemosa	bay-rum tree	0–200 m	H, SH	S	M	5–12 m	P			
Pinus caribaea	Caribbean pine	0–700 m	H, SH	S	M	30–40 m	P		3–4	yes
Piper methysticum	kava; kava root	0–700 m	H	C	S	2–3 m		yes		
Pipturus argenteus		0–1000 m	H, C	S	M	2–6 m		yes		
Pisonia grandis	pisonia; lettuce tree	0–300 m	H, C	C	M	10–20 m		yes		
Pithecellobium dulce	Manila tamarind; sweet inga	0–1600 m	A, SH	S	M	5–22 m	W	yes	4–6	
Plumeria obtusa	evergreen frangipani	0–700 m	H, SH, A	C	M	5–8 m		yes	6–9	
Plumeria rubra	frangipani; plumeria	0–700 m	H, SH	C	M	5–8 m		yes	6–9	
Polyscias spp.	panax; hedge panax	0–800 m	H, SH	C	F	2–4 m				
Pometia pinnata	Oceanic lychee	0–500 m	H	S	S	25–40 m				
Premna serratifolia		0–400 m	H, SH, C	C,S	M	4–7 m		yes		
Pritchardia pacifica	Fiji fan palm; Pacific fan palm	1–200 m	H, SH	S	S	10–12 m				
Psidium guajava	guava	0–1500 m	H, SH	S,A,B	M	5–10 m	W		4–6	yes

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Drought tolerance

in months

Waterlogging tolerance

yes or no

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information unavailable

Multipurpose Species Characteristics and Tolerances (continued)

Species	Common Names	Elevation (meters)	Climatic Zones	Means of Propagation	Growth Rate	Height at Maturity (meters)	Weediness/Invasiveness	Salt Tolerance	Drought Tolerance (months)	Waterlogging Tolerance
<i>Pterocarpus indicus</i>	narra; New Guinea rosewood	0–500 m	H, SH	S,C	M	30–40 m				
<i>Rhizophora</i> spp.	red mangrove	0 m	C	S	M	2–15 m		yes	no	yes
<i>Santalum</i> spp.	sandalwood	0–200 m	H, SH	S	S	2–12 m				
<i>Scaevola taccada</i>	scaevola; saltbrush	0–200 m	C, H	S	M	2–3 m		yes		yes
<i>Schizostachyum</i> spp.	bamboo; aboriginal bamboo	0–900 m	H, SH	V	F	5–8 m				
<i>Senna alata</i>		1–500 m	H, SH	S	M	2–5 m	P			yes
<i>Senna siamea</i>	kassod; pheasantwood	0–600 m	H, SH	S	F	15–20 m		yes	4–6	no
<i>Sesbania grandiflora</i>	sesbania; corkwood tree	0–1000 m	H, SH	S	F	8–10 m	P	yes	6–8	yes
<i>Sesbania sesban</i>	sesban	0–1500 m	H, SH, A	S	F	6–8 m	P	yes	4–6	yes
<i>Spathodea campanulata</i>	African tulip tree	0–1200 m	H, SH	S	F	20–30 m	W		3–4	yes
<i>Spondias dulcis</i>	vi apple; Polynesian plum	0–700 m	H, SH	S,A,C	M	20–25 m			3–4	
<i>Swietenia macrophylla</i>	West Indian mahogany	0–1500 m	H, SH	S	M	30–40 m				
<i>Syzygium cumini</i>	jambolan; Java plum	0–600 m	H, SH	S,B,G	M	10–20 m	P		4–6	yes
<i>Syzygium jambos</i>	rose apple; Malabar plum	0–1200 m	H, SH	S,A,C	S	10–15 m	P		3–4	
<i>Syzygium malaccense</i>	Malay apple; mountain apple	0–600 m	H, SH	S	M	10–15 m				
<i>Tamarindus indica</i>	tamarind	0–1000 m	SH, A	S,A,G	M	15–25 m			4–8	no
<i>Terminalia catappa</i>	tropical almond	0–300 m	C, H, SH	S	F	15–25 m		yes	2–3	
<i>Terminalia samoensis/littoralis</i>	tropical almond	0–10 m	C	S	M	3–5 m		yes		
<i>Thespesia populnea</i>	Pacific rosewood; milo	0–600 m	C, H, SH	S	S	10–18 m		yes	6–8	yes
<i>Toona ciliata</i> var. <i>australis</i>	Australian red cedar	0–2000 m	H, SH, U	S	M	30–35 m				no
<i>Tournefortia argentea</i>	beach heliotrope	0–10 m	C	S	S	3–8 m		yes		
<i>Veitchia</i> spp.	niusawa palm (V. joannis)	0–900 m	H, U	S	M	5–10 m				
<i>Vitex negundo/trifolia</i>	vitex; beach vitex; blue vitex	0–900 m	H, SH, C	S,C	F	1.5–3 m		yes		

Elevation

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C° mean temp.; >20 inches; >68°F)

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Means of Propagation

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R = Root cutting

Growth Rate

S = Slow growth rate, less than 0.75

meters (2 ft) per year

M = Medium, 0.75–1.5 meters (2–5 ft) per

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Height at Maturity

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W = Weedy or extremely invasive in

some areas; often problematic

P = Potentially weedy; naturalized in

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Salt tolerance

yes or no

Drought tolerance

in months

Waterlogging tolerance

yes or no

blank

information unavailable

Common Names, Origin and Presence in Pacific Islands

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Acacia auriculiformis</i>	Northern black wattle; Papua wattle		New Guinea and northern Australia	Papua New Guinea and Solomon Islands (western Malesia)
<i>Acacia koa</i>	koa	koa (Hawaii)	Hawaii	Hawaii
<i>Acacia koaia</i>	koaia	koa'ia (Hawaii)	Hawaii	Hawaii
<i>Acacia mangium</i>	mangium; brown salwood; black wattle; hickory wattle		Southeast Asia and Malesia	Papua New Guinea
<i>Adenanthera pavonina</i>	red bead tree; red sandalwood; Polynesian peanut	lopa (Samoa, Tuvalu, Tonga); hua-'ula'ula (Hawaii)	Southeast Asia and Malaysia	Most Pacific Islands; although not generally found on atolls
<i>Agathis macrophylla</i>	kauri; kauri pine	kauli (Tonga)	northern Australia; Southeast Asia; Malesia	Solomon Islands
<i>Agathis robusta</i>	Queensland kauri; smooth-barked kauri pine		eastern Australia and Malesia	Papua New Guinea; Tonga
<i>Agathis vitiensis</i>	Fiji kauri		northern Australia; Southeast Asia; Malesia	Fiji
<i>Albizia lebeck</i>	albizia; siris tree; woman's tongue		Tropical Asia	Vanuatu; Fiji; Saipan; Hawaii
<i>Albizia saman</i>	rain tree; monkeypod	tamalini; tamaligi (Samoa); kasia (Tonga); 'ohai (Hawaii)	Tropical America	Most Pacific Islands (especially Polynesia and Malesia: Fiji, Vanuatu, Hawaii, and Samoa)
<i>Aleurites moluccana</i>	candlenut	lauci; sikeci (Fiji); tuitui (Tonga); Cooks; lama (Samoa); tutu'; 'ti'a'iri (Societies); 'ama (Marquesas); kukui (Hawaii)	Malaysia	Aboriginal intr. to most of Melanesia; Polynesia; and parts of Micronesia; recent to Guam
<i>Alphitonia zizyphoides</i>	toi	toi (Samoa; Tonga) (kauila is related native Hawaii species A. ponderosa)	Sumatra and Philippines	Sumatra; Philippines; Society Islands; related species in PNG and Hawaii
<i>Anacardium occidentale</i>	cashew	apu 'Initia (Samoa); 'apu (Tonga)	Tropical America	Tonga; Samoa
<i>Annona muricata</i>	soursop	sasalapa (Samoa); 'apele 'Initia (Tonga)	Tropical America	Pre-WWII intr. to most Pacific Islands, not found on atolls
<i>Annona squamosa</i>	sugarapple; sweetsop	apele Tonga (Tonga); nameana (Tuvalu)	South America	Tonga; Kiribati; Tuvalu
<i>Araucaria cunninghamii</i>	hoop pine; Moreton Bay pine; Richmond river pine	paina (Samoa); paini (Tonga)	Australia; Papua New Guinea	Papua New Guinea (large plantations)
<i>Araucaria heterophylla</i>	Norfolk Island pine	paina (Samoa); paini (Tonga)	New Caledonia	Hawaii
<i>Areca catechu</i>	betel-nut; betel-nut palm	nioi-keketa (Hawaii)	Southern Asia and Indonesia	Aboriginal intr. to Papua New Guinea; Solomon Islands; and western Micronesia; recent to Fiji; Samoa; and other areas

Common Names, Origin and Presence in Pacific Islands (continued)

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Artocarpus altilis</i>	breadfruit	uto (Fiji); mei (Tonga, Marquesas); 'ulu (Samoa, Hawaii); kuru (Cook's) maiore; 'uru (Society Islands)	Malaysia	Aboriginal intr. to most of Melanesia; Polynesia; and Micronesia
<i>Artocarpus heterophyllus</i>	jakfruit; jackfruit		Southeast Asia and India	Post-European contact intr. to Pacific Islands. Fiji.
<i>Averrhoa carambola</i>	carambola; star fruit	tapanima (Tonga)	Southeast Asia	Fiji
<i>Azadirachta indica</i>	neem		India	Hawaii and Fiji
<i>Bambusa vulgaris</i>	common bamboo; feathery bamboo	ofe Fiti (Samoa); pitu (Tonga); te kaibaba (Kiribati); kofe; pampu (Tuvalu); bitu (Fiji)	tropical Asia	Most Pacific Islands
<i>Barringtonia asiatica</i>	fish-poison tree	vutu (Fiji); futu (Tonga, Samoa); 'utu (Cook's); hutu; hotu (Societies); hutu (Marquesas) te bairiati (Kiribati)	Indian Ocean to the Marquesas	Most of Polynesia; not common on atolls
<i>Barringtonia edulis</i>	cut nut; katnut		Melanesia	Melanesia; Fiji; Solomon Islands
<i>Bischofia javanica</i>	Java cedar	koka (Hawaii, Polynesia, Fiji, Vanuatu, Tonga, Cooks); 'o'a (Samoa)	India; South China; Indonesia and Philippines	Fiji; Samoa; Tonga; Uvea; Futuna; Cook and Society Islands; Hawaii
<i>Broussonetia papyrifera</i>	paper mulberry	malo; masi (Fiji) hiapo; tutu (Tonga); u'a (Samoa); aute (Cook's, Societies) ute (Marquesas); wauke (Hawaii) aute (New Zealand)	China; Japan; Burma; Thailand	Aboriginal intr. throughout Malasia; Melanesia; and Polynesia as far east as Hawaii. Commonly found in Fiji; Tonga; Samoa; PNG; Hawaii; recent intr. to Yap; not in Micronesia or found on atolls
<i>Bruguiera gymnorhiza</i>	Oriental mangrove; brown mangrove	togo; toto saina (Samoa); tongo; tongo ta'ane; fa'onelua (Tonga); te tongo buangi (Kiribati); kukuna-o-ka-la (Hawaii)	East Africa; Indian Ocean; tropical Asia; western Polynesia and eastern Micronesia	western Polynesia (Tonga; Samoa) and eastern Micronesia (Marshall and Gilbert Islands; Nauru)
<i>Calliandra calothyrsus</i>	calliandra		Tropical America	Samoa; Hawaii
<i>Calophyllum inophyllum</i>	portia tree; Alexandrian laurel; beach mahogany	dilo (Fiji); feta'u (Tonga); fetau (Samoa); tamanu (Cook's; Societies; Marquesas); te itai (Kiribati); kamani (Hawaii)	tropical Africa; eastern Polynesia and Micronesia	Eastern Polynesia; Fiji; Nauru; Banaba; Makatea
<i>Cananga odorata</i>	ylang-ylang; perfume tree	makosoi; mokosoi (Fiji); mohokoi (Tonga); moso'oi (Samoa)	Southeast Asia; Philippines; northern Australia	aboriginal intr. to parts of Melanesia and Polynesia; recent intr. to Hawaii and other smaller eastern Pacific Islands
<i>Canarium indicum</i>	red canarium; galip		Malasia	Mainly Melanesia Fiji; Tonga; Niue

Common Names, Origin and Presence in Pacific Islands (continued)

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Canarium harveyi</i>	pili nut; canarium almond; Java almond; galip nut	ai (Tonga); mafoa (Samoa)	Malaysia; Indonesia; New Guinea; Fiji and Tonga	Melanesia and Polynesia as far east as Samoa and Niue. Common throughout Melanesia; occasional in Fiji; Tonga; Samoa; and Niue
<i>Carica papaya</i>	papaya; pawpaw	esi (Samoa); lesi (Tonga) olesi (Tuvalu); te babaia (Kiribati) mikana; milikana; papaia; he'i (Hawaii)	Tropical America	abundant throughout Pacific Islands Hawaii; Fiji; Tonga; Rarotonga; Samoa; Cook Islands
<i>Cassia fistula</i>	golden shower tree; Indian laburnum; pudding-pipe tree	kasia (Tonga)	Tropical Asia	recent intr. to Pacific Islands; home gardens and roadsides in Tonga; Samoa; Hawaii
<i>Cassia grandis</i>	pink shower tree; horse cassia	kasia (Tonga)	Tropical America	recent intr. to Pacific Islands
<i>Cassia javanica</i>	pink and white shower tree; pink shower tree		Tropical Asia	recent intr. to Pacific Islands
<i>Casuarina equisetifolia</i>	ironwood; she oak; beefwood; casaurina	nokonoko (Fiji); toa (Hawaii, Tonga, Samoa, Cooks, Marquesas) 'aito (Societies) te burukam (Kiribati)	Indian Ocean; Southeast Asia; Malesia; N. Australia; and parts of the western Pacific	most Pacific Islands
<i>Ceiba pentandra</i>	kapok tree; silk-cotton tree	vavae (Samoa, Tonga)	India or Africa	most Pacific Islands (especially common in the high islands)
<i>Chrysophyllum cainito</i>	caimito; starapple		West Indies	
<i>Citrus aurantifolia</i>	lime; West Indian lime	tipolo; moli tipolo (Samoa); laimi; moli laimi (Tonga); taim (Tuvalu); te raim (Kiribati)	S. Asia or Indonesia	Home gardens in many areas of Pacific: Fiji; Samoa; Niue; Cook Islands; Kiribati and atolls
<i>Citrus aurantium</i>	sour orange; Seville orange	kola (Tonga)	Southeast Asia	Throughout Polynesia; and some areas of Micronesia and Melanesia; not found on atolls
<i>Citrus hystrix</i>	kaffir lime; rough lemon; leach lime; Mauritius papeda	lemani (Tonga); tipolo patupatu (Samoa); te remen (Kiribati); laim (Tuvalu)	Indonesia	The most common "lemon" in many Pacific Islands
<i>Citrus limon</i>	lemon	moli; moli tipolo (Samoa); moli lemani; lemani (Tonga); kukane (Hawaii)	Southeast Asia	Most Pacific Islands
<i>Citrus maxima</i>	pummelo; pomelo; shaddock	moli kana (Fiji); moli Tonga (Tonga); moli Toga (Samoa); muli (Papua New Guinea)	Malesia Southeast Asia and Indo-Malesia	Tonga
<i>Citrus mitis</i>	calamondin; calamondin orange	tipolo lapani (Samoa); 'alani-'awa'awa (Hawaii)	Philippines or Malaysia	Tonga; Samoa; Marshall Islands; Kiribati
<i>Citrus paradisi</i>	grapefruit; pumelo	muli (Papua New Guinea Pidgin)	West Indies	

Common Names, Origin and Presence in Pacific Islands (continued)

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Citrus reticulata</i>	tangerine; mandarin orange	moli Saina (Samoa); moli peli (Tonga)	Southeast Asia and Philippines	Most Pacific Islands
<i>Citrus sinensis</i>	orange; sweet orange	moli 'aina; moli 'aiga (Samoa); moli kai; moli inu (Tonga) te aoranti (Kiribati); 'alani (Hawaii)	South China and Southeast Asia	Most Pacific Islands
<i>Cocos nucifera</i>	coconut palm; coconut	niu (Fiji); Tonga; Samoa; Cooks; Hawaii); nu (Cooks); ha'ari (Societies); te ni (Kiribati)	S. Asia and Indian Ocean Islands	All Pacific Islands
<i>Cordia subcordata</i>	beach cordia; sea trumpet	nawanawa (Fiji); puataukanave (Tonga); tuanave (Samoa); tou (Cooks, Societies, Marquesas); kou (Hawaii)	Indian Ocean to Pacific Islands	Polynesia and Micronesia
<i>Dodonaea viscosa</i>	native hop bush	te kai boia (Kiribati); lala vao (Samoa); 'A'ali'i (Hawaii)	Native to most Pacific Islands; possibly intr. to some atolls	Kiribati; Tonga; Hawaii
<i>Delonix regia</i>	poinciana; royal poinciana; flame tree; flamboyant; flame of the forest	tamaligi (Samoa); 'ohai (Tonga); te tua (Kiribati); fua l tausaga (Tuvalu) 'ohai-'ula (Hawaii)	Madagascar	Most Pacific Islands
<i>Dracontomelon vitiense</i>	coral tree; Indian coral tree; tiger's claw; dadap; tropical coral		Malasia	some areas of Melanesia; Polynesia; and Micronesia
<i>Erythrina subumbrans</i>	lemon-scented gum; spotted gum	drala dina (Fiji); ngatae; gatae (Tonga, Samoa); 'atae (Cooks; Societies); natae (Marquesas); wiliwili-haole (Hawaii)	Burma; east to Philippines	Most Pacific Islands especially Melanesia
<i>Eucalyptus citriodora</i>	Mindanao gum; Bagras		Queensland; Australia	Most Pacific Islands
<i>Eucalyptus deglupta</i>	eucalyptus; deglupta; kamarere		Southeast Asia; Philippines; Australia and New Guinea	Most Pacific Islands
<i>Eucalyptus saligna</i>	flooded gum; Sydney blue gum		Australia	Most Pacific Islands
<i>Eucalyptus tereticornis</i>	forest red gum		Southeast Asia; Philippines; Australia and New Guinea	Most Pacific Islands especially Papua New Guinea
<i>Fagraea berteriana</i>	pua tree	bua (Fiji); pua; pua tonga (Tonga); pua lulu (Samoa); pua (Cooks, Societies, Marquesas); pua-kenikeni (Hawaii)	New Guinea; Caroline Islands; Marquesas	Polynesia and Melanesia
<i>Ficus bengalensis</i>	banyan; Indian banyan; vada tree	pulu (Samoa)	India	
<i>Ficus benjamina</i>	weeping fig; Benjamin tree; waringin	ovava Fisi (Tonga)	India	
<i>Ficus carica</i>	fig; piku; fiku		Asia	

Common Names, Origin and Presence in Pacific Islands (continued)

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Ficus tinctoria</i>	Dyer's fig	nunu (Fiji); masi'ata (Tonga); mati (Samoa, Cooks, Societies); 'ata (Marquesas)	Philippines	
<i>Fluggea flexuosa</i>		poumulu (Samoa, Tonga)	Philippines; Solomon Islands; Moluccas	Samoa; Tonga
<i>Gliricidia sepium</i>	gliricidia; madre de cacao (Mother of cocoa); Nicaragua cocoa shade; Mexican lilac		Central America and northern South America	recent intr. to Pacific Islands (Fiji; Vanuatu; Hawaii; Samoa; Tonga; Kiribati)
<i>Glochidion ramiflorum</i> /spp.		masame (Samoa); malolo; masikoka (Tonga)	Tropical Asia to the Marquesas; Marianas and Caroline Islands in Micronesia	Most Pacific Islands
<i>Gnetum gnemon</i>	gnetum; joint fir		India; Southern Asia and Malesia to Caroline Islands and Fiji	Most of Micronesia and Melanesia (Solomons; New Guinea; Fiji)
<i>Guettarda speciosa</i>	guettarda	puapua (Samoa); puopua (Tonga); te uri (Kiribati); pua; puapua; uli (Tuvalu)	East Africa; tropical Asia to Marshall Islands and southeastern Polynesia	Most Pacific Islands esp. Micronesia; common on atolls
<i>Gyrocarpus americanus</i>		wiriwiri (Fiji); pukovili (Tonga); vili; vilivili; moa (Samoa)	East Africa to tropical America; aboriginal intr. to Tonga	Vanuatu; Tonga; Samoa
<i>Hernandia nymphaeifolia</i>	lantern tree; Chinese lantern tree	pipi (Fiji, Samoa); pu'a (Samoa); fotulona; puko (Tonga); puka (Tuvalu); te bingbing (Kiribati)	East Africa to Micronesia and southeastern Polynesia	Micronesia and Polynesia; some parts of Melanesia
<i>Hibiscus tiliaceus</i>	beach hibiscus tree; beach mallow	vau (Fiji); fau (Tonga, Samoa); 'au (Cooks); purau (Societies); fau; hau (Marquesas); hau (Hawaii)	Pantropical; indigenous to many Pacific Islands	Most Pacific Islands
<i>Inga edulis</i>	inga; ice cream bean		Central and South America	
<i>Inocarpus fagifer</i>	Tahitian chestnut	ivi (Fiji); ifi (Tonga, Samoa); 'I (Cooks) ihi; mape (Societies); ihi (Marquesas) te ibi (Kiribati)	Malesia and possibly Melanesia; aboriginal intr. to most of Micronesia and Polynesia	Polynesia and Melanesia
<i>Intsia bijuga</i>	ipli; Borneo teak; island teak	vesi (Fiji); fehi (Tonga); ifilele (Samoa)	Eastern Africa; Madagascar; southern Asia; Malesia to the Caroline Islands; Rotuma; and Samoa	Melanesia and Polynesia; especially Samoa; Tonga; and Fiji
<i>Kleinhovia hospita</i>	Kleinhovia; guest tree	fu'afu'a; pu'apu'a (Samoa); fukofuka (Tonga)	Tropical Africa; Asia through Malesia to the Caroline Islands and Samoa; Tonga; and Society Islands	Melanesia and Samoa

Common Names, Origin and Presence in Pacific Islands (continued)

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Leucaena leucocephala</i>	leucaena; wild tamarind; ipil- ipil	fua pepe (Samoa); sialehemohe (Tonga); te kaitetua (Kiribati); haole koa or koa haole (Hawaii)	Central America and Mexico	Most Pacific Islands
<i>Litchi chinensis</i>	litchi; lychee; leechee; lechee; laichi		Southern China; northern Vietnam; and Malaysia	
<i>Lumnitzera littorea</i>		hangale (Tonga); te aitoa (Kiribati); sagale (Tuvalu)	East Africa to Tonga and Marshall Islands in Micronesia	Tonga; Kiribati; Tuvalu
<i>Macadamia integrifolia</i>	Macadamia nut; Queensland nut; Australian bush nut		Australia	Hawaii
<i>Macaranga</i> spp. (harveyana, stipulosa, carolinensis)	macaranga	lau pata; papata; lau papata (Samoa); loupata; lepo (Tonga)	Fiji to the Solomon Islands	Most Pacific Islands
<i>Mangifera indica</i>	mango	mago (Samoa, Tuvalu); mango (Tonga); te mangko (Kiribati) manako (Hawaii)	India and Burma	Most Pacific Islands (Polynesia; Melanesia; and larger islands of Micronesia)
<i>Melia azedarach</i>	Chinaberry; pride of India; Indian lilac; Persian lilac; bead tree	inia (Hawaii); sita; sita Tonga	Old World tropics into Malesia and northern Australia	Early European intr. throughout high Pacific Islands
<i>Metroxylon</i> spp.	sago palm; ivory-nut palm	nui masoa; niu o Lotuma (Samoa)	Indonesia; Melanesia; and Caroline Islands in Micronesia	Melanesia; Samoa and some parts of western Micronesia
<i>Morinda citrifolia</i>	Indian mulberry; beach mulberry	kura (Fiji); nonu (Tonga, Samoa); nono (Cooks, Societies); te non (Kiribati); noni (Hawaii, Marquesas)	Tropical Asia and Australia; intr. to southeast Polynesia and Hawaii; Marshall and Gilbert Islands in Micronesia	Most Pacific Islands esp. Micronesia; Polynesia (esp. Hawaii; Tahiti) Tonga; Nauru; Kiribati
<i>Moringa oleifera</i>	horseradish tree; drumstick tree; saijan (Hindi); malunggay (Philippines)		north-western India	Most Pacific Islands; esp. Fiji; thrives on atolls
<i>Musa</i> spp.	banana	many different Pacific Island names depending on cultivar; including vudi (Fiji); fusi (Tonga) fa'i (Samoa); meika (Cooks); mei'a (Societies); meika; mei'a (Marquesas); mai'a (Hawaii)	India and tropical Asia	Most Pacific Islands
<i>Neisosperma oppositifolium</i>		fao (Samoa, Tonga); te kiebutinang (Kiribati)	Indian Ocean to Polynesia and Micronesia	Atolls ; Kiribati; Tuvalu; Tonga
<i>Pandanus dubius</i>	screw pine			
<i>Pandanus tectorius</i>	pandanus; screw pine	balawa; vadra (Fiji); fala; lau fala; fasa (Tonga, Samoa); 'ara (Cooks); fara (Societies); fa'a; ha'a (Marquesas); hala (Hawaii)	Indigenous to most of Melanesia and Polynesia ; aboriginal intr. to Micronesia	Most Pacific Islands

Common Names, Origin and Presence in Pacific Islands (continued)

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Pandanus</i> cultivars	screw pine cultivars	tutu'ila (Tonga) fala (Samoa); rau'ara; pae'ore (Cook's) papa; pae'ore (Societies)	Micronesia; Polynesia and Melanesia	Most Pacific Islands
<i>Paraserianthes</i> falcata	albizia; white albizia	tamalini; tamaligi (Samoa); kasia (Tonga)	Southeast Asia	Modern intr. to Papua New Guinea; Samoa; Hawaii; and other Pacific Islands
<i>Pemphis</i> acidula	pemphis	ngingie (Tonga); te ngea (Kiribati); gie; gigie (Tuvalu); mimiki; gagie (Hawaii)	East Africa to Micronesia and eastern Polynesia	Micronesia (common on atolls) Kiribati; Fiji; Tahiti
<i>Persea</i> americana	avocado; avocado pear; alligator pear	avoka (Samoa, Tonga)	Mexico	Most of the larger Pacific Islands
<i>Pimenta</i> racemosa	bay-rum tree		West Indies and South America	
<i>Pinus</i> caribaea	Caribbean pine	paina (Samoa, Hawaii); paini (Tonga)	West Indies and Central America	Fiji; Vanuatu; New Caledonia; and Tonga (extensive monocultural plantations)
<i>Piper</i> methysticum	kava; kava root	yagona (Fiji); kava (Tonga, Marquesas); 'ava (Samoa, Marquesas); 'awa (Hawaii)	Domesticated from Vanuatu	Papua New Guinea; Vanuatu; Fiji; Tonga; Samoa; Hawaii and Pohnpei in Micronesia; plantings in other areas of Polynesia
<i>Pipturus</i> argenteus		roga (Fiji); 'olonga (Tonga); sogā; lausoga (Samoa); 'oronga (Cook's); ro'a (Societies); hoka (Marquesas) (<i>P. albidus</i> —mamaki in Hawaii)	Malesia through Melanesia to the Marquesas and Marshall Islands and Kiribati in eastern Micronesia; similar endemic species in Hawaii	Polynesia and Melanesia
<i>Pisonia</i> grandis	pisonia; lettuce tree	pu'avai (Samoa); puko (Tonga); te buka (Kiribati); pukavai (Tuvalu) puka; puatea (Hawaii)	Madagascar; tropical Australia; eastern Polynesia; Kiribati and Marshall Islands	Micronesia; Polynesia; and some parts of Melanesia
<i>Pithecellobium</i> dulce	Manila tamarind; sweet inga	optuma (Hawaii)	Central America	
<i>Plumeria</i> obtusa	evergreen frangipani	pua		increasingly common throughout the Pacific
<i>Plumeria</i> rubra	frangipani; plumeria; temple tree; graveyard tree	pua Fiti; pua (Samoa); kalosipani; pua Palangi (Tonga); te meria (Kiribati)	Tropical America (Mexico to Panama)	Most Pacific Islands
<i>Polyscias</i> spp.	panax; hedge panax	tanitani; tagitagi (Samoa); tanetane (Tonga) kahili (Hawaii)	(many species) Tropical Asia; Melanesia	Most Pacific Islands
<i>Pometia</i> pinnata	Oceanic lychee; island lychee	dawa (Fiji); tava (Tonga, Samoa)	Indonesia; Philippines as far east as Fiji; Tonga; Samoa; and Niue	Melanesia and Polynesia
<i>Premna</i> serratifolia		yaro (Fiji); aloalo (Samoa)	East Africa; tropical Asia; and Australia	Most Pacific Islands

Common Names, Origin and Presence in Pacific Islands (continued)

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Pritchardia pacifica</i>	Fiji fan palm; Pacific fan palm	viu (Fiji); piu (Tonga); piu; niu piu (Samoa) loulou (Hawaii)	Fiji; Tonga	Western Polynesia; Tonga
<i>Psidium guajava</i>	guava	kau'ava (Samoa); kuava (Tonga; Tuvalu; Hawaii); te kuava (Kiribati)	Tropical America	Most Pacific Islands
<i>Pterocarpus indicus</i>	narra; New Guinea rosewood; bluewater; sand dragon; padouk		Southeast Asia; Caroline Islands in Micronesia to Vanuatu and Fiji in Melanesia	Micronesia; Melanesia and Hawaii
<i>Rhizophora</i> spp.	red mangrove; American mangrove	togo (Samoa; Tuvalu); tongo; tongolei (Tonga); te tongo (Kiribati)	Indian Ocean to Samoa; Tonga and Tuvalu in western Polynesia and to Gilbert Islands in Micronesia	Micronesia; some parts of Melanesia and Polynesia (Fiji; Tonga; Samoa; Kiribati; Tuvalu)
<i>Santalum</i> spp.	sandalwood	yasi (Fiji); ahi (Tonga) 'ili-ahi (Hawaii)	Pacific Islands	Tonga; Fiji; Vanuatu; Niue
<i>Scaevola taccada</i>	scaevola; saltbrush; half-flower	to'ito'i (Samoa); ngahu (Tonga); te mao (Kiribati); gahu; gasu (Tuvalu) naupaka; naupaka-kahakai (Hawaii)	East Africa; Tropical Asia; northern Australia; Malesia to eastern Polynesia; Micronesia; and Hawaii	Most Pacific Islands (Kiribati; Tuvalu; Tokelau; Nauru; New Guinea; Vanuatu; Hawaii)
<i>Schizostachyum</i> spp.	bamboo; aboriginal bamboo; native bamboo	bitu (Fiji); kofe (Tonga); 'ofe (Samoa); ko'e (Cooks); 'ohe, 'ofe (Societies); kohe (Marquesas); 'ohe (Hawaii)	Asia; Melanesia; to Palau and Yap in the Caroline Islands	Most Pacific Islands; esp. Melanesia and Polynesia (Fiji; Solomon Islands)
<i>Senna alata</i>	candle bush; golden candelabra tree		tropical America	Many Pacific Islands
<i>Senna siamea</i>	kassod; pheasantwood; Thailand shower; minjiri		South and Southeast Asia	
<i>Sesbania grandiflora</i>	sesbania; corkwood tree; grandiflora	ohai-ke'oke'o (Hawaii)	India and tropical Asia	recent intr. to Pacific Islands
<i>Sesbania sesban</i>	sesban		Africa	
<i>Spathodea campanulata</i>	African tulip tree	tiulipe (Tonga)	tropical Africa	Tonga; Samoa; Hawaii; Fiji
<i>Spondias dulcis</i>	vi apple; Polynesian plum	wi (Fiji); vi (Tonga, Samoa, Cooks, Societies, Marquesas, Hawaii)	tropical Asia; aboriginal intr. to Melanesia; Polynesia; and parts of Micronesia	Polynesia; Melanesia; parts of Micronesia
<i>Swietenia macrophylla</i>	West Indian mahogany; large-leaved mahogany; Honduras mahogany	mahokani (Samoa, Tonga)	Central and South America	Fiji; Niue; Tonga; Vanuatu; Solomon Islands; Samoa
<i>Syzygium cumini</i>	jambolan; Java plum		India and Sri Lanka to Malesia	Fiji; Niue; the Cook Islands; the Marquesas; and French Polynesia
<i>Syzygium jambos</i>	rose apple; Malabar plum		Southeast Asia	

Common Names, Origin and Presence in Pacific Islands (continued)

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
<i>Syzygium malaccense</i>	Malay apple; mountain apple	kavika (Fiji); fekika kai (Tonga); nonu f'ia'ia (Samoa) ka'ika (Cook) 'ahi'a (Societies); kehika (Marquesas) 'ohi'a 'ai (Hawaii)	Tropical Asia	Most Pacific Islands
<i>Tamarindus indica</i>	tamarind	tamalin (Tonga, Samoa); tamaligi (Samoa) wi'awa'awa (Hawaii)	tropical Africa and Asia	Fiji; Samoa; Tonga
<i>Terminalia catappa</i>	tropical almond; beach almond; Indian almond; Malabar almond; coastal almond; sea almond	tavola (Fiji); telle (Tonga); talie (Samoa); kamani haole (Hawaii)	Tropical Asia through Malesia; northern Australia; and Melanesia to eastern Polynesia and Micronesia	Kiribati; Nauru; Fiji; Niue; Solomon Islands; Puluwat; Samoa
<i>Terminalia samoensis</i> . T. littoralis	tropical almond	talie (Samoa); telie (Tonga)	Samoa; Micronesia	Samoa; Tonga
<i>Thespesia populnea</i>	Pacific rosewood; milo	mulomulo (Fiji); milo (Tonga; Samoa; Hawaii) miro; 'amae (Societies); mi'o (Marquesas)	Eastern Africa and southern Asia through Malesia to eastern Polynesia; Marshall and Gilbert Islands in Micronesia	esp. in parts of Polynesia Tahiti; Hawaii; Cook Islands; Papua New Guinea; Nauru; Tuvalu; Kiribati
<i>Toona ciliata</i> var. <i>australis</i>	Australian red cedar; surian; Indian mahogany; Indian Toon; Burma toon	sita kulu (Tonga) wood pikake (Hawaii)	Asia; northern Australia and Malesia	Recent intr. to many Pacific Islands
<i>Tournefortia argentea</i>	beach heliotrope	tausuni (Samoa); touhuni (Tonga); te ren (Kiribati) tahinu (Hawaii)	Eastern Africa; Southeast Asia through Malesia and eastern Polynesia; to Marshall Islands and Kiribati in Micronesia	Micronesia and Polynesia
<i>Veitchia</i> spp.	niasawa palm (V. joannis) ; Manila palm (V. merillii); merrill palm	niu sawa (Fiji); niu kula (Tonga)	Fiji	Fiji; Tonga
<i>Vitex negundo/trifolia</i>	vitex; beach vitex; blue vitex	namulega (Samoa); lala tahi (Tonga) polinalina; kolokolo-kahakai (Hawaii)	Southern Africa and Indian Ocean through southern Asia; Malesia; and northern Australia	Most Pacific Islands Marshall Islands; Melanesia; Nauru; Hawaii

Index by English common names

aboriginal bamboo
African tulip tree
albizia
albizia
Alexandrian laurel
American mangrove
Australian red cedar
avocado
avocado pear
Bagras eucalyptus
bamboo
banana
banyan
bay-rum tree
beach almond
beach cordia
beach heliotrope
beach hibiscus tree
beach mallow
beach mulberry
beach vitex
Benjamin tree
betel-nut
betel-nut palm
Borneo teak
breadfruit
brown mangrove
brown salwood
caimito
calamondin
calamondin orange
calliandra
canarium almond
candlenut
carambola
Caribbean pine
casuarina
cashew
Chinaberry
Chinese lantern tree
coconut
coconut palm
common bamboo
coral tree
corkwood tree
cut nut
dao
drumstick tree
Dyer's fig
evergreen frangipani
fig
Fiji fan palm
Fiji kauri
fish-poison tree
flamboyant
flooded gum
forest red gum

Schizostachyum spp.
Spathodea campanulata
Albizia lebbbeck
Paraserianthes falcataria
Calophyllum inophyllum
Rhizophora spp.
Toona ciliata var. *australis*
Persea americana
Persea americana
Eucalyptus deglupta
Schizostachyum spp.
Musa spp.
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Hibiscus tiliaceus
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Areca catechu
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Citrus mitis
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Cocos nucifera
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Eucalyptus tereticornis

frangipani
gliricidia
gnetum
golden shower tree
grapefruit
guava
guest tree
guettarda
hedge panax
Honduras mahogany
hoop pine
horse cassia
horseradish tree
ice cream bean
Indian almond
Indian banyan
Indian coral tree
Indian laburnum
Indian lilac
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inga
ipil
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kaffir lime
kamarere
kapok tree
kassod
kauri
kauri pine
kava
kava root
kleinhovia
koa
koaia
lantern tree
large-leaved mahogany
lemon
lemon-scented gum
lettuce tree
leucaena
lime
litchi
lychee
Macadamia nut
macaranga
madre de cacao
Malabar plum

Plumeria rubra
Gliricidia sepium
Gnetum gnemon
Cassia fistula
Citrus paradisi
Psidium guajava
Kleinhovia hospita
Guettarda speciosa
Polyscias spp.
Spathodea campanulata
Araucaria cunninghamii
Cassia grandis
Moringa oleifera
Inga edulis
Syzygium malaccense
Ficus bengalensis
Erythrina variegata
Cassia fistula
Mangifera indica
Terminalia samoensis/littoralis
Morinda citrifolia
Inga edulis
Intsia bijuga
Leucaena leucocephala
Casuarina equisetifolia
Pometia pinnata
Metroxylon spp.
Artocarpus heterophyllus
Artocarpus heterophyllus
Syzygium cumini
Canarium harveyi
Bischofia javanica
Syzygium cumini
Gnetum gnemon
Citrus hystrix
Eucalyptus deglupta
Ceiba pentandra
Senna siamea
Agathis macrophylla
Agathis macrophylla
Piper methysticum
Piper methysticum
Kleinhovia hospita
Acacia koa
Acacia koaia
Hernandia nymphaeifolia
Swietenia macrophylla
Citrus limon
Eucalyptus citriodora
Pisonia grandis
Leucaena leucocephala
Citrus aurantifolia
Litchi sinensis
Litchi sinensis
Macadamia integrifolia
Macaranga spp.
Gliricidia sepium
Syzygium jambos

Malay apple	<i>Syzygium malaccense</i>	red sandalwood	<i>Adenanthera pavonina</i>
malunggay	<i>Moringa oleifera</i>	rose apple	<i>Syzygium jambos</i>
mandarin orange	<i>Citrus reticulata</i>	rough lemon	<i>Citrus hystrix</i>
mangium	<i>Acacia mangium</i>	royal poinciana	<i>Delonix regia</i>
mango	<i>Mangifera indica</i>	sago palm	<i>Metroxylon</i> spp.
Manila palm (V. merillii)	<i>Veitchia</i> spp.	saltbrush	<i>Scaevola taccada</i>
Manila tamarind	<i>Pithecellobium dulce</i>	sandalwood	<i>Santalum</i> spp.
Mexican lilac	<i>Gliricidia sepium</i>	scaevola	<i>Scaevola taccada</i>
milo	<i>Thespesia populnea</i>	screw pine	<i>Pandanus dubius</i>
Mindanao gum	<i>Eucalyptus deglupta</i>	screw pine	<i>Pandanus tectorius</i>
monkeypod	<i>Albizia saman</i>	screw pine cultivars	<i>Pandanus cultivars</i>
Moreton Bay pine	<i>Araucaria cunninghamii</i>	sea trumpet	<i>Cordia subcordata</i>
mountain apple	<i>Syzygium malaccense</i>	sesban	<i>Sesbania sesban</i>
narra	<i>Pterocarpus indicus</i>	sesbania	<i>Sesbania grandiflora</i>
native bamboo	<i>Scaevola taccada</i>	Seville orange	<i>Citrus aurantium</i>
native hop bush	<i>Dodonea viscosa</i>	she oak	<i>Casuarina equisetifolia</i>
neem	<i>Azadirachta indica</i>	silk-cotton tree	<i>Ceiba pentandra</i>
New Guinea rosewood	<i>Pterocarpus indicus</i>	siris tree	<i>Albizia lebbek</i>
New Guinea walnut	<i>Dracontomelon vitiense</i>	sour orange	<i>Citrus aurantium</i>
niasawa palm (V. joannis)	<i>Veitchia</i> spp.	soursop	<i>Annona muricata</i>
none	<i>Lumnitzera littorea</i>	spotted gum	<i>Eucalyptus citriodora</i>
none	<i>Pipturus argenteus</i>	star fruit	<i>Averrhoa carambola</i>
Norfolk Island pine	<i>Araucaria heterophylla</i>	starapple	<i>Chrysophyllum cainito</i>
Northern black wattle	<i>Acacia auriculiformis</i>	sugarapple	<i>Annona squamosa</i>
Oceanic lychee	<i>Pometia pinnata</i>	surian	<i>Toona ciliata</i> var. <i>australis</i>
orange	<i>Citrus sinensis</i>	sweet inga	<i>Pithecellobium dulce</i>
Oriental mangrove	<i>Bruguiera gymnorhiza</i>	sweetsop	<i>Annona squamosa</i>
Pacific fan palm	<i>Pritchardia pacifica</i>	Sydney blue gum	<i>Eucalyptus saligna</i>
Pacific rosewood	<i>Thespesia populnea</i>	Tahitian chestnut	<i>Inocarpus fagifer</i>
padouk	<i>Psidium guajava</i>	tamarind	<i>Tamarindus indica</i>
panax	<i>Polyscias</i> spp.	tangerine	<i>Citrus reticulata</i>
pandanus	<i>Pandanus tectorius</i>	toi	<i>Alphitonia zizyphoides</i>
papaya	<i>Carica papaya</i>	tropical almond	<i>Terminalia catappa</i>
paper mulberry	<i>Broussonetia papyrifera</i>	tropical almond	<i>Terminalia samoensis/littoralis</i>
Papua wattle	<i>Acacia auriculiformis</i>	vi apple	<i>Spondias dulcis</i>
pawpaw	<i>Carica papaya</i>	vitex	<i>Vitex negundo/trifolia</i>
pemphis	<i>Pemphis acidula</i>	weeping fig	<i>Ficus benjamina</i>
perfume tree	<i>Cananga odorata</i>	West Indian lime	<i>Citrus aurantifolia</i>
pheasantwood	<i>Senna siamea</i>	West Indian mahogany	<i>Swietenia macrophylla</i>
pili nut	<i>Canarium harveyi</i>	white albizia	<i>Paraserianthes falcataria</i>
pink and white shower tree	<i>Cassia javanica</i>	ylang-ylang	<i>Cananga odorata</i>
pink shower tree	<i>Cassia grandis</i>		
pink shower tree	<i>Cassia javanica</i>		
pisonia	<i>Pisonia grandis</i>		
plumeria	<i>Plumeria rubra</i>		
poinciana	<i>Delonix regia</i>		
Polynesian plum	<i>Spondias dulcis</i>		
pomelo	<i>Citrus maxima</i>		
portia tree	<i>Calophyllum inophyllum</i>		
pride of India	<i>Melia azedarach</i>		
pua tree	<i>Fagraea berteriana</i>		
pummelo	<i>Citrus maxima</i>		
Queensland kauri	<i>Agathis robusta</i>		
Queensland nut	<i>Macadamia integrifolia</i>		
rain tree	<i>Albizia saman</i>		
red bead tree	<i>Adenanthera pavonina</i>		
red canarium	<i>Canarium indicum</i>		
red mangrove	<i>Rhizophora</i> spp.		

Species Lists by Product

Fruit/Nut species			
<i>Adenanthera pavonina</i>	<i>Gnetum gnemon</i>	<i>Agathis macrophylla</i>	<i>Kleinhovia hospita</i>
<i>Albizia saman</i>	<i>Inga edulis</i>	<i>Agathis robusta</i>	<i>Leucaena leucocephala</i>
<i>Aleurites moluccana</i>	<i>Inocarpus fagifer</i>	<i>Agathis vitiensis</i>	<i>Litchi sinensis</i>
<i>Anacardium occidentale</i>	<i>Leucaena leucocephala</i>	<i>Albizia lebbeck</i>	<i>Lumnitzera littorea</i>
<i>Annona muricata</i>	<i>Litchi sinensis</i>	<i>Albizia saman</i>	<i>Macadamia integrifolia</i>
<i>Annona squamosa</i>	<i>Macadamia integrifolia</i>	<i>Aleurites moluccana</i>	<i>Macaranga</i> spp.
<i>Areca catechu</i>	<i>Mangifera indica</i>	<i>Alphitonia zizyphoides</i>	<i>Melia azedarach</i>
<i>Artocarpus altilis</i>	<i>Morinda citrifolia</i>	<i>Araucaria cunninghamii</i>	<i>Morinda citrifolia</i>
<i>Artocarpus heterophyllus</i>	<i>Moringa oleifera</i>	<i>Araucaria heterophylla</i>	<i>Neisosperma oppositifolium</i>
<i>Averrhoa carambola</i>	<i>Musa</i> spp.	<i>Areca catechu</i>	<i>Pandanus dubius</i>
<i>Barringtonia edulis</i>	<i>Neisosperma oppositifolium</i>	<i>Artocarpus altilis</i>	<i>Pandanus tectorius</i>
<i>Bruguiera gymnorhiza</i>	<i>Pandanus dubius</i>	<i>Artocarpus heterophyllus</i>	<i>Paraserianthes falcataria</i>
<i>Canarium indicum</i>	<i>Pandanus tectorius</i>	<i>Azadirachta indica</i>	<i>Pemphis acidula</i>
<i>Canarium</i> spp./harveyi	<i>Pemphis acidula</i>	<i>Bambusa vulgaris</i>	<i>Pinus caribaea</i>
<i>Carica papaya</i>	<i>Persea americana</i>	<i>Barringtonia asiatica</i>	<i>Pipturus argenteus</i>
<i>Chrysophyllum cainito</i>	<i>Pipturus argenteus</i>	<i>Barringtonia edulis</i>	<i>Pisonia grandis</i>
<i>Citrus aurantifolia</i>	<i>Pithecellobium dulce</i>	<i>Bischofia javanica</i>	<i>Pometia pinnata</i>
<i>Citrus aurantium</i>	<i>Pometia pinnata</i>	<i>Bruguiera gymnorhiza</i>	<i>Premna serratifolia</i>
<i>Citrus hystrix</i>	<i>Premna serratifolia</i>	<i>Calophyllum inophyllum</i>	<i>Pritchardia pacifica</i>
<i>Citrus limon</i>	<i>Pritchardia pacifica</i>	<i>Cananga odorata</i>	<i>Psidium guajava</i>
<i>Citrus maxima</i>	<i>Psidium guajava</i>	<i>Canarium indicum</i>	<i>Pterocarpus indicus</i>
<i>Citrus mitis</i>	<i>Spondias dulcis</i>	<i>Canarium</i> spp./harveyi	<i>Rhizophora</i> spp.
<i>Citrus paradisi</i>	<i>Syzygium cumini</i>	<i>Casuarina equisetifolia</i>	<i>Scaevola taccada</i>
<i>Citrus reticulata</i>	<i>Syzygium jambos</i>	<i>Chrysophyllum cainito</i>	<i>Schizostachyum</i> spp.
<i>Citrus sinensis</i>	<i>Syzygium malaccense</i>	<i>Cocos nucifera</i>	<i>Senna siamea</i>
<i>Cocos nucifera</i>	<i>Tamarindus indica</i>	<i>Cordia subcordata</i>	<i>Sesbania grandiflora</i>
<i>Dracontomelon vitiense</i>	<i>Terminalia catappa</i>	<i>Dodonaea viscosa</i>	<i>Spathodea campanulata</i>
<i>Ficus carica</i>	<i>Terminalia samoensis/ littoralis</i>	<i>Dracontomelon vitiense</i>	<i>Spondias dulcis</i>
<i>Ficus tinctoria</i>	<i>Veitchia</i> spp.	<i>Eucalyptus citriodora</i>	<i>Swietenia macrophylla</i>
		<i>Eucalyptus deglupta</i>	<i>Syzygium cumini</i>
		<i>Eucalyptus saligna</i>	<i>Syzygium jambos</i>
		<i>Eucalyptus tereticornis</i>	<i>Syzygium malaccense</i>
			<i>Terminalia catappa</i>
		<i>Fagraea berteriana</i>	<i>Terminalia samoensis/ littoralis</i>
		<i>Ficus tinctoria</i>	<i>Thespesia populnea</i>
		<i>Flueggea flexuosa</i>	<i>Toona ciliata</i> var. <i>australis</i>
		<i>Gliricidia sepium</i>	<i>Tournefortia argentea</i>
		<i>Glochidion ramiflorum</i> /spp.	<i>Veitchia</i> spp.
		<i>Guettarda speciosa</i>	<i>Vitex negundo/trifolia</i>
Leaf Vegetable		Nitrogen Fixing	
<i>Adenanthera pavonina</i>	<i>Polyscias</i> spp.	<i>Acacia auriculiformis</i>	<i>Gliricidia sepium</i>
<i>Anacardium occidentale</i>	<i>Premna serratifolia</i>	<i>Acacia koa</i>	<i>Inga edulis</i>
<i>Artocarpus altilis</i>	<i>Pterocarpus indicus</i>	<i>Acacia koaia</i>	<i>Inocarpus fagifer</i>
<i>Artocarpus heterophyllus</i>	<i>Scaevola taccada</i>	<i>Acacia mangium</i>	<i>Intsia bijuga</i>
<i>Carica papaya</i>	<i>Sesbania grandiflora</i>	<i>Albizia lebbeck</i>	<i>Leucaena leucocephala</i>
<i>Ceiba pentandra</i>	<i>Sesbania sesban</i>	<i>Albizia saman</i>	<i>Paraserianthes falcataria</i>
<i>Gnetum gnemon</i>	<i>Spondias dulcis</i>	<i>Calliandra calothyrsus</i>	<i>Pithecellobium dulce</i>
<i>Leucaena leucocephala</i>	<i>Syzygium malaccense</i>	<i>Casuarina equisetifolia</i>	<i>Pterocarpus indicus</i>
<i>Mangifera indica</i>	<i>Thespesia populnea</i>	<i>Erythrina subumbrans</i>	<i>Sesbania sesban</i>
<i>Moringa oleifera</i>	<i>Toona ciliata</i> var. <i>australis</i>	<i>Erythrina variegata</i>	
<i>Pandanus tectorius</i>	<i>Tournefortia argentea</i>		
<i>Pipturus argenteus</i>	<i>Veitchia</i> spp.		
<i>Pisonia grandis</i>	<i>Vitex negundo/trifolia</i>		
Wood/Timber			
<i>Acacia auriculiformis</i>	<i>Gyrocarpus americanus</i>		
<i>Acacia koa</i>	<i>Hernandia nymphaeifolia</i>		
<i>Acacia koaia</i>	<i>Hibiscus tiliaceus</i>		
<i>Acacia mangium</i>	<i>Inocarpus fagifer</i>		
<i>Adenanthera pavonina</i>	<i>Intsia bijuga</i>		

Windbreak		Protection from salt spray	
Acacia auriculiformis	Gyrocarpus americanus	Albizia lebbeck	Intsia bijuga
Acacia koa	Hernandia nymphaeifolia	Araucaria heterophylla	Lumnitzera littorea
Acacia koaia	Hibiscus tiliaceus	Barringtonia asiatica	Macaranga spp.
Acacia mangium	Inocarpus fagifer	Calophyllum inophyllum	Morinda citrifolia
Adenanthera pavonina	Intsia bijuga	Casuarina equisetifolia	Neisosperma oppositifolium
Albizia lebbeck	Kleinhovia hospita	Cocos nucifera	Pandanus cultivars
Albizia saman	Leucaena leucocephala	Cordia subcordata	Pandanus tectorius
Aleurites moluccana	Lumnitzera littorea	Delonix regia	Pemphis acidula
Anacardium occidentale	Macadamia integrifolia	Erythrina variegata	Pisonia grandis
Annona muricata	Macaranga spp.	Ficus bengalensis	Polyscias spp.
Annona squamosa	Mangifera indica	Ficus benjamina	Premna serratifolia
Araucaria cunninghamii	Moringa oleifera	Ficus tinctoria	Rhizophora spp.
Araucaria heterophylla	Musa spp.	Gliricidia sepium	Scaevola taccada
Artocarpus altilis	Pandanus cultivars	Glochidion ramiflorum/spp.	Terminalia catappa
Artocarpus heterophyllus	Paraserianthes falcata	Guettarda speciosa	Terminalia samoensis/ littoralis
Azadirachta indica	Pemphis acidula	Gyrocarpus americanus	Thespesia populnea
Bambusa vulgaris	Pinus caribaea	Hernandia nymphaeifolia	Tournefortia argentea
Barringtonia asiatica	Pisonia grandis	Hibiscus tiliaceus	Vitex negundo/trifolia
Bischofia javanica	Pithecellobium dulce	Leucaena leucocephala	
Bruguiera gymnorrhiza	Polyscias spp.		
Calliandra calothyrsus	Pometia pinnata		
Calophyllum inophyllum	Psidium guajava		
Casuarina equisetifolia	Pterocarpus indicus		
Ceiba pentandra	Rhizophora spp.		
Chrysophyllum cainito	Scaevola taccada		
Cocos nucifera	Schizostachyum spp.		
Cordia subcordata	Senna siamea		
Delonix regia	Sesbania sesban		
Dodonea viscosa	Spathodea campanulata		
Erythrina subumbrans	Swietenia macrophylla		
Erythrina variegata	Syzygium cumini		
Ficus bengalensis	Syzygium jambos		
Ficus benjamina	Tamarindus indica		
Gliricidia sepium	Terminalia catappa		
Glochidion ramiflorum/spp.	Thespesia populnea		
Guettarda speciosa	Tournefortia argentea		

Resources and Recommended Reading

Local Assistance

There is no substitute for direct, locally appropriate experience. Landowners are encouraged to contact the local offices of the Natural Resources Conservation Service and/or Cooperative Extension Service for personal assistance.

The Natural Resources Conservation Service (NRCS, formerly the Soil Conservation Service) provides assistance with conservation practices such as windbreaks and contour plantings. They also have a Forest Incentive Program, to increase the supply of timber products from nonindustrial private forest lands. They have offices throughout the American-affiliated Pacific. To find the one nearest you, contact:

NRCS State Office
P.O. Box 50004, Honolulu, HI 96850-0050
Tel: 808-541-2600, Fax: 808-541-1335 or 541-2652
Web site: <http://www.hi.nrcs.usda.gov>

The Cooperative Extension Service (CES) of the University of Hawaii can assist landowners with further information. There are CES offices throughout the State of Hawaii; to local one near you contact:

Cooperative Extension Service Main Office
3050 Maile Way, Gilmore Hall 203, Honolulu, HI 96822
Tel: 808-956-8397, Fax: 808-956-9105
E-mail: extension@ctahr.hawaii.edu
Web site: <http://www2.ctahr.hawaii.edu>

The State of Hawaii Department of Land and Natural Resources Division of Forestry and Wildlife provides information, education, and support for forestry. Some cost-sharing and other partnerships with private landowners are available. Contact:

Division of Forestry and Wildlife
1151 Punchbowl St. Room 325, Honolulu, HI 96813-3089
Tel: 808-587-0166, Fax: 808-587-0160
Web site: <http://www.hawaii.gov/dlnr/dofaw/>

Resources for Further Reading

Books on Multipurpose Species

- Abbott, I.A. 1992. *La'au Hawai'i: Traditional Hawaiian Uses of Plants*. Bishop Museum Press, Honolulu.
- ADAP Project. 1994. *Pacific Islands Farm Manual*, ADAP Project, Tropical Energy House, University of Hawaii, Honolulu, Hawaii 96822.
- Clarke, W.C., and R.R. Thaman. 1993. *Agroforestry in the Pacific Islands: Systems for Sustainability*. United Nations University Press, Tokyo.
- Facciola, S. 1998. *Cornucopia II: A Source Book of Edible Plants*, Kampong Publications, Vista, California.
- Handy, E.S.C., E.G. Handy, with M.K. Pukui. 1972. *Native Planters of Old Hawai'i: Their Life, Lore, and Environment*. Bernice P. Bishop Museum, Honolulu, Hawaii.
- Krauss, B.H. 1993. *Plants in Hawaiian Culture*. University of Hawaii Press, Honolulu.
- Lemmens, R.H.M.J., I. Soerianegara, and W.C. Wong, eds. 1995. *Plant Resources of Southeast Asia No. 5(2): Timber Trees: Minor Commercial Timbers*. PROSEA, Bogor, Indonesia.

- Martin, F.W., R.M. Ruberté, and L.S. Meitzner. 1998. *Edible Leaves of the Tropics*. Educational Concerns for Hunger Organization, Inc., North Fort Myers, Florida.
- Morton, J.F. 1987. *Fruits of Warm Climates*. Julia Morton, Media, Incorporated, Greensboro, North Carolina.
- National Academy of Sciences. 1979. *Tropical Legumes: Resources for the Future*, National Academy Press, Washington, DC
- National Academy of Sciences. 1990. *Saline Agriculture—Salt Tolerant Plants for Developing Countries*, National Academy Press, Washington, DC.
- Neal, M.C. 1965. In *Gardens of Hawaii*. Bernice P. Bishop Museum, Honolulu, Hawaii.
- Smith, A.C. 1979-1991. *Flora Vitiensis Nova: A New Flora of Fiji (Spermatophytes Only): Vol 1-5*. Pacific Tropical Botanical Garden, Lawai, Kauai, Hawaii.
- Soerianegara, I., and R.H.M.J. Lemmens, Eds. 1994. *Plant Resources of Southeast Asia No. 5(1): Timber Trees: Major Commercial Timbers*. PROSEA, Bogor, Indonesia.
- Thaman, R.R., and W.A. Whistler. 1996. *A Review of Uses and Status of Trees and Forests in Land-Use Systems in Samoa, Tonga, Kiribati and Tuvalu with Recommendations for Future Action*. South Pacific Forestry Development Programme, Suva, Fiji.
- Verheij, E.W.M., and R.E. Coronel, Eds. 1992. *Plant Resources of Southeast Asia No. 2: Edible Fruits and Nuts*. PROSEA, Bogor, Indonesia.
- Thaman, R.R., and W.A. Whistler. 1996. *A Review of Uses and Status of Trees and Forests in Land-Use Systems in Samoa, Tonga, Kiribati and Tuvalu with Recommendations for Future Action*. South Pacific Forestry Development Programme, Suva, Fiji.
- Whistler, W. A. 1991. *The Ethnobotany of Tonga: The Plants, Their Tongan Names, and Their Uses*. Bishop Museum Press, Honolulu.
- Verheij, E.W.M., and R.E. Coronel, Eds. 1992. *Plant Resources of Southeast Asia No. 2: Edible Fruits and Nuts*. PROSEA, Bogor, Indonesia.

Books on Agroforestry, Systems Design, and Tree Selection

- Clarke, W.C., and R.R. Thaman. 1993. *Agroforestry in the Pacific Islands: Systems for Sustainability*. United Nations University Press, Tokyo.
- International Institute of Rural Reconstruction. 1990. *Agroforestry Technology Information Kit*, IIRR, Room 1270, 475 Riverside Dr., New York, NY 10115.
- Landauer, K., and M. Brazil, Eds. 1990. *Tropical Home Gardens*. United Nations University Press, Tokyo.
- Mollison, B. 1990. *Permaculture: A Practical Guide for a Sustainable Future*, Island Press, Washington, DC.
- Mollison, B., and R.M. Slay. 1991. *Introduction to Permaculture*, Tagari Publications, Tyalgum, Australia.
- Nair, P.K.R. 1993. *An Introduction to Agroforestry*. Kluwer Academic Publishers, Dordrecht, The Netherlands.
- Reid, R., and G. Wilson. 1985. *Agroforestry in Australia and New Zealand*, Goddard & Dobson, Victoria, Australia.
- Rocheleau, D., F. Weber, and A. Field-Juma. 1989. *Agroforestry in Dryland Africa*. International Council for Research in Agroforestry, Nairobi, Kenya.
- Wood, P.J., and J. Burley. 1991. *A Tree for All Reasons: The Introduction and Evaluation of Multipurpose Trees for Agroforestry*. International Council for Research in Agroforestry, Nairobi, Kenya.
- Young, A. 1997. *Agroforestry for Soil Management—2nd Edition*. CAB International, New York, New York.

Organizations

Educational Concerns for Hunger Organization (ECHO) has many online publications related to agroforestry, including an extensive offering of hard-to-find publications in its online bookstore. Address: ECHO, 17430 Durance Rd., N. Ft. Myers, FL 33917, USA; Tel: 941-543-3246; Fax: 941-543-5317; E-mail: echo@echonet.org; Web site: <http://www.echonet.org/>

Farm, Community, and Tree Network (FACT Net) is dedicated to stimulating the use of multipurpose trees. FACT Net offers many publications at a reasonable cost, including comprehensive fact sheets on many important agroforestry tree species. Address: FACT Net, Winrock International, 38 Winrock Drive, Morrilton, Arkansas 72110-9370, USA; Tel: 501-727-5435; Fax: 501-727-5417; E-mail: forestry@winrock.org; Web site: <http://www.winrock.org/forestry/factnet.htm>

The Forest Garden Initiative Program supported by Counterpart International is developing a model silvicultural system that fosters the restoration of degraded land through the development of family-owned forest rural gardens around the world. Address: Counterpart International, Inc., 1200 18th Street NW, Suite 1100, Washington, DC 20036, USA; Tel: 202-296-9676; Fax: 202-296-9679; E-mail: info@counterpart.org; Web sites: <http://www.forestgarden.org/>, <http://www.counterpart.org/>

The Forestry Programme of the Food and Agriculture Organization of the United Nations (FAO) addresses how to use trees, forests, and related resources to improve people's economic, environmental, social, and cultural conditions while ensuring that resources meet the needs of future generations. Many useful publications are available online. Address: Publications and Information Coordinator, Forestry Department, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy; Tel.: +39-6-57054778; Fax: +39-6-57052151; E-mail: Forestry-www@fao.org; Web site: <http://www.fao.org/fo/>

International Center for Research in Agroforestry (ICRAF) has extensive worldwide programs in agroforestry research and training. Address: ICRAF, P.O. Box 30677, Nairobi, Kenya; Tel: +254-2-521450 or +1 650 833 6645; Fax: +254-2-521001 or +1-650-833-6646; E-mail: ICRAF@cgiar.org; Web site: <http://www.cgiar.org/icraf/>

The International Institute of Rural Reconstruction (IIRR) conducts workshops and publishes popular practical works emphasizing participatory approaches to development and agroforestry. Address: Yen Center and Headquarters, Silang, Cavite, Philippines 4118; Tel: +63-46-4142417; Fax: +63-46-4142420; E-mail: iirr@cav.pworld.net.ph; Web site: <http://www.cav.pworld.net.ph/~iirr/>

The National Agroforestry Center (NAC) of the US Department of Agriculture supports practices which integrate trees and agriculture and publishes many practical agroforestry materials including Inside Agroforestry, a newsletter for natural resource professionals with a temperate focus. Address: USDA Forest Service/Natural Resources Conservation Service, East Campus—UNL, Lincoln, Nebraska 68583-0822, USA; Tel: 402-437-5178; Fax: 402-437-5712; Web site: <http://www.unl.edu/nac/>

Pacific Islands Forests & Trees Support Programme (PIF&TSP) works to strengthen national capabilities in Pacific Island countries to manage, conserve, use, and develop their forest and tree resources sustainably. Address:

SPC/UNDP/AusAID/FAO SPC, Private Mail Bag, Suva, Fiji;
Web site: <http://www.spc.org.nc/En/forestry.htm>

The People and Plants Initiative carries out applied research projects, community workshops, exchanges, and training courses with young ethnobotanists from developing countries and disseminates results and information through their People and Plants Online Program.

Web site: <http://www.rbgekew.org.uk/peopleplants/index.html>

Permanent Agriculture Resources (PAR) carries out agroforestry education and research in the Pacific, provides workshops, and publishes Agroforestry Guides for Pacific Islands and The Overstory, a free e-mail journal. Address: Permanent Agriculture Resources, P.O. Box 428, Holualoa, HI 96725, USA; Tel: 808-324-4427; Fax: 808-324-4129; E-mail: par@agroforestry.net; Web site: <http://www.agroforestry.net>

Periodicals

Agroforestry Today carries practitioner-oriented reports from around the world on trees and crops on farms, and on the people who plant them. Published by International Centre for Research in Agroforestry (ICRAF). Address: Agroforestry Today, P.O. Box 30677, Nairobi, Kenya; Fax: +254-2-521001; E-mail: aftoday@cgiar.org

APANews, the newsletter of the Asia-Pacific Agroforestry Network (APAN), is dedicated to the exchange of information on agroforestry research, development, and training in the Asia-Pacific region. Address: APANews, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok 10200, Thailand; Fax: +66-2-280-0445; E-mail: fao-rap@fao.org

ILEIA Newsletter covers technical and social options for ecological and sustainable agriculture, and has frequent articles on tree-based systems. Address: LEISA, P.O. Box 64, 3830 AB Leusden, The Netherlands; Tel: +31-33-494 30 86; Fax: +31-33-495 17 79; E-mail: ileia@ileia.nl

The Indigenous Knowledge & Development Monitor focuses on the role that indigenous knowledge can play in participatory approaches to sustainable development. Web site: <http://www.nuffic.nl/ciran/ikdm/>

Non-wood News is an information-rich newsletter produced by FAO's Wood and Non-wood Products Utilization Branch, providing readers with current information on nontimber forest products and their contribution to the sustainable development of the world's forest resources. Address: Non-Wood News, Forest Products Division, Forestry Department, FAO, Viale delle Terme di Caracalla, 00100 Rome, Italy; Tel: +39-06-570-52746; Fax: +39-06-570-55618; Web site: <http://www.fao.org/forestry/FOP/FOPW/NWFP/newsle-e.stm>

The Overstory, produced by Permanent Agriculture Resources (PAR), is a free e-mail journal covering concepts central to agroforestry practices in the tropics including up-to-date references and web links. Address: The Overstory, P.O. Box 428, Holualoa, HI 96725, USA; Tel: 808-324-4427; Fax: 808-324-4129; E-mail: overstory@agroforester.com; Web site: <http://www.overstory.com>

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About the Authors

Dr. Randolph R. Thaman is Professor of Pacific Island Biogeography at the University of the South Pacific, Suva, Fiji. He also serves as chairman of the Fiji National Food and Nutrition Committee. Thaman is the author of several important books including, *Agro-Forestry in the Pacific Islands: Systems for Sustainability*.

Craig R. Elevitch is an agroforestry specialist with more than ten years of public and private sector experience in tropical agroforest and forest management. He has a M.S. degree in Electrical Engineering (Dynamical Systems) from Cornell University.

Kim M. Wilkinson is the Education Director for Permanent Agriculture Resources and editor of *The Overstory*, an international tropical agroforestry journal. She has B.A. degrees in Anthropology and Ecology from Emory University.

Christi A. Sobel is a freelance scientific illustrator and artist who has been published by the Royal Botanic Gardens, Kew, and Educational Concerns for Hunger Organization (ECHO). She holds a graduate degree in Scientific Illustration from University of California, Santa Cruz.

References

- Clarke, W.C. 1971. *People and place: An ecology of a New Guinean community*. University of California Press, Berkeley, Los Angeles and London. P. 275–298.
- Clarke, W.C. 1977. The structure of permanence: The relevance of self-subsistence communities for world ecosystem management. In: T. Bayliss-Smith and R. Feachem, Eds. *Subsistence and Survival: Rural Ecology in the Pacific*. Academic Press, New York, New York.
- Clarke, W.C., and R.R. Thaman. 1993. *Agroforestry in the Pacific Islands: Systems for sustainability*. United Nations University Press, Tokyo.
- Clarke, W.C., and R.R. Thaman. 1997. Incremental agroforestry: Enriching Pacific landscapes. *Contemporary Pacific* 9 (1): 121–148.
- Cox, P. A., and S. A. Banack. 1991. *Islands, Plants, and Polynesians: An Introduction to Polynesian Ethnobotany*. Discorides Press, Portland, Oregon.
- Decker, B.G. 1971. *Plants, man and the landscape in Marquesan valleys, French Polynesia*. Ph. D. thesis. Department of Geography, University of California, Berkeley.

- Falanruw, M.V.C. 1990. The Food Production System of the Yap Islands. In: Landauer, K., and Brazil, M. Eds. Tropical home gardens. United Nations University Press, Tokyo.
- International Institute of Tropical Forestry. 1989-1998. Species Notes. USDA Forest Service, Rio Piedras, Puerto Rico.
- King, K.F.S., and M.T. Chandler. 1978. The wasted lands: The programme of work of ICRAF. International Council for Research in Agroforestry (ICRAF), Nairobi.
- Krauss, B. 1974. Ethnobotany of Hawaii. Honolulu: University of Hawaii Press.
- Kunzel, W. 1989. Agroforestry in Tonga: A Traditional Source for Development of Sustainable Farming Systems. Occasional Paper 12, South Pacific Smallholder Project, University of New England, Armidale, N.S.W., Australia.
- Lemmens R.H.M.J., I. Soerianegara, and W.C. Wong, eds. 1995. Plant Resources of Southeast Asia No. 5(2): Timber Trees: Minor Commercial Timbers. PROSEA, Bogor, Indonesia.
- Little, E.L., and R.G. Skolman. 1989. Common Forest Trees of Hawaii. Agriculture Handbook No. 679. USDA Forest Service, Washington, DC.
- MacDicken, K.G. 1994. Selection and Management of Nitrogen-Fixing Trees. Winrock International, Morrilton, Arkansas USA.
- Mbuya L.P., H.P. Msanga, C.K. Ruffo, A. Birne, and B. Tengnäs. 1994. Useful trees and shrubs for Tanzania: Identification, Propagation and Management for Agricultural and Pastoral Communities. Regional Soil Conservation Unit (RSCU), Swedish International Development Authority (SIDA), Nairobi, Kenya.
- Morton, J.F. 1987. Fruits of Warm Climates. Julia Morton, Media, Incorporated, Greensboro, North Carolina.
- Neal, M.C. 1965. In Gardens of Hawaii. Bernice Puahi Bishop Museum, Honolulu.
- Nair, P.K.R. 1993. An Introduction to Agroforestry. Kluwer Academic Publishers, Dordrecht, The Netherlands.
- Raynor, W. 1992. Economic Analysis of Indigenous Agroforestry: A Case Study on Pohnpei Island, Federated States of Micronesia. In Sullivan, G. et al, Eds. Financial and Economic Analyses of Agroforestry Systems. Proceedings of a workshop held in Honolulu, Hawaii, USA, July 1991. Paia, Hawaii.
- Rocheleau, D., F. Weber, and A. Field-Juma. 1989. Agroforestry in Dryland Africa. Nairobi: International Council for Research in Agroforestry.
- Smith, A.C. 1979-1991. Flora Vitiensis Nova: A New Flora of Fiji (Spermatophytes Only): Vol 1-5. Pacific Tropical Botanical Garden, Lawai, Kauai, Hawaii.
- Soerianegara, I., and R.H.M.J. Lemmens, Eds. 1994. Plant Resources of Southeast Asia No. 5(1): Timber Trees: Major Commercial Timbers. PROSEA, Bogor, Indonesia.
- Thaman, R.R. 1982. Deterioration of traditional food systems, increasing malnutrition and food dependency in the Pacific islands. *Journal of Food and Nutrition* 39(3):109-121.
- Thaman, R.R. 1987. Urban agroforestry: The Pacific islands and beyond. *Unasylva* 39(55):2-13.
- Thaman, R.R. 1989. Agrodeforestation and the neglect of trees: Threat to the wellbeing of Pacific societies. *Ples: An Environmental Education Journal for the South Pacific Region* 5:48-64.
- Thaman, R.R. 1989. Fijian agroforestry: Trees, people and sustainable polycultural development. In Overton, J. Ed., *Rural Fiji*. Institute of Pacific Studies, The University of the South Pacific, Suva. P. 31-58.

- Thaman, R.R. 1990. Kiribati agroforestry: Trees, people and the atoll environment. *Atoll Research Bulletin*.
- Thaman, R.R. 1990b. Mixed home gardening in the Pacific Islands: Present status and future prospects. In Landauer, K. and M. Brazil, Eds., *Tropical home gardens*. United Nations University Press, Tokyo.
- Thaman, R.R. 1990c. Coastal reforestation and coastal agroforestry as strategies to address global warming and to promote sustainable development in the Pacific Islands. In Hughes, P.J. and McGregor, G. Eds., *Global warming-related effects on agriculture and human health and comfort in the South Pacific*. South Pacific Regional Environment Programme (SPREP), Noumea and United Nations Environment Programme (UNEP), Nairobi, Kenya.
- Thaman, R.R. 1992. Atoll agroforestry and plant resources: a basis for sustainable atoll agricultural development. In Chase, R.G. Ed., *A review of agricultural development in the atolls: Invited papers from the International Conference on Developing Agriculture Research Programs for Atolls*, Pacific Harbour, Fiji, November 1990. Institute for Research, Extension and Training in Agriculture, University of the South Pacific, Apia, Western Samoa.
- Thaman, R.R. 1992. Batiri kei Baravi: The ethnobotany of Pacific Island coastal plants. *Atoll Research Bulletin* 361:1–62.
- Thaman, R.R. 1993. Climate change, forestry and agroforestry in the Pacific Islands: Impacts and appropriate responses. In: Hay, J.E., and C. Kaluwin, Eds., *Climate change and sea level rise in the South Pacific Region: Proceedings of the Second SPREP Meeting*, Noumea, New Caledonia, 6–10 April, 1992. South Pacific Regional Environment Programme, Apia, Western Samoa.
- Thaman, R.R. 1995. Urban food gardening in the Pacific Islands: A basis for food security in rapidly urbanizing small-island states. *Habitat International* 19 (2):209–224.
- Thaman, R.R. 1996. Evolutionary agroforestry: Traditional Pacific Island agroforestry as a foundation for modern agroforestry development. In Rogers, S. and Thorpe, P. Eds., *Agroforestry research and practices in the Pacific: Reports and papers from the Second Annual Meeting of Collaborators*, Port Vila, Vanuatu, 22–26 April, 1996. PRAP report No. 3. Pacific Regional Agricultural Programme, Suva, Fiji.
- Thaman, R.R., and W.C. Clarke. 1987. Pacific island agrosilviculture: Systems for cultural and ecological stability. *Canopy International* 13(1):6–7; 13(2):8–10; 13(1):8–9 (three-part series).
- Thaman, R.R., and W.A. Whistler. 1996. *A Review of Uses and Status of Trees and Forests in Land-Use Systems in Samoa, Tonga, Kiribati and Tuvalu with Recommendations for Future Action*. South Pacific Forestry Development Programme, Suva, Fiji.
- Verheij, E.W.M., and R.E. Coronel, Eds. 1992. *Plant Resources of Southeast Asia No. 2: Edible Fruits and Nuts*. PROSEA, Bogor, Indonesia.
- Westley, B. 1990. Defining agroforestry technologies. *Agroforestry Today* 2(1)(Jan.–March):21–24, Nairobi, Kenya.
- Whistler, W.A. 1996. *Samoan Herbal Medicine*. Isle Botanica, Honolulu, Hawaii.

Agroforestry Guides for Pacific Islands

Multipurpose Trees for Agroforestry in the Pacific Islands is the second in a series of eight Agroforestry Guides for Pacific Islands, published by Permanent Agriculture Resources with support from the U.S. Department of Agriculture's Western Region Sustainable Agriculture Research and Education (WSARE) Program. The guides can be downloaded from the internet free of charge from <http://www.agroforestry.net>. Master copies are also available to photocopy free of charge from Pacific Island offices of the Natural Resources Conservation Service (NRCS) or the Cooperative Extension Service (CES) of the University of Hawaii.

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2. Multipurpose Trees for Agroforestry in the Pacific Islands

Introduces traditional Pacific Island agroforestry systems and species. Provides a species table with over 130 multipurpose trees used in Pacific Island agroforestry, detailing information on uses (food, fodder, timber, etc.) and tree characteristics such as height, growth rates, and habitat requirements.

3. Nontimber Forest Products for Pacific Islands: An Introductory Guide for Producers

Discusses the environmental, economic, and cultural role of nontimber forest products. Provides planning suggestions for those starting a nontimber product enterprise. Includes a species table of over 70 traditional Pacific Island nontimber forest products.

4. Integrating Understory Crops with Tree Crops: An Introductory Guide for Pacific Islands

Introduces planning considerations for planting crops with forestry, orchard, or other tree-based systems. Examples of understory intercropping systems in the tropics are included, as well as a species list of over 75 trees, shrubs, and vines used as understory crops in the region.

5. Introduction to Integrating Trees into Pacific Island Farm Systems

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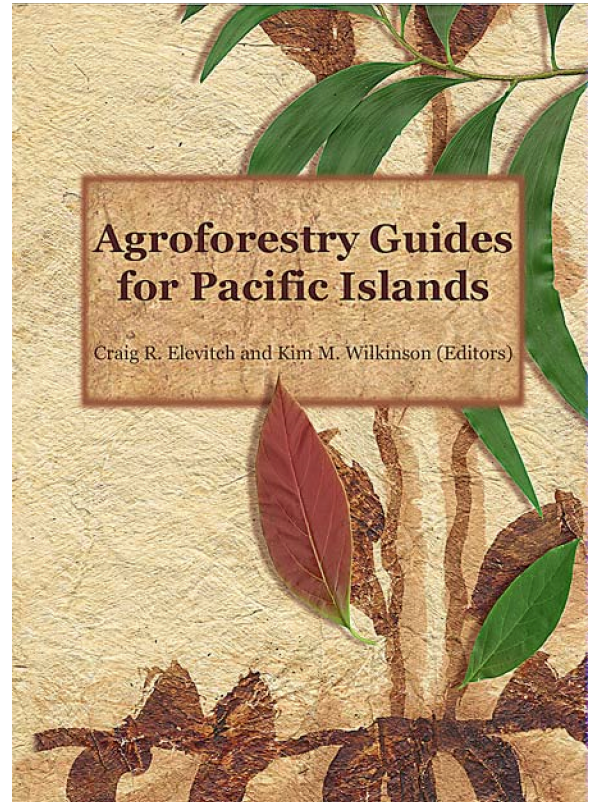
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