# Multipurpose Tree Species Network Research Series

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**Multipurpose Tree Species Network Research Series**

This series of publications, produced or supported by the Forestry/Fuelwood Research and Development (F/FRED) Project, was developed to improve the scientific research exchanged on the production and use of multipurpose trees. The series includes research papers, case studies, manuals, videos, and consultancy reports. Publications in this series are available for distribution to F/FRED network members and other selected individuals and institutions.

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Report #5

# Agroforestry Practices in Selected Areas of Burma: Preliminary Recommendations

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*in cooperation with*
Burma Agricultural Production Project
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# Foreword

This report is a preliminary assessment of the possibilities for developing agroforestry systems in Burma. This consultancy was to have involved field visits to the areas covered under the Burma Agricultural Production Project (BAPP) and the Burma Agricultural Research and Development (BARD) Project, discussions with officials in the Department of Forests, the Agricultural Research Institute (ARI) and Forestry Research Institute (FRI) at Yezin, and visits to forest department nurseries in project areas. Following the field visits, a 3-5 day short-course on agroforestry principles was to have been presented at the ARI. Unfortunately, political disturbances that began the day after arrival in Rangoon limited travel, and the consultancy had to be rescheduled for a later date.

The BAPP Director requested that a short report be prepared, outlining preliminary recommendations. This report was prepared for that purpose and is based on discussions with project personnel, consultants working on similar or related projects, and a review of the literature available through the USAID office in Rangoon. This report should not be regarded as prescriptive in any sense. It merely strives to point out some of the potentials for agroforestry and farm forestry in Burma and suggests how agencies involved or interested in this effort might proceed.

The author would like to express his thanks and gratitude to all those involved in the BAAP, BARD Project, FAO offices and Watershed Project, and USAID for their assistance and suggestions during the short stay in Rangoon. Any inaccuracies in the report or misinterpretation of the information provided are the responsibility of the author.

# Acronyms

ARI--Agricultural Research Institute

BAPP--Burma Agricultural Production Project

BARD--Burma Agricultural Research and Development

CSIRO--Commonwealth Scientific and Industrial Research Organization

FAO--Food and Agriculture Organization of the United Nations

F/FRED--Forestry/Fuelwood Research and Development Project

FRI--Forest Research Institute

IITA--International Institute of Tropical Agriculture

MPTS--Multipurpose Tree Species

NFTA--Nitrogen Fixing Tree Association

USAID--United States Agency for International Development

## INTRODUCTION

Agroforestry, as defined by the International Council for Research in Agroforestry, is "a collective name for land use systems and technologies in which woody perennials (trees, shrubs, palms, bamboos, etc.) are combined on the same land management unit with herbaceous crops and/or animals, either in some form of spatial arrangement or temporal sequence. In agroforestry systems there are both ecological and economic interactions among the different components."

Agroforestry is a new word for a variety of traditional land management systems and newly developed technologies that attempt to integrate trees and crops on the same land management unit with the objective of increasing the overall productivity of the system. Although agroforestry systems have existed for centuries, research into and application of agroforestry systems have only recently been promoted in development efforts.

Trees can and do provide many benefits when appropriately integrated into farming systems. Through nitrogen fixation or the incorporation of nutrient-rich foliage, trees can improve the structure and nutrient status of soils. They provide food for human consumption and fodder for livestock. In shelterbelts, they prevent wind erosion and reduce evaporation rates from croplands. Trees can help prevent soil erosion and increase water infiltration by blocking overland water flow and improving the infiltration capacity of the soil. They provide a source of fuel that can replace crop residues and animal dung, freeing those resources for crops or animal fodder. In addition, they provide building materials and various other products for household use or cash conversion.

But trees can also be detrimental to agricultural production through shading effects and competition for soil moisture and nutrients and, in some cases, have allelopathic effects on herbaceous vegetation. A good agroforestry system requires a proper understanding of these positive and negative effects and those areas within an existing farming system where the addition of trees can have the greatest net positive effect.

The following sections of this paper discuss the potential for agroforestry systems in Burma in general, with specific reference to areas of concern expressed by BAPP project leaders.

## POTENTIAL FOR AGROFORESTRY IN BURMA

A review of project documents and discussions with project personnel and development agencies suggests areas in which agroforestry may provide a means of addressing natural resource problems and constraints in farming systems. Some of those constraints and potential areas of intervention are listed below.

### Low soil fertility and organic matter and lack of inputs

The BAPP project paper mentions the concern over whether sufficient fertilizer is available to extend to farmers outside the project area. It also mentions the limited availability of fertilizer as a major constraint to increased food production in Burma (USAID 1985a, pp. 2, 15; USAID 1985b).

Agroforestry practices can help improve soil properties. Research on alley cropping (the intercropping of agricultural crops and trees) at the International Institute for Tropical Agriculture (IITA) has demonstrated the benefits of tree/crop intercropping. Benefits attributed to this system include i) increased nutrient content in the soil due to recycling of nutrients from lower soil horizons by tree roots; ii) increased nutrient and organic matter content through the incorporation of prunings from the trees that act as green manure to enrich the soil; iii) biologically fixed nitrogen for the food crop; and iv) mulch, which conserves soil moisture, suppresses weeds, and favors the activity of soil microorganisms. In addition to the beneficial effects on the soil, the trees also provide stakes, fuelwood, and animal forage (Kang, Wilson, and Lawson 1984).

In other agroforestry systems, soil conservation plantings have been combined with green manure plantings in hedgerows along contours on the island of Flores, Indonesia, maintaining and improving soils under the system (NAS 1984b). By including nitrogen-fixing trees in fallow systems, the fallow periods can be shortened or even eliminated. The purpose of the research at IITA in Africa was to develop a more continuous form of agriculture by eliminating the fallow periods by using nitrogen-fixing trees in hedgerows and incorporating prunings and trimmings into the soil. These approaches to soil conservation and soil enrichment deserve consideration as agroforestry systems for Burma. They may have particular application in the hilly areas.

The green manure and mulch benefits of alley cropping can also be provided through the harvest of foliage and branches from small block plantings of trees or plantings along field margins and boundaries. Where mechanized farming is carried out, as on the Agriculture Corporation seed farms, trees can impede the movement of tractors and other machinery. Under those circumstances, alternatives to alley cropping may be required. Block plantings or boundary plantings can provide benefits similar to those of alley cropping and, under certain circumstances, may be preferable. This is not to say that mechanized farming and alley cropping are not compatible. Distances between rows of trees can be adjusted to allow for the movement of tractors and machinery. IITA's work with alley cropping includes mechanized farming. Each particular situation must be evaluated and the most appropriate use of trees determined to best meet the needs and requirements of each situation.

Alley cropping and the use of tree plantings for green manure could potentially help alleviate the fertilizer shortage in Burma. Even if the green manuring cannot replace fertilizer entirely, it can reduce the fertilizer requirements. Most of the research on alley cropping to date has been in the humid tropics and can provide background for developing systems for humid, tropical areas in Burma. Little research on alley cropping in arid and semi-arid areas has been carried out. This lack of research would suggest that a cautious approach to alley cropping be used in the dry zone. Nonetheless, **alley cropping may prove beneficial in the dry zone and trials should be initiated**, as well as plantings in small blocks and along field margins to provide a source of mulch, green manure, fuelwood, and other needed tree products.

**Wind and water as causes of soil erosion**

BAPP personnel have suggested that wind is a problem for crops in the central dry zone of Burma. This is likely due to both wind erosion and the harmful effects of wind on crops. In the more humid, hilly regions of Burma, soil erosion caused by runoff from cultivated fields and areas under shifting cultivation presents another problem. Trees can play a role in preventing wind and water erosion and reducing the harmful effects of drying winds on agricultural crops.

Windbreaks and shelterbelts have been shown to reduce wind velocity for distances of up to 10-20 times the height of the trees. A CARE project in the Majjia Valley in Niger has planted shelterbelts that have increased the productivity of agricultural crops by 20 percent, taking into account the production lost on those portions of fields where trees replaced crops (Weber and Stoney 1986). **Shelterbelts can increase cropland productivity in the dry zones of Burma.** In addition to the protection provided by shelterbelts, alley-cropping tree rows planted perpendicular to the wind provide additional protection. However, where planting along the contours is desired for protection from soil erosion, this may not be possible.

As previously mentioned, alley cropping systems with rows of trees planted along the contours have effectively prevented soil erosion by providing a barrier to water running off fields while, at the same time, building up and enriching the soil. By serving both these functions, alley cropping systems can potentiallly reduce erosion and increase soil resources in upland areas cultivated under shifting cultivation, thereby reducing the need for extended fallow periods.

**Fuelwood scarcity and deforestation**

Fuelwood scarcity in the dry zone of Burma and extensive cutting of mangroves for production of charcoal for the city of Rangoon have been reported. Agroforestry plantings and small plantation efforts as those initiated by the forest department can begin to address the problem. Agroforestry plantings can provide fuelwood for household use and help eliminate the need to purchase or spend excessive time gathering wood or other fuels. To the extent that fuelwood can be produced by the households on landholdings, pressure is relieved from forested areas where fuel is gathered. In areas where fuelwood is not available and crop residues are substituted for fuel, crop residues are not returned to the soil to provide organic matter. Providing fuelwood through agroforestry plantings can free up those residues for use as soil amendments or other products.

Agroforestry plantings can do little to alleviate the demand for charcoal in the larger cities of Burma. However, where marginal land is available and uncultivated, it may be possible to establish plantations of fast-growing trees that could be used to produce charcoal and take the pressure off mangrove forests. Another potential area for introducing trees (at least improved tree species) is in the already existing home gardens of Burma. During discussions in Rangoon, it was suggested that in paddy-growing regions homesteads be built on higher areas of land. These home gardens often contain trees, as is also common in Bangladesh. There may be an opportunity to introduce fast-growing fuelwood species or live fences into these traditional agroforestry systems. In addition, where grazing is a problem, live fences that can produce fuel, fodder, green manure, and protection from uncontrolled grazing may be a viable option.

A more complete assessment of the agroforestry opportunities is needed. This section only suggests some possible agroforesty options for Burma. In addition to these general opportunities for agroforestry interventions in Burma, more specific applications relevant to the BAPP and BARD Project follow.

## POTENTIAL AGROFORESTRY SYSTEMS FOR BAPP AND BARD PROJECT AREAS

In discussing the possibilities for agroforestry interventions in project areas, BAPP leaders identified the central dry zone of Burma as a priority area for agroforestry. They also expressed interest in exploring the possibility for agroforestry in their other project areas. Within the dry zone, they indicated interest in i) alley cropping to improve soil fertility and organic matter content and ii) windbreaks/shelterbelts to ameliorate the detrimental effects of winds. Scarcity of fuelwood was also mentioned as a concern to be addressed. In response to these concerns, potential species and management systems have been identified for consideration in trials.

Agroforestry and farm forestry systems that may be applicable to the dry zone include:

- windbreaks/shelterbelts,
- alley cropping, and
- small block plantings for production of fodder, green manure, and fuelwood.

These three systems can (in order of priority): i) improve soil properties and soil productivity, ii) provide protection from wind, and iii) produce fuelwood as a byproduct. A list of potential tree species that could provide these benefits is included in Appendix I.

Any of these systems can be managed for production of fodder, fuel, green manure, or a combination of products/benefits. Selection of management strategies depends on the priorities in any given locale. In experimental plantings, various management strategies can be tested and compared for productivity, but the design of experimental plantings should also be based on an appraisal of

community needs or a particular management situation (such as the BAPP seed farms). If the practice is ultimately extended to local farmers, experimental plantings should reflect, to the extent possible, local conditions and management based on available local resources.

**Windbreaks/shelterbelts**

Shelterbelts have been shown to increase crop productivity in areas where winds lead to soil erosion and accelerated drying of field crops (NAS 1984a). Before establishing shelterbelts in the dry zone, species selection, management systems, protection from grazing, and maintaining continuity of shelterbelts across croplands need to be considered.

The following species for arid and semi-arid areas (Appendix I) have been used successfully in shelterbelt plantings (NAS 1980, 1983a):[1]

*Azadirachta indica* (B)
*Cajanus cajan* (B, NF)
*Cassia siamea* (B, NF)
*Conocarpus lancifolius*
*Prosopis alba* (NF)
*Sesbania sesban* (B, NF)

Sesbania and Cajanus are both relatively short-lived but become rapidly established. The role of Cajanus as a crop plant may make it easier to protect since crop plants are customarily protected from grazing animals. They could be used to establish shelterbelts quickly while longer-lived trees, such as Azadirachta and Cassia, become established. Since Sesbania, Cajanus, Azadirachta, and Cassia are available in Burma, seed procurement should not be a problem. Upright varieties of Cajanus should be selected if this species is to be used. Conocarpus and thornless Prosopis are also possible alternatives for shelterbelts, although Conocarpus is an exotic that does not fix nitrogen. If fruit trees are desired, Tamarindus and/or Zizyphus should also be considered for shelterbelt plantings.

Species composition and management of the shelterbelts will depend on the products and benefits desired from the shelterbelts and should follow an assessment of local conditions. The following general, technical specifications for basic design and spacings are given by Weber and Stoney (1986) and Ffolliott and Thames (1983):

1. Shelterbelts should be planted perpendicular to the predominant wind direction for the season in which the wind causes the greatest damage to crops.

2. Three-five rows of trees are generally recommended, with 2-3 meters between larger trees, 1-1.5 meters between lower trees or shrubs in rows, and 3-4 meters between rows.

3. Survival and continuity of shelterbelt plantings is extremely important since any gaps in a belt tend to accentuate the effects of wind at the gap.

4. A density of 60-80 percent is recommended for arid areas; denser belts block wind too completely and can actually cause erosion.

5. Shelterbelts effectively reduce wind velocity for 10-20 times the height of trees in the belt; therefore, the distance between parallel belts should be at most about 20 times the height of the mature trees.

[1] B = naturalized or native to Burma, NF = nitrogen fixing.

To provide protection during the establishment phase of the shelterbelts, intermediate plantings of shorter-lived species could be planted between the permanent rows.

In areas with uncontrolled grazing at certain times of year, protection of shelterbelt plantings is a major concern, especially where goats are grazed. Lack of protection, even for a short period, can destroy a shelterbelt planting. Protecting the extensive areas required for shelterbelts will probably require fencing, either commercial (e.g., barbed wire) or by using local materials, such as branches of thorny species or woven bamboo. Local cooperation will also be required. If local residents do not understand the importance of the shelterbelts or have any interest in protecting them, there is little chance of successfully protecting the young plantings. With local cooperation and interest, protection is easier to achieve. By involving the local population in the planning and implementation of shelterbelt plantings, success in their protection and maintainence is more likely. Where landholdings are fragmented or small, this requires that landholders cooperate to i) provide shelterbelts long enough to have a protective effect and ii) maintain the shelterbelts to avoid gaps developing within them. Including fruit trees in shelterbelt plantings and taking advantage of the protection provided by field crops can also improve protection as people are often more likely to protect them.

Shelterbelts can potentially increase productivity in the dry zones of Burma. The needed products and benefits they can provide should be assessed. Based on such an assessment, the best species and management strategies can be selected to meet the needs of local people and help ensure the success of efforts to establish shelterbelts. Experimental plantings should be established to test and develop species and management strategies appropriate for the dry zone and assess the net benefit that can be provided by shelterbelts, taking into account the associated costs.

**Alley cropping**

Alley cropping has been shown to improve soil properties in the humid and subhumid tropics and to improve overall productivity that can lead to more permanent agriculture as opposed to alternating fallow and cropping systems (Kang, Wilson, and Lawson 1984). Only limited research has been done in the arid and semi-arid tropics, and results have been mixed. A review of research on hedgerow intercropping (Huxley 1986) suggests that long-term soil improvement in arid and semi-arid zones may not be possible, but short-term benefits in crop production are possible. In India, scientists working with *Leucaena leucocephala* (Singh et al. 1986) found that, where fertilizer is readily available, the soil improvement benefits of mulching in alley cropping were secondary to the use of trimmings as fodder, especially during the dry season. In years of drought when other crops failed completely, Leucaena still produced fodder and other tree products that helped improve the long-term sustainability of the system.

With the limited availability of fertilizer in Burma, the soil improvement benefits of alley cropping may prove sufficient to recommend widespread use of such systems. The mixed results from trials in arid and semi-arid regions suggest that more research will be required before alley cropping can be recommended or adopted more widely.

The BAPP and BARD Project provide an opportunity to conduct research on alley cropping systems in Burma. For the humid and sub-humid zones, appropriate species and management systems need to be identified to provide those outputs of greatest utility to local communities. Plantings for erosion control and soil improvement may be appropriate for many of these areas. Live fencing to protect fallow lands from uncontrolled grazing may be another possible agroforestry intervention. In the arid and semi-arid zones of central Burma, alley cropping systems that provide mulch, green manure, and fuelwood may be appropriate. Species and management systems that can provide those products and benefits need to be identified and trials undertaken to test their productivity.

Most of the species identified for consideration in Appendix I are nitrogen-fixing. Those that are not were included for use in shelterbelts. *Adhatoda vasica* is not nitrogen-fixing but was included

because it can serve as a green manure. It is reportedly left unbrowsed by animals and may be useful where grazing will not permit survival of other species (NAS 1980). *Prosopis cineraria* is used extensively in the dry zones of India and is reported to improve productivity of agricultural crops grown in association with it. The ability of *Prosopis* spp. to fix nitrogen and withstand drought conditions recommend them as candidates for alley cropping in dry areas. The one disadvantage of these species is their thorniness. Varieties of relatively thornless Prosopis have been developed and it may be possible to obtain seed of those varieties for trials in Burma. Leucaena has been used extensively in alley cropping research for which it is well adapted. If psyllid resistant varieties can be identified and seed procured for trials, Leucaena should be included in alley cropping trials. It may be possible for Burma to participate in trials of psyllid resistant varieties by working through the Nitrogen Fixing Tree Association. Other possible species for trials include *Acacia albida, A. nilotica, A. catechu, Cajanus cajan* (erect varieties), and *Sesbania sesban*.

Trials with Leucaena in India (Singh et al. 1986) suggest that wider spacing between rows of trees in alley cropping are required in arid and semi-arid regions due to the effects of moisture competition between trees and field crops. Spacings in the humid and sub-humid tropics are usually about 4 meters between rows. Spacings of 6-8 meters or more between rows may be required to minimize the impact of trees on crops and optimize productivity of the system in arid and semi-arid zones. Yields of fodder or green manure may be increased at such wide spacings by planting the hedgerows with multiple rows of trees. To avoid the problem of moisture and nutrient competition between trees and crops, trials of *Prosopis cineraria* should be conducted. Experience with *P. cineraria* (Baumer 1983) indicates that the tree can improve soil conditions and does not compete with crop plants. Its deep root system allows it to draw moisture from deeper soil levels, which makes it extremely drought resistant. The main disadvantages of *P. cineraria* are its slow initial growth and thorniness, but these are at least partially compensated for by its high compatibility with field crops.

An alternative to alley cropping for soil improvement through mulching and green manuring is to set aside areas for production of biomass and fuelwood on poorer lands unsuitable for agricultural crops and harvest and apply biomass to the fields. This can be accomplished through small block plantings, or by harvesting biomass from shelterbelts and line plantings along field boundaries. This type of management reduces the adverse effects of competition between crops and trees but increases the labor required to harvest, transport, and apply cuttings and trimmings to the field crop. A close accounting of the benefits to be provided by the foliage and cuttings compared to the additional labor costs would be necessary to determine the feasibility of such a system.

**Fuelwood production**

In areas where fuelwood production is a concern, the alley cropping and shelterbelt systems mentioned above can be managed to produce fuelwood as a byproduct or even a major product. It simply requires adjusting the management to allow for harvesting of branches or trees for fuelwood production. In the alley cropping systems, trees are cut back to 25-75 cm from ground level during the field crop growing season. If allowed to grow during the fallow season, these cuttings can produce usable fuelwood. Shelterbelts can be managed on a fuelwood rotation, harvesting alternating rows to maintain the windbreak while the harvested rows become reestablished. Tree branches can sometimes be harvested periodically without having an adverse impact on the shelterbelt, and thinning and pruning the shelterbelt may even be required to prevent it from becoming too dense.

Another source of fuelwood from farmland may be small block plantings on marginal land. These small blocks could be managed exclusively for fuelwood or, as mentioned previously, provide a number of benefits, including fuel, fodder, green manure, and mulch.

## PRELIMINARY RECOMMENDATIONS

The following recommendations are limited, based entirely on discussions with BAPP leaders and organizations involved in forestry and agroforestry development in Burma combined with a review of the available literature in Rangoon. These recommendations cannot replace visits to project areas and discussions with those involved with implementation in the field.

### Agroforestry consultancy

The agroforestry consultancy should be rescheduled and completed as planned. The dates suggested for rescheduling are from February 15 to March 15, 1989. Following the initial trip, it was suggested that one month should be sufficient to complete the consultancy. The rescheduling should be started as soon as possible. The current political situation in Burma will obviously have an effect on when and whether the consultancy can be rescheduled.

### Training

Three types of training are recommended: 1) principles of agroforestry, 2) research methods, and 3) nursery methods. The first two types of training were provided for in the original consultancy (see Appendix III). The research methods training would be based on a farming-systems research approach with emphasis on research problems specific to agroforestry. Training in nursery methods is recommended since local nurseries may be required if agroforestry is extended to communities. It may be possible to contract nursery work to the forest corporation, which has good experience with nurseries but not necessarily with the species to be used for agroforestry plantings. The F/FRED team in Bangkok, Thailand suggested that it may be possible to identify local trainers (in Asia) for teaching nursery methods. This training could be handled separately from the agroforestry training and provided to those involved most directly with nurseries.

### Seed procurement and species trials

Appendix II lists seed sources for tree species recommended for agroforestry trials and provenance testing. F/FRED, NFTA, and CSIRO may be able to provide seed in research quantities for species trials and assist with locating bulk seed suppliers. They should also be able to provide research designs for trials that allow for networking opportunities with other scientists who work trees under similar conditions in both the Asia region and worldwide. Project personnel should correspond directly with individual organizations to obtain seed and instructions for trials. Names and addresses of contact persons have been included in Annex 2. Information on nursery planting practices for the trials will most likely be provided by the organizations involved but should be requested. For species trials to begin in the 1989 monsoon season, the seed should be procured by the beginning of the new year to ensure adequate time to raise planting stock in nurseries. The suppliers of seed and technical assistance should be contacted as soon as possible to start making arrangements for importing seed and initiating species trials in 1989.

### Coordination with F/FRED

The F/FRED Project's Coordinating Unit in Bangkok, Thailand may be able to provide technical assistance and opportunities for cooperative research on multipurpose tree species (MPTS). In addition, there may be opportunities for Burmese scientists to participate in regional conferences and training programs sponsored by F/FRED. Scientists should correspond directly with Kenneth G. MacDicken, F/FRED Team Leader, if they are interested in working with F/FRED (See Appendix II). He can provide more detailed information on the possible opportunities for cooperation.

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# Appendices

# POTENTIAL AGROFORESTRY SPECIES FOR BURMA

A. Species Selection

The perennial species suggested were selected for the following properties:

1) capacity to fix nitrogen and serve as green manure,

2) suitability for windbreaks or shelterbelts,

3) value as a fuel,

4) rapid growth

Because of the need expressed for species that can improve soils, prevent wind and water erosion, and are adaptable to alley cropping systems, emphasis was placed on those species that fix nitrogen and/or serve as green manure and those that have been used successfully for windbreaks and shelterbelts. Rapid growth is always a consideration in any agroforestry system, especially when farmers cannot wait long periods of time to gain a return on their investments of time, labor, land, and money. This is especially true given the land tenure situation in Burma, with farmers being allotted land use rights on an annual basis with no guarantee of long-term tenure. Fruit species have also been included.

The list of species provided includes those reported as occurring in Burma as well as exotics. For those species occurring in Burma and in the project areas, information should be gathered on local uses and attitudes towards the trees. Favorable local attitudes may make it easier to introduce an agroforestry system. Unfavorable attitudes may cause people to reject the system. Where local species have been suggested, their local names have been provided. Names may vary within Burma.

The list has been divided into species suitable to the dry zones (250-1000 mm) and those suited to wet zones (1000+ mm). A copy of a summary of characteristics of tree species from the National Academy of Sciences publication *Firewood Crops: Shrub and Tree Species for Energy Production*, vol. 2, has been included as Appendix IV. It contains additional information on environmental requirements for most of the suggested tree species.

B. Preliminary Species List

Arid, Semi-arid Areas (+- 250-1000 mm.)

| Species | Local Name |
|---|---|
| *Acacia albida* | |
| *A. catechu* | Cutch, Sha |
| *A. nilotica* | |
| *Adhatoda vasica* | (none reported) |
| *Azadirachta indica* | Tamaka |
| *Cajanus cajan* | Pay-in-chong |
| *Cassia siamea* | Mezali |
| *Casuarina equisetifolia* | Kabwi |
| *Conocarpus lancifolius* | |
| *Leucaena* spp.* | Bosca |
| *Prosopis alba* (thornless) | |
| *P. cineraria* | |
| *P. juliflora* (thornless) | |
| *Sesbania sesban* | |
| *Tamarindus indica* | Magyi |
| *Zizyphus mauritania* | Zi |

Subhumid, Humid Areas (+- 1000+ mm.)

| Species | Local Name |
|---|---|
| *Acacia auriculiformis* | |
| *A. mangium* | |
| *A. meamsii* | |
| *Albizia lebbek* | Kokku |
| *Alnus nepalensis* | Maibau |
| *Calliandra calothyrsus* | |
| *Casuarina cunninghamiana* | |
| *Gliricidia sepium* | |
| *Leucaena* hybrids* | Bosca |
| *L. diversifolia** | Bosca |
| *Morus alba* | |
| *Robinia pseudoacacia* | |
| *Sesbania grandiflora* | |

* Note: Because of the problem with psyllids attacking Leucaena, the Nitrogen Fixing Tree Association should be consulted for those species and varieties that are most resistant.

# SOURCES OF SEED AND TECHNICAL ASSISTANCE

**A. Forestry/Fuelwood Research and Development(F/FRED) Project**

Contact: Kenneth G. MacDicken
MPTS Network Specialist and Team Leader
F/FRED Coordinating Unit
P.O. Box 1038
Kasetsart Post Office
Bangkok 10903, Thailand
Telephone: 66-2/561-1041
66-2/579-1977
Telex: 21340 WINROCK TH
Dialcom 41: tcn370

The F/FRED Project is helping cooperating scientists carry out research on multipurpose tree species (MPTS) throughout Asia. The project provides seed and complete instructions including research design for trials of promising multiple purpose trees for different climatic zones in Asia. Data from the research will be pooled and made available to all cooperators. In addition, the project provides opportunities for training courses, seminars and study tours for cooperating researchers working with multipurpose tree species. Given the proximity of the F/FRED project offices and the applicability of their research efforts to the development of agroforestry in Burma, cooperation with F/FRED provides a good opportunity for developing the potential for agroforestry research and application in Burma.

The F/FRED project may be able to provide seed for some of the species suggested in this report. It is possible that Burma could become involved with their upcoming research trials.

**B. The Nitrogen Fixing Tree Association (NFTA)**

Contact: Jim Chamberlain
Development Associate for Asia
NFTA
P.O. Box 680
Waimanalo, Hawaii 96795
Telephone: 808/259-85555
Telex: 5101004385
Cable: NFTAHAWAII, Hawaii

NFTA was incorporated in Hawaii in 1981 to encourage more and better use of nitrogen fixing trees for fuelwood, fodder, timber and other products and services for small farmers in the developing tropics. They have a cooperative planting program which helps match appropriate species with sites and preferred end uses. Through this program they provide assistance for the establishment of trials of selected species.

In addition, NFTA publishes *Leucaena Research Reports, Nitrogen Fixing Tree Research Reports, NFT Highlights,* and *NFTA News*. These publications are good sources of up to date research on nitrogen fixing trees. It may also be possible to get back issues. The annual fees are only $10 for institutional members and putting these publications in project libraries and ARI libraries is highly desirable, particularly if the emphasis is to be on using agroforestry systems for soil improvement through intercropping with nitrogen fixing trees. Application blanks have been left with the USAID project officer.

**C. Commonwealth Scientific and Industrial Research Organization (CSIRO)**

Contact: Stephen Midgley, Officer in Charge of Seed Section
Division of Forestry Research
CSIRO
Yarramula 2601, A.C.T.
Australia

CSIRO carries out research and provides seed commercially for nitrogen fixing species. In the past they have provided information on appropriate species for sites when given information on climatic and edaphic characteristics of the site and intended end use of the tree products.

**D. Other Seed Suppliers**

The May 1987 issue of *Nitrogen Fixing Tree Research Reports* provided a list of suppliers of seed for nitrogen fixing trees. The NFTA list is included as Appendix V. Another source of information on seed suppliers is the ICRAF publication *Multipurpose Tree and Shrub Seed Directory* by Peter G. Von Carlowitz. The ICRAF publication is included in the list provided by NFTA.

# TRAINING

The terms of reference for the Agroforestry Consultancy provide for a 5-day short course in agroforestry principles with an option for a 2-3 day course in research methods. This coursework was to follow visits by the consultant to the areas in which agroforestry systems are to be tried. Although the field visits were not possible, this report suggests potential species and agroforestry systems based on discussions in Rangoon with project personnel and development agencies and a review of available literature. Although these suggestions are only preliminary, it should be possible to conduct trials with the species suggested including trial plantings of windbreaks and other appropriate agroforestry plantings.

Selection of systems for local communities cannot be made until a full assessment of local conditions and opportunities is carried out in the communities. The proposed agroforestry training should give the trainees the background to be able to i) understand agroforestry systems and their applications, ii) carry out an assessment of social and physical factors in local communities which will form the basis for selection of appropriate agroforestry systems, and iii) select and develop management guidelines for agroforestry systems.

The proposed short course would consist of a series of lectures and activities which would i) acquaint trainees with the basic principles of agroforestry, and ii) lead them through a series of exercises similar to the process that would be followed in assessing a community's resources and needs and designing agroforestry systems to take advantage of existing resources and provide for the needs of the communities by integrating trees into the existing farming systems.

In addition to the agroforestry training, a short session would go over basic nursery practices for raising planting stock to be planted in agroforestry systems. If, as has been suggested, the BAPP and BARD projects intend to raise their own seedlings, additional training in nursery planning and management should be considered. This training could possibly be arranged through the F/FRED project office in Bangkok. Local expertise is probably available for that kind of training. Temporary, local nurseries are often a preferable alternative to large centrally located nurseries and, in many countries, have been shown to be more successful in promoting tree planting in local communities.

Following is a proposed schedule for the short course on Agroforestry Principles. Two half-day field exercises have been included as part of the training. Logistics may present problems for these sessions as one of them involves farmer interviews which will require that arrangements be made with farmers well in advance of the course. These field exercises are a key part of the training and every effort should be made to include them in the course.

# AGROFORESTRY PRINCIPLES

## Course Outline

DAY 1

### Morning Session

Topics

- Inauguration
- Introductions - Trainer and Trainees
- Course objectives and general structure
- Hand out course materials (syllabus, readings, etc.)
- What is agroforestry ?

Objectives

The objective of this session will be to inaugurate the course, introduce participants to the instructor and to one another, hand out class material, and present and discuss definitions of Agroforestry.

### Afternoon Session

Topics

- Uses of trees
- Benefits provided by trees
- Uses of trees in Burma (Class discussion)

Objectives

The objective of this session will be to discuss the many ways trees are used in farming systems (ex. fuelwood, fodder, shade, raw material for cottage industries, etc.) and the benefits trees can provide (protection from soil erosion, source of income, soil improvement, nitrogen fixation, etc.). Following a general discussion of the uses and benefits provided by trees, trainees will be asked to present and discuss aspects of tree use in rural areas of Burma.

DAY 2

### Morning Session

Topics

- Farming systems approach
- Agroforestry systems (Lecture and slides)
- Traditional farming systems in Burma and the role of trees (Class discussion)

Objectives

The objective of this session will be to present a systems approach to the classification of agroforestry systems. The emphasis will be on looking at the whole farming system and the ways in which trees can successfully be integrated into that system. A slide show will be presented illustrating a number of traditional and experimental agroforestry systems from the tropics. Trainees will be asked to present and discuss traditional Burmese agroforestry systems they have encountered.

Afternoon Session

Topics

- Agroforestry diagnosis and design (ICRAF D&D Manual)
- Prediagnostic data needs
- Diagnostic survey design and implementation

Objectives

The objective of this session will be to present the International Council for Research in Agroforestry (ICRAF) methodology for designing agroforestry systems. Trainees will be instructed in the basic principles of the D&D methodology, will work through the prediagnostic stage for a given area and then be asked to design a diagnostic survey that will be used for the first field exercise. The field exercise will form the basis for designing and planning an agroforestry system.

DAY 3

Morning Session (Lecture and field visit)

Topics

- Nursery Operations
- Planning nursery operations
- Visit to Forestry Dept. Nursery

Objectives

The objective of this session will be to acquaint trainees with basic forest tree nursery operations and, if time and arrangements with a nursery can be arranged, provide them with some "hands-on" experience in a nursery. Trainees should understand the importance of coordinating nursery operations with field activities.

Afternoon Session

Topics

- Selecting tree species for agroforestry systems
  (Nitrogen fixing trees, environmental requirements, etc.)
- Selecting and designing agroforestry systems
- Final diagnostic survey preparation

Objectives

In this session the process of selecting tree species and designing agroforestry systems based on the results of the diagnosis of a representative field management area will be presented. Following this presentation, trainees will review and revise the diagnostic surveys prepared on day 2 and make final arrangements for field interviews on day 4.

DAY 4

Morning Session

Field Exercise

If arrangements can be made, trainees will be divided into groups with 4 persons per group (max. 5) to interview farm families in a preselected area using the diagnostic surveys or interview format developed on days 2 and 3.

Objective

The objective of the field exercise will be to give trainees practical experience with field interviews and a better idea of some of the problems encountered in conducting an interview. The information gathered will be used for the final exercise.

Afternoon Session

Activity

Trainees will be asked to analyze and present the results of their interviews to the whole group.

Objective

This activity will give the small groups a chance to review and summarize what they learn during their field interviews, and then share it with the larger group.

DAY 5

Final Exercise

The groups selected earlier to work together on planning and implementing diagnostic interviews will be asked to develop a work plan for incorporating agroforestry research and agroforestry systems into their ongoing research and extension programs. The morning will be used to develop the work plan and the groups will be given 15-20 minutes each in the afternoon to present their work plans.

Objective

The objective of the final exercise will be to bring together everything that was covered in the previous sessions to come up with a work plan to incorporate agroforestry activities into the ongoing research and extension activities of the participating agencies and projects.

## Burmese Trees*

**(Alphabetized by Common Name)**

| Common Name | Scientific Name | Family Name |
|---|---|---|
| (unknown) | *Adhatoda zeylanica* | *Acanthaceae* |
| (unknown) | *Emblica officinalis* | *Euphorbiaceae* |
| Ananbo | *Crypteronia paniculata* | *Lythraceae* |
| Ananma | *Fagraea fragrans* | *Loganiaceae* |
| Aukchinsa | *Diospyros ehretiodies* | *Ebenaceae* |
| Aukchinsani | *Amoora wallichi* | *Meliaceae* |
| Aukkyu | *Bischofia javanica* | *Euphorbiaceae* |
| Awza | *Anona squamosa* | *Annonaceae* |
| Badan | *Terminalia catappa* | *Combretaceae* |
| Baing | *Tetrameles nudiflora* | *Datiscaceae* |
| Bamaw | *Sagereae listeri* | *Anonaceae* |
| Bambwe | *Careya arborea* | *Myrtaceae* |
| Banatha | *Strombosia javanica* | *Olacaceae* |
| Bawa | *Garcinia speciosa* | *Guttiferae* |
| Bebya | *Cratoxylon nerifolium* | *Hypericaceae* |
| Binga | *Stephegyne diversifolia* | *Rubiaceae* |
| Bonmeza | *Albizia stipulata* | *Leguminosae* |
| Bosca | *Leucaena leucocephala* | *Leguminosae* |
| Bwegyin | *Bauhinia malaarica* | *Leguminosae* |
| Byu-chidauk | *Rhizophora mucronata* | *Rhizophoraceae* |
| Byu-u-talon | *Bruguiera gymnorhiza* | *Rhizophoraceae* |
| Chaung-shia | *Oroxylum indicum* | *Bignoniaceae* |
| Chay | *Gluta tavoyana* | *Anacardiaceae* |
| Chestnuts | *Castanopsis* spp. | *Fagaceae* |
| Chinese Coffin Wood | *Coniferales* spp. | |
| Chinyok | *Garuga pinnata* | *Burseraceae* |
| Custard Apple | *Anona squamosa* | *Annonaceae* |
| Cutch | *Acacia catechu* | *Leguminosae* |
| Dahat | *Tectona hamiltoniana* | *Verbenaceae* |
| Danda-lune | *Moringa oleifera* Lam. | *Moringaceae* |
| Daung-de-laung-nwe | *Dalbergia vouvillis* Roxb. | *Leguminosae* |
| Dawehmaing | *Lumnitzera coccinea* | *Combretaceae* |
| Didu | *Bombax insigne* | *Malvaceae* |
| Dwabok | *Kydia calycina* | *Malvaceaae* |
| Dwani | *Eriolaena candollei* | *Sterculiaceae* |
| Fig | *Ficus carica* | *Moraceae* |
| Flame tree | *Delonix regia* Rafin. | *Leguminosae* |
| Gangaw | *Mesua ferrea* | *Guttiferae* |
| Gaung-byu | *Ehretia laevis* | *Boraginaceae* |
| Gwe | *Spondias mangifera* | *Anacardiaceae* |
| Gyo | *Schleichera trijuga* | *Sapindaceae* |
| Gyobo | *Walsura robusta* | *Meliaceae* |
| Hlega | *Machilus villosa* | *Lauraceae* |
| Hmanbyu | *Randia uliginosa* | *Rubiaceae* |
| Hmanni | *Gardenia erythroclada* | *Rubiaceae* |
| Hmanthin | *Cinnamomum iners* | *Lauraceae* |
| Hminthan | *Cinnamomum iners* | *Lauraceae* |
| Hnaw | *Adina cordifolia* | *Rubiaceae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Htan | *Borassus flabellifer* | *Palmae* |
| Htauksha | *Vitex glabrata* | *Verbenaceae* |
| Hte-naung | *Acacia leucaphloea* | *Leguminosae* |
| In | *Dipterocarpus tuberculatus* | *Dipterocarp.* |
| Inbo | *Dipterocarpus obtusifolius* | *Dipterocarp.* |
| Ingyin | *Pentacme siamensis* | *Dipterocarpac.* |
| Ironwood | *Xylia dolabriformis* | *Leguminosae* |
| Jack | *Artocarpus integrifolia* | *Moraceae* |
| Ka-pwee | *Casuarina equisetifolia* | *Casuarinaceae* |
| Kabaing | *Ceriops candolleana* | *Rhizophoraceae* |
| Kabaing | *Ceriops roxburghiana* | *Rhizophoraceae* |
| Kaban | *Anisoptera oblonga* | *Dipterocarpac.* |
| Kaban-ywet-the | *Shorea floribunda* | *Dipterocarpac.* |
| Kabaung | *Strychnos nux-blanda* | *Loganiaceae* |
| Kabwi | *Casuarina equisetifolia* | *Casuarinaceae* |
| Kadet | *Crataeva roxburghii* | *Capparidaceae* |
| Kadi | *Bursera serrata* | *Burseraceae* |
| Kadi | *Protium serratum* | *Burseraceae* |
| Kalamet | *Mansonia gagei* | *Sterculiaceae* |
| Kalaw | *Taraktogenos kurzii* | *Bixaceae* |
| Kalaway | *Lindera assamica* | *Lauraceae* |
| Kalaway | *Lindera pulcherrima* | *Lauraceae* |
| Kambala | *Sonneratia apetala* | *Lythraceae* |
| Kanazo | *Baccaurea sapida* | *Euphorbiaceae* |
| Kanyaung | *Shorea argentea* | *Dipterocarpac.* |
| Kanyin | *Dipterocarpus alatus* | *Dipterocarpac.* |
| Kanyin | *Dipterocarpus obtusifolius* | *Dipterocarp.* |
| Kanzo | *Tarrietia javanaica* | *Sterculiaceae* |
| Karawe | *Cinnamomum inunctum* | *Lauraceae* |
| Kathit | *Erythrina* spp. | *Leguminosae* |
| Kaunghmu | *Anisoptera glabra* | *Dipterocarpac.* |
| Kaya | *Mimusops elegni* | *Sapotaceae* |
| Kazaw | *Myrsine semiserrata* | *Myrsinaceae* |
| Kinthat-putgyi | *Evodia meliaefolia* | *Rutaceae* |
| Kokko | *Albizia lebbek* | *Leguminosae* |
| Konpyinma | *Lagerstroemia macrocarpa* | *Lythraceae* |
| Kuthan | *Hymenodictyon excelsum* | *Rubiaceae* |
| Kyana | *Carapa moluccensis* | *Meliaceae* |
| Kyatnan | *Carapa moluccensis* | *Meliaceae* |
| Kyauktinyu | *Cephalotaxus griffithii* | *Coniferae* |
| Kyaungdauk | *Pajanelia rheedii* | *Bignoniaceae* |
| Kyaungya | *Oroxylum indicum* | *Bignoniaceae* |
| Kyese-kyiche | *Dehaasia cuneata* | *Laureaceae* |
| Kyettet-nwe | *Combretum pilosum* | *Combretaceae* |
| Kyetyo | *Vitex canescens* | *Verbenaceae* |
| Kyetyo | *Vitex pubescens* | *Verbenaceaae* |
| Kyi | *Barringtonia acutangula* | *Myrtaceae* |
| Kyilan | *Shorea assamica* | *Dipterocarpac.* |
| Kyu | *Terminalia citrina* | *Combretaceae* |
| Kyun | *Tectona grandis* | *Verbenaceae* |
| Kyunbo | *Premna pyramidata* | *Verbenaceae* |
| Kyungauknwe | *Vitex pubescens* | *Verbenaceaae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Kywedanyin | *Adinobotrys atropurpureus* | *Leguminosae* |
| Kywemagyolein | *Sterospermum suaveolens* | *Bigonianceae* |
| Laba | *Sonneratia griffithii* | *Lythraceae* |
| Laburnum, Indian | *Cassia fistula* | *Leguminosae* |
| Lacquertree | *Melanorrhoea usitata* | *Anacardiaceae* |
| Laukya | *Schima wallichii* | *Temstroemiac.* |
| Leh-paeh* | *Bombax malabaricum* | *Malvaceae* |
| Lein | *Terminalia pyrifolia* | *Combretaceae* |
| Lelun | *Sapium baccatum* | *Euphorbiaceae* |
| Letkok | *Sterculia foetida* | *Sterculiaceae* |
| Letkok | *Sterculia alata* | *Sterculiaceae* |
| Letpan | *Bombax malabaricum* | *Malvaceae* |
| LetpanLeah | *Bombax malabaricum* | *Malvaceae* |
| Lettok | *Alstonia scholaris* | *Apocynaceae* |
| Lettok-gyi | *Holarrhena antidysenterica* | *Apocynaceae* |
| Lettok-thein | *Wrightia tomentosa* | *Apocynaceae* |
| Leza | *Lagerstroemia tomentosa* | *Lythraceae* |
| Lunbo | *Buchanania latifolia* | *Anacardiaceae* |
| Lunbo | *Buchanania latifolia* | *Anacardiaceae* |
| Madama | *Dalbergia ovata* | *Leguminosae* |
| Magyi | *Tamarindus indica* | *Leguminosae* |
| Mah-gyee | *Tamarindus indica* | *Leguminosae* |
| Mahaga | *Linostoma decandrum* | *Thymeleaceae* |
| Mahlwa | *Dolichandrone stipulata* | *Bignoniaceae* |
| Mahogany | *Swietenia macrophylla* | *Meliaceae* |
| Maibau | *Alnus nepalensis* | *Betulaceae* |
| Malaka | *Psidium guayava* | *Myrtaceae* |
| Mango | *Mangifera indica* | *Anacardiaceae* |
| Maniawga | *Carallia integerrima* | *Rhizophoraceae* |
| Mau-kadon | *Sarcocephalus cordatus* | *Rubiaceae* |
| Mau-lettan-she | *Anthocephalus chinensis* | *Rubiaceae* |
| Metlin | *Garcinia paniculata* | *Guttiferae* |
| Mezali | *Cassia siamea* | *Leguminosae* |
| Minbaw | *Caryota urens* | *Palmae* |
| Momaka | *Salix tetrasperma* | *Salicaceae* |
| Mondaing | *Lophopetalum fimbriatum* | *Celastraceae* |
| Mondaing | *Lophopetalum wallichii* | *Celastraceae* |
| Myaakamaung | *Tristania merguensis* | *Myrtaceae* |
| Myatya | *Grewia microcos* | *Tiliaceae* |
| Myaukchaw | *Homalium tomentosum* | *Samydaceae* |
| Myauklaung | *Canthium didymum* | *Rubiaceae* |
| Myauklok | *Artocarpus lakoocha* | *Moraceae* |
| Myaukngo | *Duabanga sonneratioides* | *Lythraceae* |
| Myaukthanlyet | *Parkia insignis* | *Leguminosae* |
| Myinga | *Cynometra ramiflora* | *Leguminosae* |
| Myrabolan tree | *Terminalia chebula* | *Combretaceae* |
| Nabe | *Lannea grandis* | *Anacardiaceae* |
| Nagye | *Pterospermum semisagittatum* | *Sterculiac.* |
| Nantayok | *Altingia excelsa* | *Hamamelidaceae* |
| Natletwa | *Wightia gigantea* | *Scrophulariac.* |
| Naywe | *Flacourtia cataphracta* | *Bixaceae* |
| N[illegible] | *Cassia fistula* | *Leguminosae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Ngu-sat | *Cassia renigera* | *Leguminosae* |
| Ngu-shwae-wah | *Cassia fistula* | *Leguminosae* |
| Nibase | *Morinda tinctoria* | *Rubiaceae* |
| Nie-choe | *Baliospermum axillare* | *Euphorbiaceae* |
| Nwe-ni | *Celastrus paniculata* | *Celastraceae* |
| Nyan-thane | *Sesbania procumbens* | *Leguminosae* |
| Nyaung | *Ficus geniculata* | *Moraceae* |
| O-neh | *Streblus asper* | *Moraceae* |
| Oak | *Quercus serrata* | *Fagaceae* |
| Oaks | *Quercus* spp. | *Fagaceae* |
| Odein | *Ailanthus malabarica* | *Simaroubaceae* |
| Oh-thee | *Cocos nucifera* | *Palmae* |
| Okhne | *Streblus asper* | *Moraceae* |
| Okshit | *Aegle marmelos* | *Rutaceae* |
| On | *Cocos nucifera* | *Palmae* |
| Ondon | *Litsaea* spp. | *Laureaceae* |
| Padauk | *Pterocarpus macrocarpus* | *Leguminosae* |
| Palan | *Bauhinia racemosa* | *Leguminosae* |
| Palm, Coconut | *Cocos nucifera* | *Palmae* |
| Palm, Palmyra | *Borassus flabellifer* | *Palmae* |
| Palm, Toddy | *Borassus flabellifer* | *Palmae* |
| Pandama | *Melia burmanica* | *Meliaceae* |
| Panga | *Terminalia chebula* | *Combretaceae* |
| Panma | *Anneslea fragrans* | *Ternstroemiac.* |
| Panni | *Prunus puddum* | *Rosaceae* |
| Panthitya | *Hopea odorata* | *Dipterocarpac.* |
| Parawa | *Garcinia speciosa* | *Guttiferae* |
| Parawa | *Garcinia speciosa* | *Guttiferae* |
| Pau-pi | *Abutilon asiaticum* | |
| Pauk | *Butea frondosa/monosperma* | *Leguminosae* |
| Pauk-nwe | *Butea superba* | *Leguminosae* |
| Pay-in-chong | *Cajanus cajan* | *Leguminosae* |
| Pebok | *Callicarpa arborea* | *Verbenaceae* |
| Peinne | *Artocarpus integrifolia* | *Moraceae* |
| Petlezin | *Vitex peduncularis* | *Verbenaceae* |
| Pettan | *Heterophragma adenophyllum* | *Bignoniaceae* |
| Pettan | *Heterophragma sulfureum* | *Bignoniaceae* |
| Pettlin | *Ehretia acuminata* | *Boraginaceae* |
| Petwaing | *Mararanga denticulata* | *Euphorbiaceae* |
| Petweun | *Berrya mollis* | *Tiliaceae* |
| Pinle-kanazo | *Heritiera fomes* | *Sterculiaceae* |
| Pinle-kanazo | *Heritieria littoralis* | *Sterculiaceae* |
| Pinle-kyetyo | *Petunga roxburghii* | *Rubiaceae* |
| Pinle-on | *Carapa obovata* | *Meliaceae* |
| Pinle-thitkauk | *Gyrocarpus americanus* | *Hernandiaceae* |
| Ponnyet | *Calophyllum inophyllum* | *Guttiferae* |
| Pwabet | *Cassia renigera* | *Leguminosae* |
| Pyaukseik | *Holoptelea integrifolia* | *Ulmaceae* |
| Pyinkado | *Xylia dolabriformis* | *Leguminosae* |
| Pyinma | *Lagerstroemia reginae* | *Lythraceae* |
| Raintree | *Pithecellobium saman* | *Leguminosae* |
| Sandawa | *Cordia fragrantissima* | *Boraginaceae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Sane-ban-a'nee | *Delonix regia* Rafin. | *Leguminosae* |
| Sanga-po | *Manglietia utilis* | *Magnoliaceae* |
| Sappan | *Caesalpinia sappan* | *Leguminosae* |
| Saung | *Bruguiera gymnorhiza* | *Rhizophoraceae* |
| Sawbya | *Sterculia campanulata* | *Sterculiaceae* |
| See-phyue | *Phyllanthus emblica* | *Euphorbiaceae* |
| Seikanangyi | *Machilus odoratissima* | *Lauraceae* |
| Seikchi | *Bridelia retusa* | *Euphorbiaceae* |
| Seiknan | *Phoebe lanceolata* | *Lauraceae* |
| Sethanbaya | *Gelonium multiflorum* | *Euphorbiaceae* |
| Sha | *Acacia catechu* | *Leguminosae* |
| Sha-tanaung | *Acacia inopinata* | *Leguminosae* |
| Sha-tanaung | *Acacia microcephala* | *Leguminosae* |
| Shaw | *Sterculia scaphigera* | *Sterculiaceae* |
| Shaw | *Sterculia ornata* | *Sterculiaceae* |
| Shaw | *Sterculia rubiginosa* | *Sterculiaceae* |
| Shaw | *Sterculia villosa* | *Sterculiaceae* |
| Shaw | *Sterculia angustifolia* | *Sterculiaceae* |
| Shawdu | *Beilschmiedia roxburghiana* | *Lauraceae* |
| Shila | *Terminalia myriocarpa* | *Combretaceae* |
| Silver Oak | *Grevillea robusta* | *Proteaceae* |
| Sinkozi | *Helicia terminalis* | *Proteaceae* |
| Sinninthayet | *Mangifera caloneura* | *Anacardiaceae* |
| Sinninthayet | *Mangifera sylvatica* | *Anacardiaceae* |
| Sit | *Albizia procera* | *Leguminosae* |
| Sitbyu | *Dichrostachys cinerea* | *Leguminosae* |
| Stick | *Moringa oleifera Lam.* | *Moringaceae* |
| Subalwe | *Balanites triflora* | *Simarubaceae* |
| Subyue | *Acacia arabica* | *Leguminosae* |
| Sue-boe | *Acacia pennata* | *Leguminosae* |
| Tagat-taghyi | *Heynea trijuga* | *Meliaceae* |
| Tamaka | *Azadirachta indica* | *Meliaceae* |
| Tamalan | *Dalbergia oliveri* | *Leguminosae* |
| Tamarind | *Tamarindus indica* | *Leguminosae* |
| Tan | *Borassus flabellifer* | *Palmae* |
| Tanaung | *Acacia leucaphloea* | *Leguminosae* |
| Tanyin | *Pithecolobium lobatum* | *Leguminosae* |
| Tat-talun | *Afzelia bijuga* | *Leguminosae* |
| Taugthabye | *Tristania burmanica* | *Myrtaceae* |
| Taukkyan | *Terminalia tomentosa* | *Combretaceae* |
| Tauksha | *Vitex canescens* | *Verbenaceae* |
| Tauksha | *Vitex glabrata* | *Verbenaceae* |
| Taungmeok | *Alstonia scholaris* | *Apocynaceae* |
| Taungpeinne | *Artocarpus chaplasha* | *Moraceae* |
| Taungpetwun | *Hibiscus macrophyllus* | *Malvaceae* |
| Taungpetwun | *Pterospermum acerifolium* | *Sterculiaceae* |
| Taungtangyi | *Premna integrifolia* | *Verbenaceae* |
| Taungthale | *Garcinia cowa* | *Guttiferae* |
| Taungthayet | *Swintonia floribunda* | *Ancardiaceae* |
| Tawgyi-kyitya | *Sarcosperma arboreum* | *Sapotaceae* |
| Tawposa | *Morus laevigata* | *Moraceae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Tawthidin | *Mallotus philippinensis* | *Euphorbiaceae* |
| Tayaw | *Excoecaria agallocha* | *Euphorbiaceae* |
| Tayokthe | *Bischofia javanica* | *Euphorbiaceae* |
| Te | *Diospyros burmanica* | *Ebenaceae* |
| Te-pyue | *Aleurites moluccana* | *Euphorbiaceae* |
| Teak | *Tectona grandis* | *Verbenaceae* |
| Tein | *Mitragyna parvifolia* | *Rubiaceae* |
| Temah | *Melia burmanica* | *Meliaceae* |
| Temah | *Melia burmanica* | *Meliaceae* |
| Tha(n)kutpo | *Stereospermum chelenoides* | *Bignoniaceae* |
| Thabutgyi | *Miliusa belutina* | *Anonaceae* |
| Thabye | *Eugenia fruticosa* | *Myrtaceae* |
| Thabye | *Eugenia grandis* | *Myrtaceae* |
| Thabye | *Eugenia jambolana* | *Myrtaceae* |
| Thabye | *Eugenia kurzii* | *Myrtaceae* |
| Thabye | *Eugenia operculata* | *Myrtaceae* |
| Thabye | *Eugenia* spp. | *Myrtaceae* |
| Thabye | *Eugenia teragona* | *Myrtaceae* |
| Thabye-on | *Memecylon edule* | *Melastomaceae* |
| Thabyebyi | *Syzygium cumini* | *Myrtaceae* |
| Thabyu | *Dillenia indica* | *Dilleniaceae* |
| Thadi | *Bursera serrata* | *Burseraceae* |
| Thadi | *Protium serratum* | *Burseraceae* |
| Thae-ya-thee | *Mangifera sylvatica* | *Anacardiaceae* |
| Thamaga | *Melia azederach* | *Meliaceae* |
| Thame | *Avicennia officinalis* | *Verbenaceae* |
| Than | *Terminalia oliveri* | *Combretaceae* |
| Thanat | *Cordia myxa* | *Boraginaceae* |
| Thanatka | *Limonia acidissima* | *Rutaceae* |
| Thanatka | *Murraya exotica* | *Rutaceae* |
| Thande | *Stereospermum neuranthum* | *Bignoniaceae* |
| Thanthat | *Albizia lucida* | *Leguminosae* |
| Thapan | *Ficus geniculata* | *Moraceae* |
| Thapan | *Ficus glomerata* | *Moraceae* |
| Tharapi | *Calophyllum spectabile* | *Guttiferae* |
| Thayet | *Mangifera indica* | *Anacardiaceae* |
| Thetyingyi | *Croton oblongifolius* | *Euphorbiaceae* |
| Thi | *Feronia elephantum* | *Rutaceae* |
| Thikyabo | *Cinnamomum obtusifolium* | *Lauraceae* |
| Thimbautae | *Polyalthia longifolia* | *Anonaceae* |
| Thinbaw | *Ficus carica* | *Moraceae* |
| Thinbaw-kokko | *Pithecellobium saman* | *Leguminosae* |
| Thinbaw-letpan | *Eriodendron anfractuosum* | *Malvaceae* |
| Thingadu | *Parashorea stellata* | *Dipterocarpac.* |
| Thingan | *Hopea odorata* | *Dipterocarpac.* |
| Thingan-kyauk | *Hopea helferi* | *Dipterocarpac.* |
| Thingbaung | *Buchanania lancifolia* | *Anacardiaceae* |
| Thinwin | *Millettia pendula* | *Leguminosae* |
| Thinwin | *Pongamia glabra* | *Leguminosae* |
| Thisibo | *Buchanania latifolia* | *Anacardiaceae* |
| Thitcha | *Juglans regia* | *Juglandaceae* |
| Thitcho | *Sideroxylon tomentosum* | *Sapotaceae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Thitka | *Pentace burmanica* | *Tiliaceae* |
| Thitkado | *Cedrela toona* | *Meliaceae* |
| Thitlinda | *Heterophragma sulfureum* | *Bignoniaceae* |
| Thitmagyi | *Albizia odoratissima* | *Leguminosae* |
| Thitmin | *Podocarpus neriifolius* | *Pococarpaceae* |
| Thitni | *Amoora ronituka* | *Meliaceae* |
| Thitpayaung | *Nauclea excelsa* | *Rubiaceae* |
| Thitpok | *Celtis tetrandra* | *Ulmaceae* |
| Thitpok | *Tetrameles nudiflora* | *Datiscaceae* |
| Thitpwe | *Elaeocarpus* spp. | *Tiliaceae* |
| Thitpyauk | *Calophyllum polyanthum* | *Guttiferae* |
| Thitsein | *Terminalia belerica* | *Combretaceae* |
| Thitsho | *Pentace griffithii* | *Tiliaceae* |
| Thitsi | *Melanorrhoea usitata* | *Anacardiaceae* |
| Thitsibo | *Buchanania latifolia* | *Anacardiaceae* |
| Thitswelwe | *Engelhardtia spicata* | *Juglandaceae* |
| Thitswelwe | *Schrebera swietenioides* | *Oleaceae* |
| Thitto | *Sandoricum indicum* | *Meliaceae* |
| Thitya | *Shorea oblongifolia* | *Dipterocarpac.* |
| Thitya | *Shorea obtusa* | *Dipterocarpac.* |
| Thityah | *Schima wallichii* | *Temstroemiac.* |
| Tim-au-chae-sue | *Ricinus communis* | *Euphorbiaceae* |
| Tinyu | *Casuarina equisetifolia* | *Casuarinaceae* |
| Tinyu | *Pinus khasya* | *Pinaceae* |
| Tinyu | *Pinus merkusii* | *Pinaceae* |
| Tonwe | *Dalbergia parviflora* | *Leguminosae* |
| Trincomalee | *Berrya mollis* | *Tiliaceae* |
| Walnut | *Juglans regia* | *Juglandaceae* |
| Willow | *Salix tetrasperma* | *Salicaceae* |
| Yei-kyin-ya | *Dalbergia spinosa* Roxb. | *Leguminosae* |
| Yemane | *Gmelina arborea* | *Verbenaceae* |
| Yew | *Cephalotaxus griffithii* | *Coniferae* |
| Yindaik | *Dalbergia cultrata* | *Leguminosae* |
| Yingat | *Gardenia obtusifolia* | *Rubiaceae* |
| Yinma | *Chukrasia tabularis* | *Meliaceae* |
| Yitpadi | *Bursera serrata* | *Burseraceae* |
| Yitpadi | *Protium serratum* | *Burseraceae* |
| Yodaya | *Ochna wallichii* | *Ochnaceae* |
| Yon | *Anogeissus phillyreaefolia* | *Combretaceae* |
| Yon | *Anogeissus acuminata* | *Combretaceae* |
| Yubgat | *Gardenia coronaria* | *Rubiaceae* |
| Ywe(Ywegi) | *Adenanthera pavonina* | *Leguminosae* |
| Zaung-gyan | *Osyris wightiana* Wall. | *Santalaceae* |
| Zaungbale | *Lagerstroemia villosa* | *Lythraceae* |
| Zi(Zee-bi) | *Zizyphus jujuba* | *Rhamnaceae* |
| Zibyu | *Phyllanthus emblica* | *Euphorbiaceae* |
| Zinbyun | *Dillenia pentagyna* | *Dilleniaceae* |

*Sources of Information:

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# Burmese Trees

**(Alphabetized by Scientific Name)**

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Pau-pi* | *Abutilon asiaticum* | |
| Subyue* | *Acacia arabica* | *Leguminosae* |
| Sha (Cutch) | *Acacia catechu* | *Leguminosae* |
| Sha-tanaung | *Acacia inopinata* | *Leguminosae* |
| Tanaung (Hte-naung*) | *Acacia leucaphloea* | *Leguminosae* |
| Sha-tanaung | *Acacia microcephala* | *Leguminosae* |
| Sue-boe* | *Acacia pennata* | *Leguminosae* |
| Ywe (Ywegi) | *Adenanthera pavonina* | *Leguminosae* |
| (unknown) | *Adhatoda zeylanica* | *Acanthaceae* |
| Hnaw | *Adina cordifolia* | *Rubiaceae* |
| Kywedanyin | *Adinobotrys atropurpureus* | *Leguminosae* |
| Okshit | *Aegle marmelos* | *Rutaceae* |
| Tat-talun | *Afzelia bijuga* | *Leguminosae* |
| Odein | *Ailanthus malabarica* | *Simaroubaceae* |
| Kokko | *Albizia lebbek* | *Leguminosae* |
| Thanthat | *Albizia lucida* Benth. | *Leguminosae* |
| Thitmagyi | *Albizia odoratissima* | *Leguminosae* |
| Sit | *Albizia procera* | *Leguminosae* |
| Bonmeza | *Albizia stipulata* | *Leguminosae* |
| Te-pyue* | *Aleurites moluccana* | *Euphorbiaceae* |
| Maibau | *Alnus nepalensis* | *Betulaceae* |
| Lettok (Taungmeok) | *Alstonia scholaris* | *Apocynaceae* |
| Nantayok | *Altingia excelsa* | *Hamamelidaceae* |
| Thitni | *Amoora rohituka* | *Meliaceae* |
| Aukchinsani | *Amoora wallichii* | *Meliaceae* |
| Kaunghmu | *Anisoptera glabra* | *Dipterocarpac.* |
| Kaban | *Anisoptera oblonga* | *Dipterocarpac.* |
| Panma | *Anneslea fragrans* | *Ternstroemiac.* |
| Yon | *Anogeissus acuminata* | *Combretaceae* |
| Yon | *Anogeissus phillyreaefolia* | *Combretaceae* |
| Awza* (Custard Apple) | *Anona squamosa* | *Annonaceae* |
| Mau-lettan-she | *Anthocephalus chinensis* | *Rubiaceae* |
| Taungpeinne | *Artocarpus chaplasha* | *Moraceae* |
| Peinne (Jack) | *Artocarpus integrifolia* | *Moraceae* |
| Myauklok | *Artocarpus lakoocha* | *Moraceae* |
| Thame | *Avicennia officinalis* | *Verbenaceae* |
| Tamaka | *Azadirachta indica* | *Meliaceae* |
| Kanazo | *Baccaurea sapida* | *Euphorbiaceae* |
| Subalwe | *Balanites triflora* | *Simarubiaceae* |
| Nie-choe | *Baliospermum axillare* | *Euphorbiaceae* |
| Kyi | *Barringtonia acutangula* | *Myrtaceae* |
| Bwegyin | *Bauhinia malabarica* | *Leguminosae* |
| Palan | *Bauhinia racemosa* | *Leguminosae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Shawdu | *Beilschmiedia roxburghiana* | *Lauraceae* |
| Petweun (Trincomalee) | *Berrya mollis* | *Tiliaceae* |
| Aukkyu | *Bischofia javanica* | *Euphorbiaceae* |
| Tayokthe | *Bischofia javanica* | *Euphorbiaceae* |
| Didu | *Bombax insigne* | *Malvaceae* |
| Letpan (Leh-paeh*) | *Bombax malabaricum* | *Malvaceae* |
| Palmyra Palm | *Borassus flabellifer* | *Palmae* |
| Tan (Htan*, Toddy Palm) | *Borassus flabellifer* | *Palmae* |
| Seikchi | *Bridelia retusa* | *Euphorbiaceae* |
| Byu-u-talon (Saung) | *Bruguiera gymnorhiza* | *Rhizophoraceae* |
| Thingbaung | *Buchanania lancifolia* | *Anacardiaceae* |
| Lunbo (Thisibo) | *Buchanania latifolia* | *Anacardiaceae* |
| Thitsibo (Lunbo) | *Buchanania latifolia* | *Anacardiaceae* |
| Thadi (Kadi,Yitpadi) | *Bursera serrata* | *Burseraceae* |
| Pauk | *Butea (monosperma*)* | *Leguminosae* |
| Pauk | *Butea frondosa** | *Leguminosa* |
| Pauk-nwe* | *Butea superba* | *Leguminosae* |
| Sappan | *Caesalpinia sappan* | *Leguminosae* |
| Pay-in-chong | *Cajanus cajan* | *Leguminosae* |
| Pebok | *Callicarpa arborea* | *Verbenaceae* |
| Ponnyet | *Calophyllum inophyllum* | *Guttiferae* |
| Thitpyauk | *Calophyllum polyanthum* | *Guttiferae* |
| Tharapi | *Calophyllum spectabile* | *Guttiferae* |
| Myauklaung | *Canthium didymum* | *Rubiaceae* |
| Maniawga | *Carallia integerrima* | *Rhizophoraceae* |
| Kyana (Kyatnan) | *Carapa moluccensis* | *Meliaceae* |
| Pinle-on | *Carapa obovata* | *Meliaceae* |
| Bambwe | *Careya arborea* | *Myrtaceae* |
| Minbaw | *Caryota urens* | *Palmae* |
| (Indian Laburnum) | *Cassia fistula* | *Leguminosae* |
| Ngu (Ngu-shwae-wah*) | *Cassia fistula* | *Leguminosae* |
| Ngu-sat (Pwabet) | *Cassia renigera* | *Leguminosae* |
| Mezali | *Cassia siamea* | *Leguminosae* |
| Chestnuts | *Castanopsis* spp. | *Fagaceae* |
| Kabwi,ka-pwee*,tinyu | *Casuarina equisetifolia* | *Casuarinaceae* |
| Thitkado | *Cedrela toona* | *Meliaceae* |
| Nwe-ni* | *Celastrus paniculata* | *Celastraceae* |
| Thitpok | *Celtis tetrandra* | *Ulmaceae* |
| Kyauktinyu (Yew) | *Cephalotaxus griffithii* | *Coniferae* |
| Kabaing | *Ceriops candolleana* | *Rhizophoraceae* |
| Kabaing | *Ceriops roxburghiana* | *Rhizophoraceae* |
| Yinma | *Chukrasia tabuiaris* | *Meliaceae* |
| Hmanthin (Hminthan) | *Cinnamomum iners* | *Lauraceae* |
| Karawe | *Cinnamomum inunctum* | *Lauraceae* |
| Thikyabo | *Cinnamomum obtusifolium* | *Lauraceae* |
| Coconut Palm | *Cocos nucifera* | *Palmae* |
| On (Oh-thee*) | *Cocos nucifera* | *Palmae* |
| Kyettet-nwe* | *Combretum pilosum* | *Combretaceae* |
| Chinese Coffin Wood | *Coniferae* spp. | |
| Sandawa | *Cordia fragrantissima* | *Boraginaceae* |
| Thanat | *Cordia myxa* | *Boraginaceae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Kadet | *Crataeva roxburghii* | *Capparidaceae* |
| Bebya | *Cratoxylon nerifolium* | *Hypericaceae* |
| Thetyingyi | *Croton oblongifolius* | *Euphorbiaceae* |
| Ananbo | *Crypteronia paniculata* | *Lythraceae* |
| Myinga | *Cynometra ramiflora* | *Leguminosae* |
| Yindaik | *Dalbergia cultrata* | *Leguminosae* |
| Tamalan | *Dalbergia oliveri* | *Leguminosae* |
| Madama | *Dalbergia ovata* | *Leguminosae* |
| Tonwe | *Dalbergia parviflora* | *Leguminosae* |
| Yei-kyin-ya | *Dalbergia spinosa* | *Leguminosae* |
| Daung-de-laung-nwe | *Dalbergia vouvillis* | *Leguminosae* |
| Kyese-kyiche | *Dehaasia cuneata* | *Laureaceae* |
| (flame tree) | *Delonix regia* | *Leguminosae* |
| Sane-ban-a'nee* | *Delonix regia* | *Leguminosae* |
| Sitbyu | *Dichrostachys cinerea* | *Leguminosae* |
| Thabyu | *Dillenia indica* | *Dilleniaceae* |
| Zinbyun | *Dillenia pentagyna* | *Dilleniaceae* |
| Te | *Diospyros burmanica* | *Ebenaceae* |
| Aukchinsa | *Diospyros ehretiodies* | *Ebenaceae* |
| Kanyin | *Dipterocarpus alatus* | *Dipterocarpac.* |
| Inbo | *Dipterocarpus obtusifolius* | *Dipterocarp.* |
| Kanyin | *Dipterocarpus obtusifolius* | *Dipterocarp.* |
| In | *Dipterocarpus tuberculatus* | *Dipterocarp.* |
| Mahlwa | *Dolichandrone stipulata* | *Bignoniaceae* |
| Myaukngo | *Duabanga sonneratioides* | *Lythracceae* |
| Pettlin | *Ehretia acuminata* | *Boraginaceae* |
| Gaung-byu | *Ehretia laevis* | *Boraginaceae* |
| Thitpwe | *Elaeocarpus* spp. | *Tiliaceae* |
| (unknown) | *Emblica officinalis* | *Euphorbiaceae* |
| Thitswelwe | *Engelhardtia spicata* | *Juglandaceae* |
| Thinbaw-letpan | *Eriodendron anfractuosum* | *Malvaceae* |
| Dwani | *Eriolaena candollei* | *Sterculiaceae* |
| Kathit | *Erythrina* spp. | *Leguminosae* |
| Thabye | *Eugenia fruticosa* | *Myrtaceae* |
| Thabye | *Eugenia grandis* | *Myrtaceae* |
| Thabye | *Eugenia jambolana* | *Myrtaceae* |
| Thabye | *Eugenia kurzii* | *Myrtaceae* |
| Thabye | *Eugenia operculata* | *Myrtaceae* |
| Thabye | *Eugenia* spp. | *Myrtaceae* |
| Thabye | *Eugenia teragona* | *Myrtaceae* |
| Kinthat-putgyi | *Evodia meliaefolia* | *Rutaceae* |
| Tayaw | *Excoecaria agallocha* | *Euphorbiaceae* |
| Ananma | *Fagraea fragrans* | *Loganiaceae* |
| Thi | *Feronia elephantum* | *Rutaceae* |
| Thinbaw (fig)* | *Ficus carica* | *Moraceae* |
| Nyaung (Thapan) | *Ficus geniculata* | *Moraceae* |
| Thapan | *Ficus glomerata* | *Moraceae* |
| Naywe | *Flacourtia cataphracta* | *Bixaceae* |

*Appendix IVb*

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Taungthale | *Garcinia cowa* | *Guttiferae* |
| Metlin | *Garcinia paniculata* | *Guttiferae* |
| Bawa (Parawa) | *Garcinia speciosa* | *Guttiferae* |
| Parawa | *Garcinia speciosa* | *Guttiferae* |
| Yubgat | *Gardenia coronaria* | *Rubiaceae* |
| Hmanni | *Gardenia erythroclada* | *Rubiaceae* |
| Yingat | *Gardenia obtusifolia* | *Rubiaceae* |
| Chinyok | *Garuga pinnata* | *Burseraceae* |
| Sethanbaya | *Gelonium multiflorum* | *Euphorbiaceae* |
| Chay | *Gluta tavoyana* | *Anacardiaceae* |
| Yemane | *Gmelina arborea* | *Verbenaceae* |
| Silver Oak | *Grevillea robusta* | *Proteaceae* |
| Myatya | *Grewia microcos* | *Tiliaceae* |
| Pinle-thitkauk | *Gyrocarpus americanus* | *Hernandiaceae* |
| Sinkozi | *Helicia terminalis* | *Proteaceae* |
| Pinle-kanazo | *Heritiera fomes* | *Sterculiaceae* |
| Pinle-kanazo | *Heritieria littoralis* | *Sterculiaceae* |
| Pettan | *Heterophragma adenophyllum* | *Bignoniaceae* |
| Pettan (Thitlinda) | *Heterophragma sulfureum* | *Bignoniaceae* |
| Tagat-taghyi | *Heynea trijuga* | *Meliaceae* |
| Taungpetwun | *Hibiscus macrophyllus* | *Malvaceae* |
| Lettok-gyi | *Holarrhena antidysenterica* | *Apocynaceae* |
| Pyaukseik | *Holoptelea integrifolia* | *Ulmaceae* |
| Myaukchaw | *Homalium tomentosum* | *Samydaceae* |
| Thingan-kyauk | *Hopea helferi* | *Dipterocarpac.* |
| Panthitya | *Hopea odorata* | *Dipterocarpac.* |
| Thingan | *Hopea odorata* | *Dipterocarpac.* |
| Kuthan | *Hymenodictyon excelsum* | *Rubiceae* |
| Thitcha (Walnut) | *Juglans regia* | *Juglandaceae* |
| Dwabok | *Kydia calycina* | *Malvaceaae* |
| Konpyinma | *Lagerstroemia macrocarpa* | *Lythraceae* |
| Pyinma | *Lagerstroemia reginae* | *Lythraceae* |
| Leza | *Lagerstroemia tomentosa* | *Lythraceae* |
| Zaungbale | *Lagerstroemia villosa* | *Lythraceae* |
| Nabe | *Lannea grandis* | *Anacardiaceae* |
| Bosca* | *Leucaena leucocephala* | *Leguminosae* |
| Thanatka | *Limonia acidissima* | *Rutaceae* |
| Kalaway | *Lindera assamica* | *Lauraceae* |
| Kalaway | *Lindera pulcherrima* | *Lauraceae* |
| Mahaga | *Linostoma decandrum* | *Thymeleaceae* |
| Ondon | *Litsaea* spp. | *Laureaceae* |
| Mondaing | *Lophopetalum fimbriatum* | *Celastraceae* |
| Mondaing | *Lophopetalum wallichii* | *Celastraceae* |
| Dawehmaing | *Lumnitzera coccinea* | *Combretaceae* |
| Seikanangyi | *Machilus odoratissima* | *Lauraceae* |
| Hlega | *Machilus villosa* | *Lauraceae* |
| Tawthidin | *Mallotus philippinensis* | *Euphorbiaceae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Sinninthayet | *Mangifera caloneura* | *Anacardiaceae* |
| Thayet (Mango) | *Mangifera indica* | *Anacardiaceae* |
| Sinninthayet | *Mangifera sylvatica* | *Anacardiceae* |
| Thae-ya-thee* | *Mangifera sylvatica* | *Anacardiaceae* |
| Sanga-po | *Manglietia utilis* | *Magnoliaceae* |
| Kalamet | *Mansonia gagei* | *Sterculiaceae* |
| Petwaing | *Mararanga denticulata* | *Euphorbiaceae* |
| Thitsi (Lacquertree) | *Melanorrhoea usitata* | *Anacardiaceae* |
| Thamaga | *Melia azedarach* | *Meliaceae* |
| Pandama (temah) | *Melia burmanica* | *Meliaceae* |
| Temah* | *Melia burmanica* | *Meliaceae* |
| Thabye-on | *Memecylon edule* | *Melastomaceae* |
| Gangaw | *Mesua ferrea* | *Guttiferae* |
| Thabutgyi | *Miliusa belutina* | *Anonaceae* |
| Thinwin | *Millettia pendula* | *Leguminosae* |
| Kaya | *Mimusops elegni* | *Sapotaceae* |
| Tein | *Mitragyna parvifolia* | *Rubiaceae* |
| Nibase | *Morinda tinctoria* | *Rubiaceae* |
| Danda-lune | *Moringa oleifera* | *Moringaceae* |
| Drumstick* | *Moringa oleifera* | *Moringaceae* |
| Tawposa | *Morus laevigata* | *Moraceae* |
| Thanatka | *Murraya exotica* | *Rutaceae* |
| Kazaw | *Myrsine semiserrata* | *Myrsinaceae* |
| Thitpayaung | *Nauclea excelsa* | *Rubiaceae* |
| Yodaya | *Ochna wallichii* | *Ochnaceae* |
| (Chaung-shia*) | *Oroxylum indicum* | *Bignoniaceae* |
| Kyaungya | *Oroxylum indicum* | *Bignoniaceae* |
| Zaung-gyan* | *Osyris wightiana* Wall. | *Santalaceae* |
| Kyaungdauk | *Pajanelia rheedii* | *Bignoniaceae* |
| Thingadu | *Parashorea stellata* | *Dipterocarpac.* |
| Myaukthanlyet | *Parkia insignis* | *Leguminosae* |
| Thitka | *Pentace burmanica* | *Tiliaceae* |
| Thitsho | *Pentace griffithii* | *Tiliaceae* |
| Ingyin | *Pentacme siamensis* | *Dipterocarpac.* |
| Pinle-kyetyo | *Petunga roxburghii* | *Rubiaceae* |
| Seiknan | *Phoebe lanceolata* | *Lauraceae* |
| See-phyue* | *Phyllanthus emblica* | *Euphorbiaceae* |
| Zibyu | *Phyllanthus emblica* | *Euphorbiaceae* |
| Tinyu | *Pinus kesiya* | *Pinaceae* |
| Tinyu | *Pinus merkusii* | *Pinaceae* |
| Raintree | *Pithecellobium saman* | *Leguminosae* |
| Thinbaw-kokko | *Pithecellobium saman* | *Leguminosae* |
| Tanyin | *Pithecellobium lobatum* | *Leguminosae* |
| Thitmin | *Podocarpus neriifolius* | *Coniferae* |
| Thimbautae* | *Polyalthia longifolia* | *Anonaceae* |
| Thinwin | *Pongamia glabra* | *Leguminosae* |
| Taungtangyi | *Premna integrifolia* | *Verbenaceae* |
| Kyunbo | *Premna pyramidata* | *Verbenaceae* |
| Thadi (Kadi,Yitpadi) | *Protium serratum* | *Burseraceae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Panni | *Prunus puddum* | *Rosaceae* |
| Malaka | *Psidium guayava* | *Myrtaceae* |
| Padauk | *Pterocarpus macrocarpus* | *Leguminosae* |
| Taungpetwun | *Pterospermum acerifolium* | *Sterculiaceae* |
| Nagye | *Pterospermum semisagittatum* | *Sterculiac.* |
| Oaks | *Quercus* | *Fagaceae* |
| Oak | *Quercus serrata* | *Fagaceae* |
| Hmanbyu | *Randia uliginosa* | *Rubiaceae* |
| Byu-chidauk | *Rhizophora mucronata* | *Rhizophoraceae* |
| Tim-au-chae-sue* | *Ricinus communis* | *Euphorbiaceae* |
| Bamaw | *Sagereae listeri* | *Anonaceae* |
| Momaka (Willow) | *Salix tetrasperma* | *Salicaceae* |
| Thitto | *Sandoricum indicum* | *Meliaceae* |
| Lelun | *Sapium baccatum* | *Euphorbiaceae* |
| Mau-kadon | *Sarcocephalus cordatus* | *Rubiaceae* |
| Tawgyi-kyitya | *Sarcosperma arboreum* | *Sapotaceae* |
| Laukya (Thityah) | *Schima wallichii* | *Ternstroemiac.* |
| Gyo | *Schleichera trijuga* | *Sapindaceae* |
| Thitswelwe | *Schrebera swietenioides* | *Oleaceae* |
| Nyan-thane* | *Sesbania procumbens* | *Leguminosae* |
| Kanyaung | *Shorea argentea* | *Dipterocarpac.* |
| Kyilan | *Shorea assamica* | *Dipterocarpac.* |
| Kaban-ywet-the | *Shorea floribunda* | *Dipterocarpac.* |
| Thitya | *Shorea oblongifolia* | *Dipterocarpac.* |
| Thitya | *Shorea obtusa* | *Dipterocarpac.* |
| Thitcho | *Sideroxylon tomentosum* | *Sapotaceae* |
| Kambala | *Sonneratia apetala* | *Lythraceae* |
| Laba | *Sonneratia griffithii* | *Lythraceae* |
| Gwe | *Spondias mangifera* | *Anacardiaceae* |
| Binga | *Stephegyne diversifolia* | *Rubiaceae* |
| Letkok | *Sterculia alata* | *Sterculiaceae* |
| Shaw | *Sterculia angustifolia* | *Sterculiaceae* |
| Sawbya | *Sterculia campanulata* | *Sterculiaceae* |
| Letkok | *Sterculia foetida* | *Sterculiaceae* |
| Shaw | *Sterculia ornata* | *Sterculiaceae* |
| Shaw | *Sterculia rubiginosa* | *Sterculiaceae* |
| Shaw | *Sterculia scaphigera* | *Sterculiaceae* |
| Shaw | *Sterculia villosa* | *Sterculiaceae* |
| Tha(n)kutpo | *Stereospermum chelenoides* | *Bignoniaceae* |
| Thande | *Stereospermum neuranthum* | *Bignoniaceaae* |
| Kywemagyolein | *Sterospermum suaveolens* | *Bigonianceae* |
| Okhne (or O-neh*) | *Streblus asper* | *Moraceae* |
| Banatha | *Strombosia javanica* | *Olacaceae* |
| Kabaung | *Strychnos nux-blanda* | *Loganiaceae* |
| Mahogany | *Swietenia macrophylla* | *Meliaceae* |
| Taungthayet | *Swintonia floribunda* | *Ancardiceae* |
| Thabyebyi | *Syzygium cumini* | *Myrtaceae* |
| Magyi (Mah-gyee*) | *Tamarindus indica* | *Leguminosae* |
| Kalaw | *Taraktogenos kurzii* | *Bixaceae* |
| Kanzo | *Tarrietia javanaica* | *Sterculiaceae* |

| Common Name | Scientific Name | Family Name |
|---|---|---|
| Kyun (Teak) | *Tectona grandis* | *Verbenaceae* |
| Dahat | *Tectona hamiltoniana* | *Verbenaceae* |
| Thitsein | *Terminalia belerica* | *Combretaceae* |
| Badan* | *Terminalia catappa* | *Combretaceae* |
| Panga, Myrabolan tree | *Terminalia chebula* | *Combretaceae* |
| Kyu | *Terminalia citrina* | *Combretaceae* |
| Shila | *Terminalia myriocarpa* | *Combretaceae* |
| Than | *Terminalia oliveri* | *Combretaceae* |
| Lein | *Terminalia pyrifolia* | *Combretaceae* |
| Taukkyan | *Terminalia tomentosa* | *Combretaceae* |
| Baing | *Tetrameles nudiflora* | *Datiscaceae* |
| Thitpok | *Tetrameles nudiflora* | *Datiscaceae* |
| Taugthabye | *Tristania burmanica* | *Myrtaceae* |
| Myaakamaung | *Tristania merguensis* | *Myrtaceae* |
| Kyetyo (Tauksha) | *Vitex canescens* | *Verbenaceae* |
| Tauksha (Htauksha*) | *Vitex glabrata* | *Verbenaceae* |
| Petlezin | *Vitex peduncularis* | *Verbenaceae* |
| Kyetyo (Kyungauknwe) | *Vitex pubescens* | *Verbenaceaae* |
| Gyobo | *Walsura robusta* | *Meliaceae* |
| Natletwa | *Wightia gigantea* | *Scrophulariac.* |
| Lettok-thein | *Wrightia tomentosa* | *Apocynaceae* |
| Pyinkado (Ironwood) | *Xylia dolabriformis* | *Leguminosae* |
| Zi (Zee-bi*) | *Zizyphus jujuba* | *Rhamnaceae* |

*Sources of Information:

BAPP Project Personnel

Brandis, Dietrich. 1906. *Indian trees*. Dehra Dun, India: Bishen Singh Mahendra Pal Singh, (5th Impression, 1971).

## SOURCES FOR RESEARCH AND COMMERCIAL QUANTITIES OF NFT SEEDS

### NFTA Cooperative Planting Program

The Cooperative Planting Program is designed to encourage the use of NFTs and to help people select and match appropriate species to their region and needs. Four types of planting programs are available for a systematic evaluation of potential species.

- o demonstration forest
- o site adaptability trial
- o international yield trial
- o provenance trial

NFTA provides small quantitities of seeds, species descriptions, planting instructions and technical assistance. Species available for evaluation are listed below. Provenance trials are available for *Leucaena leucocephala* and *Gliricidia sepium.*

Requests for seed, together with the necessary import permits, should reach NFTA at least three months before sowing. The type of trial and species for evaluation should be clearly stated. When technical assistance is needed in selecting potential species for evaluation, the intended use(s) must also be included. Brief site details such as latitude, longitude, altitude, mean annual rainfall, minimum and maximum temperatures and soil information must accompany the request. All collaborators are encouraged to publish their results in NFTRR.

Requests should be addressed to: Nancy Glover, Research Associate, NFTA, Waimanalo, Hawaii 96795 USA.

Humid and Sub-Humid Tropics

*Acacia auriculiformis*
*A. mangium*
*Albizia falcataria*
*Calliandra calothyrsus*
*Casuarina cunninghamiana*
*Enterolobium cyclocarpum*
*Erythrina poeppigiana*
*Gliricidia sepium*
*Leucaena leucocephala*
*Mimosa scabrella*
*Samanea saman*
*Sesbania grandiflora*
*S. sesban*

Arid and Semi-Arid Tropics

*Acacia albida*
*A. aneura*
*A. farnesiana*
*A. nilotica*
*A. pennatula*
*Haematoxylon brasiletto*
*Parkinsonia aculeata*
*Pithecellobium dulce*
*Prosopis alba*
*P. pallida*

T. ..ical Highlands

| | |
|---|---|
| *Acacia mearnsii* | *Casuarina cunninghamiana* |
| *A. melonoxylon* | *Chamaecytisus palmensis* |
| *Acrocarpus fraxinifolius* | *Leucaena hybrid K743* |
| *Alnus acuminata* | *L. diversifolia* |
| *A. rubra* | |

NFTA associates are asked to assist NFTA in obtaining well-documented seed (1/4 to 1 kilo) of other species not listed. Please contact Nancy Glover for details.

**OFI International Provenance Trial of *Gliricidia sepium***

The Oxford Forestry Institute (OFI), in collaboration with Latin American organizations, have completed range-wide provenance collections of G. *sepium* which are available to interested institutions for evaluation.

Twenty-six provenances were collected primarily from the postulated native range in western Central America with a few land race collections in the naturalized range of Central and South America. Provenances range from areas receiving 650 to 3500 mm rainfall/year in elevations from sea level to 1100 meters.

Seed and *Rhizobium* inoculum are distributed in small research quantities free of charge. A Trial Protocol accompanies the seed and includes background information on *G. sepium* and detailed evaluation procedures (available in English and Spanish). Two trial designs are described, one for alley-cropping and the other for woodlot management.

Seed should be requested at least four months before sowing. Requests must include the following information:

1) number of provenances required,

2) intended trial design (alley-cropping or woodlot).

3) Rainfall, altitude and soil type of trial site, and

4) import requirements for recipient country.

Requests should be addressed to either Colin Hughes or Janet Stewart, Oxford Forestry Institute, South Parks Road, Oxford OX1 3RB, United Kingdom.

**Acacia Provenance Collections**

Provenance collections of *Acacia mangium, A. auriculiformis* and other promising *Acacia* spp. will be conducted in Australia and Papua New Guinea by the Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia. The Forestry/Fuelwood Research and Development Project (F/FRED) will fund the project. F/FRED, a Winrock International project supported by the U.S. Agency for International Development's Science and Technology Office and regional bureaus, is designed to improve research and communication in Asia, Africa and Latin America.

For information about when seeds might be available for trials, contact: Dr. Douglas Boland, CSIRO, Division of Forest Research, P.O. Box 4008, Queen Victoria Terrace, Canberra, A.C.T. 2600 Australia.

**International Trial of Dry Zone Species**

The Oxford Forestry Institute and national organizations in Central America have acquired seed collections of dry zone hardwood species suitable for firewood, posts, forage and other non-industrial products. Small experimental quantities of seed of the species listed below are available for distribution free of charge to researchers. The species are native to dry, but not truly arid, areas in Latin America with mean annual precipitation of 500-1000 mm, a dry seasoon of 5 to 7 months, and adapted to up to 100 m in elevation. The species listed are preferred locally for firewood and several have particular attributes making them valuable for erosion control.

| | |
|---|---|
| *Acacia deamii* | *Leucaena diversifolia* |
| *A. farnesiana* | *L. leucocephala* |
| *A. pennatula* | *L. shannoni* |
| *Albizia guachepele* | *Myrospernum frutescens* |
| *Apoplanesia paniculata* | *Parkinsonia aculeata* |
| *Ateleia herbert-smithii* | *Pithecellobium dulce* |
| *Caesalpinia coriaria* | *Prosopis juliflora* |
| *C. eriostachys* | *Senna atomeria* |
| *C. velutina* | *Crescentia alata* |
| *Enterolobium cyclocarpum* | *Alvaradoa amorphoides* |
| *Gliricidia sepium* | *Simarouba glauca* |
| *Haematoxylon brasiletto* | *Guazuma almifolia* |

Requests for seed should be addressed to Colin Hughes, Research Officer, Unit of Tropical Silviculture, Oxford Forestry Institute, South Parks Road, Oxford OX1 3RB, United Kingdom.

Requests should reach OFI at least three months before sowing and should include the necessary import permits. Brief site details of latitude, longitude, altitude, soil profile and rainfall and temperature regimes are also useful.

**Tree Improvement of Arid Zone Species**

The Central Arid Zone Research Institute, India, began a tree improvement program in 1983 with the NFT species *Acacia senegal, A. tortilis* and *Prosopis cineraria.* Activities have concentrated on germplasm exploration and collection, evaluation of *in situ* genetic variability, selection of plus trees, and establishment of progeny trials under different agro-climatic zones. Fast-growing, frost tolerant and small thorned *A. tortilis* trees have been identified. Seedling and clonal seed orchards have been established.

For more information contact: N. L. Kackar, S.K. Jindal or D.R. Solanki, Central Arid zone Research Institute, Jodhpur-342 001, India.

**Multipurpose Tree and Shrub Seed Directory**

*Multipurpose Tree and Shrub Seed Directory.* Peter G. Von Carlowitz. 1986. ICRAF, P.O. Box 30677, Nairobi, Kenya. 265 pp.
This comprehensive directory is based on the results of a world-wide inventory conducted by ICRAF of potential seed suppliers. The reported seed availability for 723 multipurpose tree species from 96 seed dealers indicates that the shortage of seed supply is partly due to a lack of communication. Therefore, the main objective of the directory is to facilitate communication between seed suppliers and institutions

and individuals requiring seeds.

This easy-to-use directory is divided into 5 chapters which include not only a list of seed dealers, but also very useful species-specific information such as seed pre-treatment, number of seeds/kg, adaptability, reproduction, management and uses. The last chapter is devoted to nitrogen-fixing trees with a list of suppliers of inoculants and cultures along with methods of inoculation.

**Commercial Seed Sources of Nitrogen Fixing Trees**

| | |
|---|---|
| Argentina | Ricardo Ayerza, Semillero la Magdalena, Cerrito 822, 7o Piso, Buenos Aires |
| Australia | Australian Seed Co., 119, Ashworth St., Albert Pk., Melbourne, Vic. 3206<br>Australian Tropical Plant Supplies, Attn. Vincent K. Moriarity, Pinnacle Rd., Julaten 4800 Qld.<br>CSIRO Div. Forest Research, P.O. 4008, Canberra 2600, A.C.T.<br>Division of Forestry Research, CSIRO, Attn. John Doran, Officer in Charge of Seed Section, Yarralumla 2601, A.C.T.<br>Flamingo Seeds Pty, Ltd., P.O.Box 1046, East Nowra 2541, NSW<br>Forestry Comm., NSW, P.O. J19, Coffs Harbour Jetty, NSW 2451<br>Forestry Commission, Tasmania, GPO 207B, Hobart, Tas. 7001<br>Forestry Commission, Victoria; GPO 4018, Melbourne 3001<br>Forest Dept., W. Australia, GPO 104, Como, WA 6152<br>Grant, H. 2 Sandra Place, Dubbo, NSW 2830<br>Kershaw, H.G., P.O. 84, Terry Hills, NSW 2840<br>Kimberley Seeds Pty Ltd., 51 King Edward Rd., Osborne Park, WA 6017<br>Kingston Rural Management Pty, Ltd., P.O.Box 47, Maryborough 4650, Qld.<br>Kylisa Native Seed Suppliers 1 Gould Court, Traralgon, Vic 3844<br>Nindethana Seed Service, Narrikup, WA 6326<br>North Australian Native Seed Supplies, P.O.40003, Casuarina, NT 5792<br>Queensland Forestry Dept., P.O.944, Brisbane, Qld 4001<br>Seeds for Preservation, Lot 6, Badgerup Rd., Wanneroo, WA 6065<br>Silvan Improvements Pty Ltd., P.O.42, Watson, A.C.T. 2602<br>Southern Seed Sales, 35 Wilhelmina Ave., Launceston, Tas. 7250<br>Tasmanian Forest Seeds, Summerleas Farm, Kingston, Tas. 7150<br>Vaughans Wildflower Seeds, P.O. Box 66, Canberra 2600, ACT<br>Western Wildlife Supply, Terrara, P.O.90, Gilgandra, NSW 2827<br>Williams, J.B. and Sons Pty. Ltd., P.O.Box 102, Murwillumbah 2484 |
| Belize | Chief Forest Officer, Ministry of Agriculture, E. Block Belmopan |
| Brazil | Nuno M. Sousa Costa, EPANIG, Caiza Postal 295, CEP35.700, Sete Lagaos, Minas Gerais |
| Colombia | Investigacion Forestal, Ing. Phil Cannon, Apdo. Aereo 219, Cali |
| Costa Rica | Ben Chang, Latin American Forest Tree Seed Bank, CATIE, Turrialba |

| | |
|---|---|
| El Salvador | Banco de Semillas Forestales, Dept. Conservacion de Recursos Naturales, Ministerio de Agricultura y Ganaderia, Sazopango, San Salvador |
| France | International Tree Seed Bank, 43 Le Puy |
| Guatemala | Banco de Semillas Forestales (BANSEFOR), 7 Avenida 7-00 Zona 13, Ciudad Guatemala |
| Honduras | Banco de Semillas (BASE), ESNACIFOR, Apdo. Postal 2, Siguatepeque, Dept. Comayagua |
| India | Bharatiya Agro-Industries Foundation, Kamdhenu, Senapati Bapat Marg, Pune 411016, Maharashtra<br>Central Arid zone Research Inst., Attn. Dr. Ashot Raina, Jodhpur 342003<br>Indian Grassland and Fodder Res. Inst., Jhansi, U.P. 284003<br>Kumar International, Ajitmal, Etawah, U.P. 206121<br>Nimbkar Seeds Pvt. Ltd., Phaltan, Maharashtra 415523<br>Pratap Nursery and Seed Stores, P.O. Box 91, Panditwari, P.O. Premnagar, Dehra Dun, U.P. 248007<br>Regional Research Lab (CSIR), Canal Road, Jammu Tawi<br>Titaghur Paper Mills Col, Ltd., 95 Park St., Calcutta 700016<br>UAS/KDDC Fodder Project, Univ. of Agric. Sciences, Hebbal, Bangalore 560024 |
| Indonesia | Biotrop, SEAMEO Regional Ctr. for Trop. Biol., P.O. 17, Bogor<br>Perum Perhutani (State Forest Corp.), J1, Jenderal Gatot Subroto 17-18, P.O. Box 111, Jakarta |
| Israel | Arava Seeds Suppliers, P.O. Box 45109, Haifa |
| Malawi | E.S.B. Kamanji Forestry Seed Off., Forestry Research Inst. of Malawi, P.O. Box 270, Zomba<br>National Seed Co. of Malawi Ltd., P.O. Box 30050, Lilongwe 3 |
| Malaysia | Forest Research Center, Attn. Seed Officer, P.O. Box 1407, Sandakan, Sabah<br>Pointomou Agri-forestry Services Sdn. Bhd., W.D.T. No. 8, Penampang, Sabah<br>Sabah Softwoods Sdn. Bhd., P.O.Box 137, Tawau, Sabah |
| Mexico | Banco de Mexico, Attn. Guillermo Sanchez Rodriguez, Calle 58 #389, Merida, Yucatan<br>Ing. Antonio Moreno Quiroz, 62000 Apdo. Postal 1082, Cuernavaca, Morelos<br>Ing. Juan F. Aguirre, Ciapas/INIA/SARH, Apdo. 98, Tapachula, Chiapas |
| Netherlands | SETROPA Ltd., P.O. Box 203, Bussum<br>Timmers and Leyuer, Attn. John D. Leyuer, P.O. Box 17, Heemstede 2100AA |
| Philippines | PORI (Dr. S. Halos), College, Lagune<br>Magsaysay Foundation, Attn. Belen Abreu, 1640 Roxas Blvd., Manila |
| Taiwan (R.O.C.) | Yilin Co., Attn. Fu-Hsiung Li, 24 Fu-jen 2nd St., Hualien |
| Thailand | Benjavan Rerkasem, Multiple Cropping Proj., Chaing Mai Univ., Chaing Mai |
| United Kingdom | Commonwealth Forestry Inst., So. Parks Rd., P.O.13RD, Oxford Kins Plants Ltd., Woodcote Grove, Ashley Rd., Epsom, Surrey KT185BM |

U.S.A. Hudson Seedsman, Redwood City CA
Amorient Inc., P.O. Box 131, Kahuku HI 96731
Native Plants, Attn. H. Bollinger, 360 Wakara Way, Salt Lake City UT 84108
Tree Seeds International, 2402, Esther Court, Silver Spring MD 20910
U.S. Forest Tree Seed Center, P.O. 819, Macon GA

## Multipurpose Tree Species Network Research Series

### Papers

no. 1. Feasibility Study on Tissue Culture for Multipurpose Tree Species. Paiboolya Gavinlertvatana, A. Colin Matheson, and Eng Peng Sim. 1987.

no. 2. A Regional Research Plan for Leucaena Psyllid Control. Banpot Napompeth, Kenneth G. MacDicken, Max McFadden, and I.N. Oka. 1987.

no. 3. Potential Impact of Biotechnology Research for Multipurpose Tree Species. Wilfrido Cruz. 1988.

no. 4. Feasibility Study on Small-Farm Production of Gums, Resins, Exudates, and Other Non-Wood Products. James W. Hanover. 1988.

### Reports

no. 1. Multipurpose Tree Species Networks for the Forestry/Fuelwood Research and Development Project: Recommendations. Kenneth G. MacDicken, Michael R. Dove, James L. Brewbaker, and William F. Hyde. 1986.

no. 2. The Status of Multipurpose Trees in Thailand. Suree Bhumibhamon. 1987.

no. 3. Multipurpose Tree Species Trials Data Compilation, Republic of the Philippines. C. Buford Briscoe, Jocelyn M. Alcazar, and Paciencia A. Votacion. 1988.

no. 4. 1987 Seed Collections of *Acacia auriculiformis* from Natural Populations in Papua New Guinea and Northern Australia. Brian Gunn, Maurice McDonald, and James Moriarty, compilers. 1988.

### Manuals

no. 1. IADSS Information and Decision Support System (Version 1.1) User's Manual. Global Research Unit. 1988.

no. 2. Manual for Multipurpose Tree Species Research Cooperators for the F/FRED 1987 Humid and Sub-humid Network Trials. Kirtland M. Barker, ed. 1988.

### Videos

no. 1. A Guide for Multipurpose Tree Species Research Cooperators for the F/FRED 1987 Humid and Sub-humid Network Trials. Kovith Yantasath and Celso B. Lantican. 1987.

The Forestry/Fuelwood Research and Development (F/FRED) Project is designed to help scientists address the needs of small-scale farmers in the developing world for fuelwood and other tree products. It provides a network through which scientists exchange research plans, methods, and results on the production and use of trees that meet the household needs of small farmers. These trees, in project terms, are multipurpose tree species (MPTS).

F/FRED is being carried out by the Winrock International Institute for Agricultural Development. Winrock was established in 1985 through the merging of the Agricultural Development Council (A/D/C), the International Agricultural Development Services (IADS), and the Winrock International Livestock Research and Training Center. Winrock's mission is to improve agriculture for the benefit of people—to help increase the productivity, improve the nutrition, and advance the well-being of men, women, and children throughout the world. Winrock's main areas of emphasis are human resources, renewable resources, food policy, animal agriculture and farming systems, and agricultural research and extension.

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