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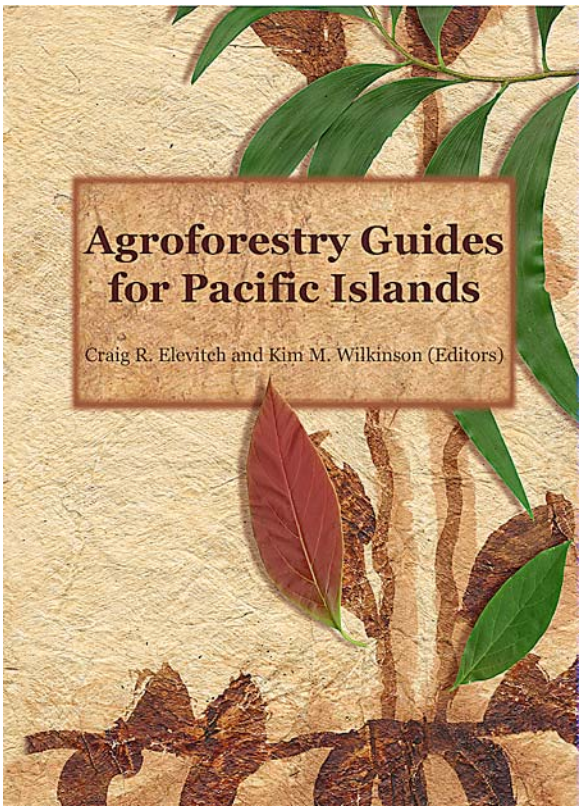
Agroforestry Guides for Pacific Islands



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Agroforestry Guides for Pacific Islands
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Price: $24.95 (plus shipping)

Availability: Usually ships within one business day.

Paperback - 240 pages, illustrated and fully indexed
Release date: September, 2000
ISBN: 097025440?
Publisher: Permanent Agriculture Resources, P.O. Box 428, Holualoa, HI, 96725, USA. Tel: 808-324-4427, Fax: 808-324-4129, email: par@agroforestry.net

Agroforestry Guides for Pacific Islands #2

Multipurpose Trees for Agroforestry in the Pacific Islands

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

PAR

Western Region Sustainable Agriculture Research and Education

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Multipurpose Trees for Agroforestry in the Pacific Islands

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

Contents

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Electronic distribution: Download this publication and others in the series at http://www.agroforestry.net

Publisher: 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

Citation: Thaman, R.R., C.R. Elevitch, and K.M. Wilkinson. 2000. Multipurpose Trees for Agroforestry in the Pacific Islands. Agroforestry Guides for Pacific Islands #2. Permanent Agriculture Resources, Holualoa, Hawaii, USA. Web site: http://www.agroforestry.net

Sponsor: Publication of this guide was made possible through a grant from the U.S. Department of Agriculture's Western Region Sustainable Agriculture Research and Education (WSARE) Program. This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture, and Agricultural Experiment Station, Utah State University, under Cooperative Agreement under 98-COOP-1-6481.

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 Islander 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.

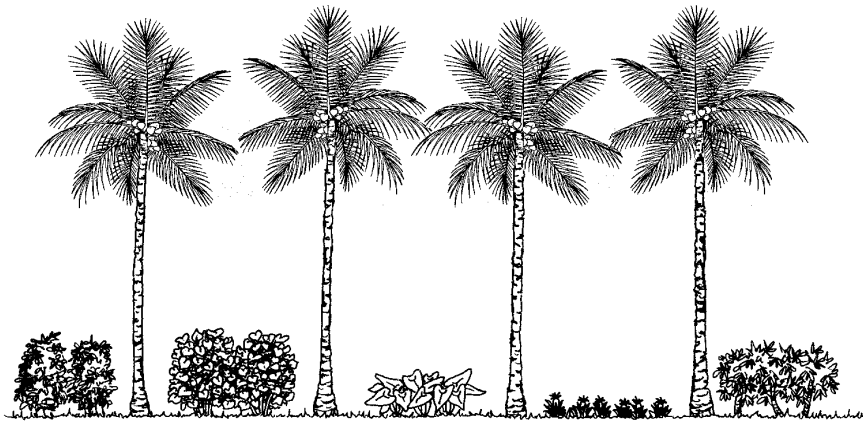


Figure 2. Post-colonial/plantation agroforestry showing coconut with understory of coffee, kava, taro, pineapple, and cassava.

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*)

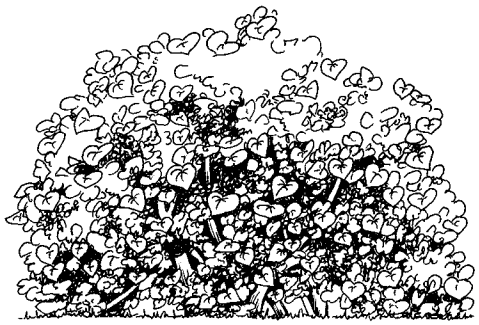
The flesh from the mature brown nut is a major staple food and animal food. It is also dried and made into copra, which is an important export product from most island countries. Juice from inside the immature green nut is an important drink and source of safe drinking water on dry islands and in times 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*)

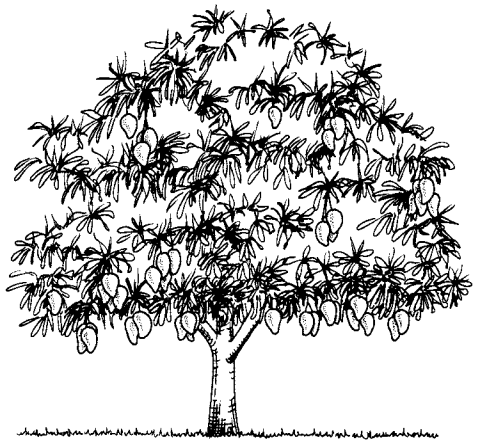
The beach hibiscus is planted as living fencing and as a windbreak. The timber and branches are used in light construction and in boat building, for making tools and as an important source of firewood. The inner bark is processed and used as fiber in dancing skirts and other handicrafts, for stringing 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

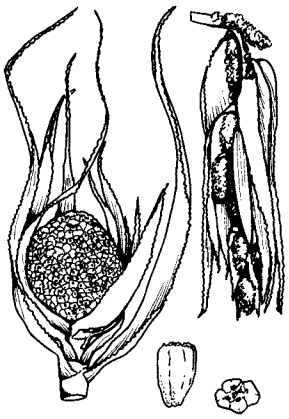
Traditional Pacific Island agroforests were developed and managed to meet not only people's needs for food and other products, but also the needs of the system as a whole for fertilizer, mulch, animal food, shade. The trees in the system also provide protection from erosion, wind, and salt spray. In 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, *Guettarda 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*), maululu (*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.

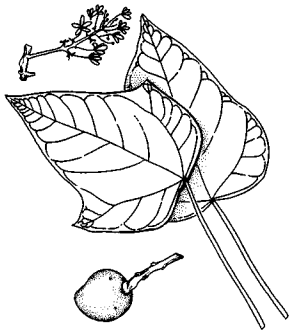
Because Tonga has frequent tropical cyclones, the lower *felei* trellises are much more appropriate than higher trellises on poles used elsewhere. Finally, when the yams are harvested, after 7 to 9 months, the branches make perfect firewood for the underground oven.

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 candelnut 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 lebbeck*) 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 agrodeforestation 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	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
Acacia auriculiformis													1	1		2	2	2		2	2	1	2			1	1									2								1	
Acacia koa	3	2									2		2	1		2	3	3		3	2	3	3			4	4	3													4			4	2
Acacia koaia													1	1			2			1	2						3																	2	3
Acacia mangium		2														2	2	2	1	2	1	1	2			1	1																	1	1
Adenanthera pavonina		2		3		1						2	3			2	3	3	3		1	2	2			2	3							4		1								1	2
Agathis macrophylla	4	4									2		2			2	4	2					2			2	2								3					3	2			3	2
Agathis robusta		2											2			2	2	2					2			1	1								1									2	2
Agathis vitiensis	4	4									2		2			2	4	2					2			2	2								4					3					2
Albizia lebbeck		3									1	1	1	2		2	3	3	2	3	2	2	2		1	2	2								1	1	1	1							3
Albizia saman	2	3		1			1					2	1	2		2	3	4	3	3	2	4	3			2	4								1									2	4
Aleurites moluccana	2	3		2					2		3					2	2	2			3	3	3			2	3					2		4		2		4	4	4	3		3	2	3
Alphitonia zizyphoides		2									4		2	2		3	4	4	3			3	2			3	3																		
Anacardium occidentale		2		2	2	1	1				1							1			1														1				1						2
Annona muricata	1	2		4	2		2					2	2								1													1			1								
Annona squamosa		2		3	2								2								1																1								
Araucaria cunninghamii	3	3											2			2	4	2			2		2			3	2														2			3	2
Araucaria heterophylla																2	2	2			3	2	2	2	2																2			2	3
Areca catechu	2	4		4						4	3	2				2	2	2																							2		2		2
Artocarpus altilis	2	5	5	5	5	2				2	4	5	3			4	3	2			1	3				2	2	3		2		4			3						3				2
Artocarpus heterophyllus		3	3	3	3	1	1				2	2					2	2			3	1						1							1	1					2			1	2
Averrhoa carambola		2		2	2		1				1	1	2																																2
Azadirachta indica	1										3	1		1		2	1	2			2	2	1														3	1	1		2				2
Bambusa vulgaris	2	3	1								2	2				3	4	3			3	2	3			2	3	4	3	3		3	2							2		3	2		3
Barringtonia asiatica																2	3	2			3	2		3	3	2	2	2	2			2					1							2	2
Barringtonia edulis	2	3		3							2	2	2			2	2	2								2															2				
Bischofia javanica		2									4	2	2			4	3	4	4		2	3	2			3	2									4					2	3	2	1	1
Broussonetia papyrifera	4	4									2					2							2							4	3	3		4							4				

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 gymnorrhiza		2		2				2			3	2	2	3	5	5	4	4			5			5		4	3	2							4				2			1	
Calliandra calothyrsus												1		1		2		2	2	2	1	2	2																			2	2
Calophyllum inophyllum	1	2						2			3		2	2	2	3	4	3			3	4	3	5	5	3	4	4					2		1		1	3	3	3		2	2	2
Cananga odorata	2	3						4			3		2			2	2	2				2				2	1	2			1						4			2				3
Canarium indicum	2	3	2	4							2		3			2	2	2																				1						
Canarium spp./harveyi	2	2		3							2		3			2	3	2								2	2																	
Carica papaya	4	5		5	5	1		2			2	4	5	3																	2		2										
Cassia fistula								2			1			2		1		2				2				2							2										4
Cassia grandis								2								1		2				2				2																	3
Cassia javanica								2						1		1		2				2				2																	3
Casuarina equisetifolia	1	3									2					4	3	4	2	4	4	3	2	3	3	2	3								2				2	2	3	3	2
Ceiba pentandra		2				1					2	2									2	1							3	1						1		1			2	2	1
Chrysophyllum cainito		2		2	3						1						1				2																					2
Citrus aurantifolia	2	3		4	4		3		3		2			2																											2	
Citrus aurantium		2		3			3	1	2		2			2				2																								
Citrus hystrix		4		4			4		4		3			2		2		2									2							2		1							
Citrus limon	1	3		3			3		3		2																														2	
Citrus maxima		2		3	4		1				3							3									2										1						
Citrus mitis		2		2	2		2		2		1			1																												2
Citrus paradisi	2	3		3	2		3				1																															2
Citrus reticulata	2	5		5	3		3		2									2																								
Citrus sinensis	3	5		5	5		5	2			2							2																								
Cocos nucifera	5	5	5	5	5		5		5		5	5	4	5		5	4	5			3	3	4	5	3	3	4	3	3	5	5	5	5	3				5	5	4	4		4	5	3
Cordia subcordata	2	3						3			2	2				2	3	2			2	2		3	3	3	5	4	3	2				2							2		2	2
Dodonea viscosa								2			2					3	2	2	3		2			2			2	2	2					2				2			2		2	
Delonix regia								3						1		2	2	2			2	4	2	2	2		2							2								2	5
Dracontomelon vitiense		2		3							2	2	2				2	2				2					2														1		

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
Erythrina variegata		2						3			3	2				4		2	3	4	3	4	3	2	2	2		2					2		2				3	3	4	3	3
Erythrina subumbrans												2				3			2	3	3	3	2																	2	3	2	2	2
Eucalyptus citriodora	1	1												1			2	2					1											1			1					2	2	2
Eucalyptus deglupta	2	2												1			3	2					2											1								2	2	2
Eucalyptus saligna	2	2												1			2	2					2											1					1			2	2	2
Eucalyptus tereticornis	2	2												1			2	2					2											1								2	2	2
Fagraea berteriana		2						4			3						2	2					2			2							4				3			2				3
Ficus bengalensis													2			2					2	3		2	2																		2
Ficus benjamina													2			2		2			3	4		3	3	2							2								2			3
Ficus carica				2									1																															2
Ficus tinctoria		2	3	3							2	2	3			2	2	3						2	2	2	3		2	2	2			2							2			
Flueggea flexuosa		3											2			2	4	2	2				2			2	2															2	3	
Gliricidia sepium								2			1	2	2	1		3	2	2	1	3	4	3	2		2	2								1	1						4	2	2
Glochidion ramiflorum/spp.											3		2			3	2	3	3		2	2	2		3	3	2																
Gnetum gnemon				2		3							2					2																										
Guettarda speciosa		3						4			3					4	4	3	4		3	2		3	3	3	4	3	3			3		4				3			3			3
Gyrocarpus americanus											3	3	3			2	3	2	2		2	2		2	2	2		3													2		3		
Hernandia nymphaeifolia		2									2		2			2	3	2			2	2		2	2	3	3	3	2				2										2
Hibiscus tiliaceus	2	3									3	2	2			4	3	4	4		3	3	3	3	3	3	4	4	4	4	4	4		5	2						2		4	2	2
Inga edulis				2								2				1		1	1	2		2	1																					2
Inocarpus fagifer	2	4	3	4							3	3	3			3	3	4	4		2	2					3															2	2	2
Intsia bijuga	3	4									3						4	3		2	2	2		2	2	2	4	4														2	2	2
Kleinhovia hospita		2									2					3	2	3	3		2		2			2	3									1								
Leucaena leucocephala	2	3		2		1	1				1	3	2			4	3	4	4	4	3	2	3	2	2	2	2							2		1	1					2	3	1
Litchi chinensis		2		2	2		1				2		2	1			1																											2
Lumnitzera littorea															3	2	3	3			3			3	3	2	3	2						3							2			
Macadamia integrifolia	4	4		4	3		2										2				1																	2						2

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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
Macaranga spp.		3									3					3	3	4	4		3	3	3	3	3	3	3	3	2			3													2
Mangifera indica	3	4		4	4	1	3				3	4	4	3		3	3	3	2		3	4	3			2	2	2								1		1			3		2	3	2
Melia azedarach											2		2	1			2	2				2															1		1						2
Metroxylon spp.		3	3								2	3				2		2					3			3	2						3	3							2				2
Morinda citrifolia	4	3		3						4	5	3	3			3	2	2	3					2	2		2					2				3					3				3
Moringa oleifera		3		3	3	3			2		3	3		1							1		1													1			1				2		2
Musa spp.	4	5	5	5	5						3	4	4			4			5		3	3	3			3				1		4		3		2					2				
Neisosperma oppositifolium				2							3		2			2	3	3						3	3	3	3	3	2			3												2	
Pandanus dubius		3	3	3							2	3	3			3	3	3								2				2		2									2				
Pandanus tectorius	4	5	4	4		2		3			4	3	3			4	4	3	3			3		4	3	3	3		2	5	4	4	4	4	3	3				3	4		2		2
Pandanus cultivars	4	5						3			3					3		3			3			3	3	3			2	5	4	4	4	3	3						3		3		3
Paraserianthes falcataria		2										1				3	3	3	3	3	3	3																						3	
Pemphis acidula		2		2							3	3	2			2	3	4			4			4	3	2	4	3	3							2					3				
Persea americana	2	3		3	3						1	2	2																									1	1						
Pimenta racemosa		2							1									2																2				3							2
Pinus caribaea	4	4														3	4	3			3	3	4												1									4	2
Piper methysticum	4	4			3					4	3																														4				
Pipturus argenteus				2		2					2	3				3	2	2	3				2			2	2	2	2	3	3	2	2	2							2			2	2
Pisonia grandis						2					2	3				3	2	2			3	2		3	3	3		2	2			2									2		2		
Pithecellobium dulce				2			1					2		1		2		2	2	2	2	1	2													1	1		1				1		2
Plumeria obtusa	2	3			5			4			1											3												4				3			2		2		4
Plumeria rubra	2	3			5			5			2											3												4				4			3		2		5
Polyscias spp.					3	3			2		3	2				2		2			4				3									3							2		5		5
Pometia pinnata		3		4							4	3	4			3	4	4	4		3					3	3														2			2	2
Premna serratifolia				2		2					5	2	2			3	3	3	3				2	2	2	2	3	2	2	2		3		3		2					3		3		2
Pritchardia pacifica				2							2		2				2	2												2		2	2								2				2
Psidium guajava	3	3		4	4		3				4	4	4	3			3	4			3		3				2		2																2

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Multipurpose Species Pacific Island Uses (continued)

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Pterocarpus indicus	2	3				1					2					3	4	3	3	3	3	3	3			3	3							1					2		3	2	2
Rhizophora spp.		3									3	3	3	3	5	5	4	5			5			5	5	5	3	3	3		2			3		3					2			
Santalum spp.	3	3									3							2															2				3			3		2	2
Scaevola taccada						1				2	4	2	2			2	2		2		1			5	5	4	4	3	3	2		3		2	2	2					3			2
Schizostachyum spp.											3	3				3	3	3	3		3		3			3	3	3	3	3		3	3								3			
Senna alata											3							2																									3
Senna siamea									1			1		1			2	2			1	3													1								3
Sesbania grandiflora						2					2	2				2	2	2	2			1																					2
Sesbania sesban						1					1	1				2		1	2	2	1	1	1							1				1									
Spathodea campanulata					2						1		2	1		2	2	2	2		2	1	2																		2		3	
Spondias dulcis		3		4	4	2	2				4	3	3				2	2				3																					
Swietenia macrophylla	4	4														2	4	2			1	1	2																		3	2	
Syzygium cumini				2							2	2	2			2	2	3	2		3	3	3				1								1							2	2	
Syzygium jambos		2		2							1	1		1			2	2			1														1			1					2	
Syzygium malaccense		3		4		2					4	2	3			2	2	2				2																					2	
Tamarindus indica		3		3					3		2	2	2	1				2			2	3													1								2	
Terminalia catappa		2		3							4	3	4			3	3	3	3		3	4	2	3	3	2	4	2	2	2	2	3		2		2			2			3			3
Terminalia samoensis/littora				2							3		2			2	2	2						2	2	2	2	2				2									2			2
Thespesia populnea		3				1					3	2				3	4	3			3	3		3	3	2	5	3	2	2	2	3		2	1	2			1			3			2	2
Toona ciliata var. australis	1	2				1					1	1					3	2					2								1				1	1			1			3	2	
Tournefortia argentea		2				1					4	3	2			3	3	3			3	3		4	3	3	3	2	2					2			2					2		
Veitchia spp.				2		2							2				2	2									2	2					2										2	
Vitex negundo/trifolia						2	2				3					2	2	2	2				2	2	2	2	2		2					2			1						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	Queensland 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 lebbeck	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		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
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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
Bruguiera gymnorrhiza	Oriental mangrove	0 m	C	S	M	15–20 m		yes		yes
Calliandra calothyrsus	calliandra	0–1500 m	H, SH	S	F	6–10 m	P		3-4	no
Calophyllum inophyllum	portia tree	0–100 m	C	S	S	20–25 m		yes		
Cananga odorata	ylang-ylang; perfume tree	0–800 m	H, SH	S	F	10–20 m	P			
Canarium indicum	red canarium; galip	0–600 m	H	S	S	40 m				
Canarium spp./harveyi	pili nut; canarium almond	0–600 m	H, SH	S	S	15–25 m				
Carica papaya	papaya; pawpaw	0–1000 m	H, SH	S	F	4–6 m	P		4-6	no
Cassia fistula	golden shower tree	0–1000 m	H, SH	S	M	10–20 m				
Cassia grandis	pink shower tree	0–1000 m	H, SH	S	M	15–20 m				
Cassia javanica	pink and white shower tree	0–1000 m	H, SH	S	M	15–25 m				
Casuarina equisetifolia	ironwood; she oak	0–1500 m	H, SH, A, C	S	F	25–30 m	W	yes	4-6	no
Ceiba pentandra	kapok tree; silk-cotton tree	0–500 m	H, SH	S,C	M	30–50 m			4-6	
Chrysophyllum cainito	caimito; starapple	0–400 m	H, SH	S,G	M	25–30 m			3-4	
Citrus aurantifolia	lime; West Indian lime	0–1800 m	H, SH, U	S,A	S	4–5 m				
Citrus aurantium	sour orange; Seville orange	0–1800 m	H, SH, U	S	S	10 m				no
Citrus hystrix	kaffir lime; rough lemon	0–1500 m	H, SH, U	S	M	12 m				
Citrus limon	lemon	0–2000 m	H, SH, U	S,A,B	S	3–6 m				
Citrus maxima	pummelo; pomelo; shaddock	0–800 m	H, SH	S,A,B	S	5–10 m			3-4	
Citrus mitis	calamondin	0–1000 m	H, SH	S,C,B	S	2–7.5 m			3-4	
Citrus paradisi	grapefruit; pumelo	0–800 m		S,A,B	S	10–15 m				
Citrus reticulata	tangerine; mandarin orange	0–1000 m	H, SH	S,A,B	S	5–10 m			3-4	
Citrus sinensis	orange; sweet orange	200–1000 m	U	S,B	S	6–15 m				
Cocos nucifera	coconut palm; coconut	0–800 m	C, H	S	M	10–20 m		yes	3-4	yes
Cordia subcordata	beach cordia; sea trumpet	0–300 m	C, H	S	M	10 m		yes	3-4	
Dodonea viscosa	native hop bush	0–1100 m	SH	S	M	2–8 m				
Delonix regia	poinciana; royal poinciana	0–500 m	H, SH, A, C	S	S	15 m			6-12	
Dracontomelon vitiense		0–300 m	H, Sh	S	M	10–20 m				

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in meters (1 foot = 0.3 meters)

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

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in months

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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				
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

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

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in meters (1 foot = 0.3 meters)

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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

Common Names, Origin and Presence in Pacific Islands

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
Acacia auriculiformis	Northern black wattle; Papua wattle		New Guinea and northern Australia	Papua New Guinea and Solomon Islands (western Malesia)
Acacia koa	koa	koa (Hawaii)	Hawaii	Hawaii
Acacia koaia	koaia	koa'ia (Hawaii)	Hawaii	Hawaii
Acacia mangium	mangium; brown salwood; black wattle; hickory wattle		Southeast Asia and Malesia	Papua New Guinea
Adenanthera pavonina	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
Agathis macrophylla	kauri; kauri pine	kauli (Tonga)	northern Australia; Southeast Asia; Malesia	Solomon Islands
Agathis robusta	Queensland kauri; smooth-barked kauri pine		eastern Australia and Malesia	Papua New Guinea; Tonga
Agathis vitiensis	Fiji kauri		northern Australia; Southeast Asia; Malesia	Fiji
Albizia lebbeck	albizia; siris tree; woman's tongue		Tropical Asia	Vanuatu; Fiji; Saipan; Hawaii
Albizia saman	rain tree; monkeypod	tamalini; tamaligi (Samoa); kasia (Tonga); 'ohai (Hawaii)	Tropical America	Most Pacific Islands (especially Polynesia and Melanesia: Fiji, Vanuatu, Hawaii, and Samoa)
Aleurites moluccana	candlenut	lauci; sikeci (Fiji); tuitui (Tonga; Cooks); lama (Samoa); tutu'i; ti'a'iri (Societies); 'ama (Marquesas); kukui (Hawaii)	Malaysia	Aboriginal intr. to most of Melanesia; Polynesia; and parts of Micronesia; recent to Guam
Alphitonia zizyphoides	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
Anacardium occidentale	cashew	apu 'Initia (Samoa); 'apu (Tonga)	Tropical America	Tonga; Samoa
Annona muricata	soursop	sasalapa (Samoa); 'apele 'Initia (Tonga)	Tropical America	Pre-WWII intr. to most Pacific Islands, not found on atolls
Annona squamosa	sugarapple; sweetsop	apele Tonga (Tonga); nameana (Tuvalu)	South America	Tonga; Kiribati; Tuvalu
Araucaria cunninghamii	hoop pine; Moreton Bay pine; Richmond river pine	paina (Samoa); paini (Tonga)	Australia; Papua New Guinea	Papua New Guinea (large plantations)
Araucaria heterophylla	Norfolk Island pine	paina (Samoa); paini (Tonga)	New Caledonia	Hawaii
Areca catechu	betel-nut; betel-nut palm	nioi-kekela (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
Artocarpus altilis	breadfruit	uto (Fiji); mei (Tonga, Marquesas); 'ulu (Samoa, Hawaii); kuru (Cooks) maiore; 'uru (Society Islands)	Malaysia	Aboriginal intr. to most of Melanesia; Polynesia; and Micronesia
Artocarpus heterophyllus	jakfruit; jackfruit		Southeast Asia and India	Post-European contact intr. to Pacific Islands. Fiji.
Averrhoa carambola	carambola; star fruit	tapanima (Tonga)	Southeast Asia	Fiji
Azadirachta indica	neem		India	Hawaii and Fiji
Bambusa vulgaris	common bamboo; feathery bamboo	ofe Fiti (Samoa); pitu (Tonga); te kaibaba (Kiribati); kofe; pampu (Tuvalu); bitu (Fiji)	tropical Asia	Most Pacific Islands
Barringtonia asiatica	fish-poison tree	vutu (Fiji); futu (Tonga, Samoa); 'utu (Cooks); hutu; hotu (Societies); hutu (Marquesas) te bairiati (Kiribati)	Indian Ocean to the Marquesas	Most of Polynesia; not common on atolls
Barringtonia edulis	cut nut; katnut		Melanesia	Melanesia; Fiji; Solomon Islands
Bischofia javanica	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
Broussonetia papyrifera	paper mulberry	malo; masi (Fiji) hiapo; tutu (Tonga); u'a (Samoa); aute (Cooks, Societies) ute (Marquesas); wauke (Hawaii) aute (New Zealand)	China; Japan; Burma; Thailand	Aboriginal intr. throughout Malesia; 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
Bruguiera gymnorrhiza	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)
Calliandra calothyrsus	calliandra		Tropical America	Samoa; Hawaii
Calophyllum inophyllum	portia tree; Alexandrian laurel; beach mahogany	dilo (Fiji); feta'u (Tonga); fetau (Samoa); tamanu (Cooks; Societies; Marquesas); te itai (Kiribati); kamani (Hawaii)	tropical Africa; eastern Polynesia and Micronesia	Eastern Polynesia; Fiji; Nauru; Banaba; Makatea
Cananga odorata	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
Canarium indicum	red canarium; galip		Malesia	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
Canarium harveyi	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
Carica papaya	papaya; pawpaw	esi (Samoa); lesi (Tonga) olesi (Tuvalu); te babaia (Kiribati) mikana; milikana; papaia; he'l (Hawaii)	Tropical America	abundant throughout Pacific Islands Hawaii; Fiji; Tonga; Rarotonga; Samoa,Cook Islands
Cassia fistula	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
Cassia grandis	pink shower tree; horse cassia	kasia (Tonga)	Tropical America	recent intr. to Pacific Islands
Cassia javanica	pink and white shower tree; pink shower tree		Tropical Asia	recent intr. to Pacific Islands
Casuarina equisetifolia	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
Ceiba pentandra	kapok tree; silk-cotton tree	vavae (Samoa, Tonga)	India or Africa	most Pacific Islands (especially common in the high islands)
Chrysophyllum cainito	caimito; starapple		West Indes	
Citrus aurantifolia	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
Citrus aurantium	sour orange; Seville orange	kola (Tonga)	Southeast Asia	Throughout Polynesia; and some areas of Micronesia and Melanesia; not found on atolls
Citrus hystrix	kaffir lime; rough lemon; leach lime; Mauritus papeda	lemani (Tonga); tipolo patupatu (Samoa); te remen (Kiribati); laim (Tuvalu)	Indonesia	The most common "lemon" in many Pacific Islands
Citrus limon	lemon	moli; moli tipolo (Samoa); moli lemani; lemani (Tonga); kukane (Hawaii)	Southeast Asia	Most Pacific Islands
Citrus maxima	pummelo; pomelo; shaddock	moli kana (Fiji); moli Tonga (Tonga); moli Toga (Samoa); muli (Papua New Guinea)	Malesia Southeast Asia and Indo-Malaysia	Tonga
Citrus mitis	calamondin; calamondin orange	tipolo Iapani (Samoa); 'alani-'awa'awa (Hawaii)	Philippines or Malaysia	Tonga; Samoa; Marshall Islands; Kiribati
Citrus paradisi	grapefruit; pumelo	muli (Papua New Guinea Pidgin)	West Indes	

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

Species Names	Common Names	Pacific Island Names	Indigenous to	Frequently Used in
Citrus reticulata	tangerine; mandarin orange	moli Saina (Samoa); moli peli (Tonga)	Southeast Asia and Philippines	Most Pacific Islands
Citrus sinensis	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
Cocos nucifera	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
Cordia subcordata	beach cordia; sea trumpet	nawanawa (Fiji); puataukanave (Tonga); tuanave (Samoa); tou (Cooks, Societies, Marquesas); kou (Hawaii)	Indian Ocean to Pacific Islands	Polynesia and Micronesia
Dodonea viscosa	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
Delonix regia	poinciana; royal poinciana; flame tree; flamboyant; flame of the forest	tamaligi (Samoa); 'ohai (Tonga); te tua (Kiribati); fua I tausaga (Tuvalu) 'ohai-'ula (Hawaii)	Madagascar	Most Pacific Islands
Dracontomelon vitiense			Malesia	
Erythrina variegata	coral tree; Indian coral tree; tiger's claw; dadap; tropical coral	drala dina (Fiji); ngatae; gatae (Tonga, Samoa); 'atae (Cooks; Societies); natae (Marquesas); wiliwili-haole (Hawaii)	Indian Ocean and Pacific Islands	some areas of Melanesia; Polynesia; and Micronesia
Erythrina subumbrans			Burma; east to Philippines	
Eucalyptus citriodora	lemon-scented gum; spotted gum		Queensland; Australia	Most Pacific Islands especially Melanesia
Eucalyptus deglupta	Mindanao gum; Bagras eucalyptus; deglupta; kamarere		Southeast Asia; Philippines; Australia and New Guinea	Most Pacific Islands
Eucalyptus saligna	flooded gum; Sydney blue gum		Australia	Most Pacific Islands
Eucalyptus tereticornis	forest red gum		Southeast Asia; Philippines; Australia and New Guinea	Most Pacific Islands especially Papua New Guinea
Fagraea berteriana	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
Ficus bengalensis	banyan; Indian banyan; vada tree	pulu (Samoa)	India	
Ficus benjamina	weeping fig; Benjamin tree; waringin	ovava Fisi (Tonga)	India	
Ficus carica	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
Ficus tinctoria	Dyer's fig	nunu (Fiji); masi'ata (Tonga) mati (Samoa, Cooks, Societies); 'ata (Marquesas)	Philippines	
Fleuggea flexuosa		poumuli (Samoa, Tonga)	Philippines; Solomon Islands; Moluccas	Samoa; Tonga
Gliricidia sepium	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)
Glochidion ramiflorum/spp.		masame (Samoa); malolo; masikoka (Tonga)	Tropical Asia to the Marquesas; Marianas and Caroline Islands in Micronesia	Most Pacific Islands
Gnetum gnemon	gnetum; joint fir		India; Southern Asia and Malesia to Caroline Islands and Fiji	Most of Micronesia and Melanesia (Solomons; New Guinea; Fiji)
Guettarda speciosa	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
Gyrocarpus americanus		wiriwiri (Fiji); pukovili (Tonga); vili; vilivili; moa (Samoa)	East Africa to tropical America; aboriginal intr. to Tonga	Vanuatu; Tonga; Samoa
Hernandia nymphaeifolia	lantern tree; Chinese lantern tree	pipi (Fiji, Samoa); pu'a (Samoa); fotulona; puko (Tonga); puka (Tuvalu); te bingibing (Kiribati)	East Africa to Micronesia and southeastern Polynesia	Micronesia and Polynesia; some parts of Melanesia
Hibiscus tiliaceus	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
Inga edulis	inga; ice cream bean		Central and South America	
Inocarpus fagifer	Tahitian chestnut	ivi (Fiji); ifi (Tonga, Samoa); I'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
Intsia bijuga	ipil; Borneo teak; island teak	vesi (Fiji); fehi (Tonga); ifilele (Samoa)	Eastern Africa; Madacascar; southern Asia; Malesia to the Caroline Islands; Rotuma; and Samoa	Melanesia and Polynesia; especially Samoa; Tonga; and Fiji
Kleinhovia hospita	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
Leucaena leucocephala	leucaena; wild tamarind; ipil-ipil	fua pepe (Samoa); sialemohemohe (Tonga); te kaitetua (Kiribati); haole koa or koa haole (Hawaii)	Central America and Mexico	Most Pacific Islands
Litchi chinensis	litchi; lychee; leechee; lechee; laichi		Southern China; northern Vietnam; and Malaysia	
Lumnitzera littorea		hangale (Tonga); te aitoa (Kiribati); sagale (Tuvalu)	East Africa to Tonga and Marshall Islands in Micronesia	Tonga; Kiribati; Tuvalu
Macadamia integrifolia	Macadamia nut; Queensland nut; Australian bush nut		Australia	Hawaii
Macaranga spp. (harveyana, stipulosa, carolinensis)	macaranga	lau pata; papata; lau papata (Samoa); loupata; lepo (Tonga)	Fiji to the Solomon Islands	Most Pacific Islands
Mangifera indica	mango	mago (Samoa, Tuvalu); mango (Tonga); te mangko (Kiribati) manako (Hawaii)	India and Burma	Most Pacific Islands (Polynesia; Melanesia; and larger islands of Micronesia
Melia azedarach	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
Metroxylon 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
Morinda citrifolia	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
Moringa oleifera	horseradish tree; drumstick tree; saijan (Hindi); malunggay (Philippines)		north-western India	Most Pacific Islands; esp. Fiji; thrives on atolls
Musa 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
Neisosperma oppositifolium		fao (Samoa, Tonga); te kiebutinang (Kiribati)	Indian Ocian to Polynesia and Micronesia	Atolls ; Kiribati; Tuvalu; Tonga
Pandanus dubius	screw pine			
Pandanus tectorius	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
Pandanus cultivars	screw pine cultivars	tutu'ila (Tonga) fala (Samoa); rau'ara; pae'ore (Cooks) papa; pae'ore (Societies)	Micronesia; Polynesia and Melanesia	Most Pacific Islands
Paraserianthes falcataria	albizia; white albizia	tamalini; tamaligi (Samoa); kasia (Tonga)	Southeast Asia	Modern intr. to Papua New Guinea; Samoa; Hawaii; and other Pacific Islands
Pemphis 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
Persea americana	avocado; avocado pear; alligator pear	avoka (Samoa, Tonga)	Mexico	Most of the larger Pacific Islands
Pimenta racemosa	bay-rum tree		West Indies and South America	
Pinus caribaea	Caribbean pine	paina (Samoa, Hawaii); paini (Tonga)	West Indies and Central America	Fiji; Vanuatu; New Caledonia; and Tonga (extensive monocultural plantations)
Piper 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
Pipturus argenteus		roga (Fiji); 'olonga (Tonga); soga; lausoga (Samoa); 'oronga (Cooks); ro'a (Societies); hoka (Marquesas) (*P. albidus*– 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
Pisonia 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
Pithecellobium dulce	Manila tamarind; sweet inga	opiuma (Hawaii)	Central America	
Plumeria obtusa	evergreen frangipani	pua		increasingly common throughout the Pacific
Plumeria 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
Polyscias spp.	panax; hedge panax	tanitani; tagitagi (Samoa); tanetane (Tonga) kahili (Hawaii)	(many species) Tropical Asia; Melanesia	Most Pacific Islands
Pometia pinnata	Oceanic lychee; island lychee	dawa (Fiji); tava (Tonga, Samoa)	Indonesia; Philippines as far east as Fiji; Tonga; Samoa; and Niue	Melanesia and Polynesia
Premna 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
Pritchardia pacifica	Fiji fan palm; Pacific fan palm	viu (Fiji); piu (Tonga); piu; niu piu (Samoa) loulu (Hawaii)	Fiji; Tonga	Western Polynesia; Tonga
Psidium guajava	guava	kau'ava (Samoa); kuava (Tonga; Tuvalu; Hawaii); te kuava (Kiribati)	Tropical America	Most Pacific Islands
Pterocarpus indicus	narra; New Guinea rosewood; bluewater; sand dragon; padouk		Southeast Asia; Caroline Islands in Micronesia to Vanuatu and Fiji in Melanesia	Micronesia; Melanesia and Hawaii
Rhizophora 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)
Santalum spp.	sandalwood	yasi (Fiji); ahi (Tonga) 'ili-ahi (Hawaii)	Pacific Islands	Tonga; Fiji; Vanuatu; Niue
Scaevola taccada	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)
Schizostachyum 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)
Senna alata	candle bush; golden candelabra tree		tropical America	Many Pacific Islands
Senna siamea	kassod; pheasantwood; Thailand shower; minjiri		South and Southeast Asia	
Sesbania grandiflora	sesbania; corkwood tree; grandiflora	ohai-ke'oke'o (Hawaii)	India and tropical Asia	recent intr. to Pacific Islands
Sesbania sesban	sesban		Africa	
Spathodea campanulata	African tulip tree	tiulipe (Tonga)	tropical Africa	Tonga; Samoa; Hawaii; Fiji
Spondias dulcis	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
Swietenia macrophylla	West Indian mahogany; large-leaved mahogany; Honduras mahogany	mahokani (Samoa, Tonga)	Central and South America	Fiji; Niue; Tonga; Vanuatu; Solomon Islands; Samoa
Syzygium cumini	jambolan; Java plum		India and Sri Lanka to Malesia	Fiji; Niue; the Cook Islands; the Marquesas; and French Polynesia
Syzygium jambos	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
Syzygium malaccense	Malay apple; mountain apple	kavika (Fiji); fekika kai (Tonga); nonu fi'afi'a (Samoa) ka'ika (Cooks) 'ahi'a (Societies); kehika (Marquesas) 'ohi'a 'ai (Hawaii)	Tropical Asia	Most Pacific Islands
Tamarindus indica	tamarind	tamalini (Tonga, Samoa); tamaligi (Samoa) wi'awa'awa (Hawaii)	tropical Africa and Asia	Fiji; Samoa; Tonga
Terminalia catappa	tropical almond; beach almond; Indian almond; Malabar almond; coastal almond; sea almond	tavola (Fiji); telie (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
Terminalia samoensis. T. littoralis	tropical almond	talie (Samoa); telie (Tonga)	Samoa; Micronesia	Samoa; Tonga
Thespesia populnea	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
Toona ciliata var. australis	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
Tournefortia argentea	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
Veitchia spp.	niusawa palm (V. joannis) ; Manila palm (V. merillii); merrill palm	niu sawa (Fiji); niu kula (Tonga)	Fiji	Fiji; Tonga
Vitex negundo/trifolia	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

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

Species Lists by Product

Fruit/Nut species	
Adenanthera pavonina	*Gnetum gnemon*
Albizia saman	*Inga edulis*
Aleurites moluccana	*Inocarpus fagifer*
Anacardium occidentale	*Leucaena leucocephala*
Annona muricata	*Litchi sinensis*
Annona squamosa	*Macadamia integrifolia*
Areca catechu	*Mangifera indica*
Artocarpus altilis	*Morinda citrifolia*
Artocarpus heterophyllus	*Moringa oleifera*
Averrhoa carambola	*Musa spp.*
Barringtonia edulis	*Neisosperma oppositifolium*
Bruguiera gymnorrhiza	*Pandanus dubius*
Canarium indicum	*Pandanus tectorius*
Canarium spp./harveyi	*Pemphis acidula*
Carica papaya	*Persea americana*
Chrysophyllum cainito	*Pipturus argenteus*
Citrus aurantifolia	*Pithecellobium dulce*
Citrus aurantium	*Pometia pinnata*
Citrus hystrix	*Premna serratifolia*
Citrus limon	*Pritchardia pacifica*
Citrus maxima	*Psidium guajava*
Citrus mitis	*Spondias dulcis*
Citrus paradisi	*Syzygium cumini*
Citrus reticulata	*Syzygium jambos*
Citrus sinensis	*Syzygium malaccense*
Cocos nucifera	*Tamarindus indica*
Dracontomelon vitiense	*Terminalia catappa*
Ficus carica	*Terminalia samoensis/ littoralis*
Ficus tinctoria	*Veitchia spp.*

Leaf Vegetable	
Adenanthera pavonina	Polyscias spp.
Anacardium occidentale	Premna serratifolia
Artocarpus altilis	Pterocarpus indicus
Artocarpus heterophyllus	Scaevola taccada
Carica papaya	Sesbania grandiflora
Ceiba pentandra	Sesbania sesban
Gnetum gnemon	Spondias dulcis
Leucaena leucocephala	Syzygium malaccense
Mangifera indica	Thespesia populnea
Moringa oleifera	Toona ciliata var. australis
Pandanus tectorius	Tournefortia argentea
Pipturus argenteus	Veitchia spp.
Pisonia grandis	Vitex negundo/trifolia

Wood/Timber	
Acacia auriculiformis	Gyrocarpus americanus
Acacia koa	Hernandia nymphaeifolia
Acacia koaia	Hibiscus tiliaceus
Acacia mangium	Inocarpus fagifer
Adenanthera pavonina	Intsia bijuga
Agathis macrophylla	Kleinhovia hospita
Agathis robusta	Leucaena leucocephala
Agathis vitiensis	Litchi sinensis
Albizia lebbeck	Lumnitzera littorea
Albizia saman	Macadamia integrifolia
Aleurites moluccana	Macaranga spp.
Alphitonia zizyphoides	Melia azedarach
Araucaria cunninghamii	Morinda citrifolia
Araucaria heterophylla	Neisosperma oppositifolium
Areca catechu	Pandanus dubius
Artocarpus altilis	Pandanus tectorius
Artocarpus heterophyllus	Paraserianthes falcataria
Azadarichta indica	Pemphis acidula
Bambusa vulgaris	Pinus caribaea
Barringtonia asiatica	Pipturus argenteus
Barringtonia edulis	Pisonia grandis
Bischofia javanica	Pometia pinnata
Bruguiera gymnorrhiza	Premna serratifolia
Calophyllum inophyllum	Pritchardia pacifica
Cananga odorata	Psidium guajava
Canarium indicum	Pterocarpus indicus
Canarium spp./harveyi	Rhizophora spp.
Casuarina equisetifolia	Scaevola taccada
Chrysophyllum cainito	Schizostachyum spp.
Cocos nucifera	Senna siamea
Cordia subcordata	Sesbania grandiflora
Delonix regia	Spathodea campanulata
Dodonea viscosa	Spondias dulcis
Dracontomelon vitiense	Swietenia macrophylla
Eucalyptus citriodora	Syzygium cumini
Eucalyptus deglupta	Syzygium jambos
Eucalyptus saligna	Syzygium malaccense
Eucalyptus tereticornis	Terminalia catappa
Fagraea berteroana	Terminalia samoensis/ littoralis
Ficus tinctoria	Thespesia populnea
Flueggea flexuosa	Toona ciliata var. australis
Gliricidia sepium	Tournefortia argentea
Glochidion ramiflorum/spp.	Veitchia spp.
Guettarda speciosa	Vitex negundo/trifolia

Nitrogen Fixing	
Acacia auriculiformis	Gliricidia sepium
Acacia koa	Inga edulis
Acacia koaia	Inocarpus fagifer
Acacia mangium	Intsia bijuga
Albizia lebbeck	Leucaena leucocephala
Albizia saman	Paraserianthes falcataria
Calliandra calothyrsus	Pithecellobium dulce
Casuarina equisetifolia	Pterocarpus indicus
Erythrina subumbrans	Sesbania sesban
Erythrina variegata	

Windbreak	
Acacia auriculiformis	Gyrocarpus americanus
Acacia koa	Hernandia nymphaeifolia
Acacia koaia	Hibiscus tiliaceus
Acacia mangium	Inocarpus fagifer
Adenanthera pavonina	Intsia bijuga
Albizia lebbeck	Kleinhovia hospita
Albizia saman	Leucaena leucocephala
Aleurites moluccana	Lumnitzera littorea
Anacardium occidentale	Macadamia integrifolia
Annona muricata	Macaranga spp.
Annona squamosa	Mangifera indica
Araucaria cunninghamii	Moringa oleifera
Araucaria heterophylla	Musa spp.
Artocarpus altilis	Pandanus cultivars
Artocarpus heterophyllus	Paraserianthes falcataria
Azadarichta indica	Pemphis acidula
Bambusa vulgaris	Pinus caribaea
Barringtonia asiatica	Pisonia grandis
Bischofia javanica	Pithecellobium dulce
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

Protection from salt spray	
Albizia lebbeck	Intsia bijuga
Araucaria heterophylla	Lumnitzera littorea
Barringtonia asiatica	Macaranga spp.
Calophyllum inophyllum	Morinda citrifolia
Casuarina equisetifolia	Neisosperma oppositifolium
Cocos nucifera	Pandanus cultivars
Cordia subcordata	Pandanus tectorius
Delonix regia	Pemphis acidula
Erythrina variegata	Pisonia grandis
Ficus bengalensis	Polyscias spp.
Ficus benjamina	Premna serratifolia
Ficus tinctoria	Rhizophora spp.
Gliricidia sepium	Scaevola taccada
Glochidion ramiflorum/spp.	Terminalia catappa
Guettarda speciosa	Terminalia samoensis/ littoralis
Gyrocarpus americanus	Thespesia populnea
Hernandia nymphaeifolia	Tournefortia argentea
Hibiscus tiliaceus	Vitex negundo/trifolia
Leucaena leucocephala	

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

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International Institute of Rural Reconstruction. 1990. Agroforestry Technology Information Kit, IIRR, Room 1270, 475 Riverside Dr., New York, NY 10115.

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Mollison, B., and R.M. Slay. 1991. Introduction to Permaculture, Tagari Publications, Tyalgum, Australia.

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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 Durrance 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.rbgkew.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: iliea@iliea.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

Acknowledgments

Special thanks are due to the experienced resource professionals who provided valuable review and feedback for this publication including: Ian Armitage, Forestry consultant, Wellington, New Zealand; Peter Van Dyke, Manager, Amy B.H. Greenwell Ethnobotanical Garden, Bishop Museum, Kealakekua, Hawaii; Odo Primavesi, Agronomist, Brazilian Agricultural Research Corporation—EMBRAPA, Brazil; Bill Raynor, Field Office Director, The Nature Conservancy, Pohnpei, Federated States of Micronesia; Steve Skipper, District Conservationist, USDA NRCS, Kealakekua, Hawaii; Orlo Colin Steele, American Samoa Community College Cooperative Extension Service/AHNR Forestry, Pago Pago, American Samoa; and Art Whistler, Botanist, Isle Botanica, Honolulu, Hawaii.

The authors accept full responsibility for any errors or omissions.

Botanical illustrations are drawn after the originals found in the USDA Forest Service publication, Common Forest Trees of Hawaii (Little and Skolman 1989).

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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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5. Introduction to Integrating Trees into Pacific Island Farm Systems

Presents eight Pacific Island agroforestry practices that integrate trees into farm systems. Includes silvopasture (trees and livestock), windbreaks, contour hedgerows, live fences, improved fallow, woodlots, sequential cropping systems, and understory cropping.

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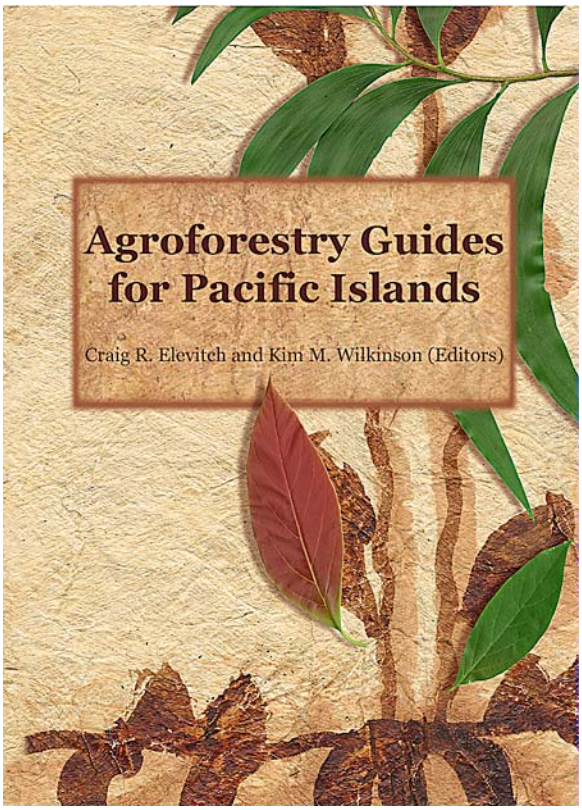

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Paperback - 240 pages, illustrated and fully indexed
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