ECHO Technical Note

SELECTING THE BEST PLANTS FOR THE TROPICAL SUBSISTENCE FARM

By Dr. F. W. Martin. Published in parts, 1989 and 1994; Revised 1998 and 2007 by ECHO Staff

Dedication: This document is dedicated to the memory of Scott Sherman who worked as ECHO's Assistant Director until his death in January 1996. He spent countless hours corresponding with hundreds of missionaries and national workers around the world, answering technical questions and helping them select new and useful plants to evaluate. Scott took special joy in this work because he knew the God who had created these plants--to be a blessing to all the nations.

Photo by ECHO Staff

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HOW TO FIND THE BEST PLANTS FOR THE SMALL FARM

Number and Classes of Useful Plants

In one attempt to list all of the food plants of the world, Tanaka recorded 10,000 species in a thick volume (Tanaka,T. 1976, Tanaka's Cyclopedia of Edible Plants of the World). Others claim that the world may contain 20,000 or even 40,000 edible plants, though these claims are not substantiated. Perhaps with the correct processing, every plant is potentially edible.

In addition to the edible plants, a very large number of plants are useful to humankind in a wide variety of other ways. Plants may serve as feed for livestock. They may also provide humankind with needed items including shelter, clothes, fibers, pipes, fishing poles, toothpicks, etc. There are also ecologically beneficial plants that protect and improve the soil and that can influence conditions such as light and wind.

Though nearly all plants are useful in some way, they are not equally valuable. For example, wheat, rice and corn may be considered the most valuable plants in the world based on the vast acreage planted to these crops, their vital role in feeding humankind, and their enormous economic value. Using various criteria, one might consider 10, 25, or even 200 species as the world's most valuable plants. Yet, under some situations, by some people, or for some special reason, other plants produced and used on a very small scale might be precious and indispensable. The question, "Which are the most valuable plants for the small farm?", then, becomes breathtaking.

The Problem of Adaptation

Adaptation as defined here is the range of environmental conditions under which a plant can survive, grow and produce. If a plant is widely adapted, it can be grown under many conditions. This is especially important when one tries to compare plants for their values. A widely-adapted plant is more valuable than one adapted to a narrow range of conditions, even if the use of the narrowly-adapted plant is of great importance. When comparing values of plants, we frequently consider their adaptation to growing conditions on small farms.

The small farms throughout the world often represent marginal areas not always well suited to agriculture. The best farming areas are frequently in the hands of a few who own or control vast acreages. There is a macrodiversity among small farms, from flat, easy-access terrain to those places where farming is very difficult such as hillsides, swamps, brushlands, extreme altitudes, rocklands and small valleys. In addition, there is a microdiversity that easily occurs within "pockets" of space with their own microclimates. This phenomenon is caused by great variability in factors such as slope, amount of soil and its nature, and the amount of rainfall, humidity, or light received. Plants respond differently to such conditions.

Now, these differences among small farms increase the problem of choosing the right plants. The problem can be seen in Central America where small farms usually produce the crop(s) necessary for their own household first, then staple foods for marketing as an income source. Often called the basic grains, these staple crops include corn, sorghum, pearl millet, rice, and beans. To this group must be added cassava and potatoes, both of great importance in many regions. The crops that are grown, and the varieties of such crops, are extremely critical, for these crops must be produced under prevailing rainfall conditions. Crops or varieties respond differently to abnormal amounts (too little or too much) and patterns (rainy season constant or intermittent; too long or too short). The problems of producing these life-sustaining crops are so great that farmers may not concern themselves with home vegetable gardens that could balance the diet for their children. On these small farms the right crops or the right varieties may differ radically from one place to another, and it is difficult to accurately predict what crop might do well in a particular location. Return to Top

Criteria of Value as Defined Here

Because of the diversity of plants that are useful on the small farm, when thinking of their values it is useful to first classify plants by their uses. For example, in comparing plants for their values it is not reasonable to compare cereal grains to windbreaks. Therefore, all of the discussion that follows is based on the comparison of

useful plants within categories as defined by the uses themselves. A very helpful list of plant uses is found as part of the Table of Contents section on the first page of this document. That list serves as an orientation to this publication.

Nevertheless, the classes of uses themselves are of different values. Judgments have been made of these values, and the categories of useful plants are listed somewhat in the order of importance in the Table of Contents. For example, food crops are listed first, and among the food crops, those great staple foods including the most important of all, cereal grains. The weakness of this classification of uses is seen in the expression, "Humankind does not live on bread alone". Thus, in some places and under some circumstances the order of values would vary.

Within each use category, suggested criteria for deciding the value of and selecting a crop are:

- The wideness of adaptation of the crop.
- The quality of the crop for the use in question.
- The useful yield for the use in question.
- Problems in production.
- Storage or durability.

Using the Tables of Useful Plants

For the avid student who wishes to learn about tropical plants and their many uses, there is never enough information. Of the hundreds of species covered by this publication, some are well known and information on them may be available in other literature. Others are inadequately known. By compiling lists of useful species and presenting them in tables, much useful information is lost, and the author apologizes. However, probably no publication can ever be adequate, for agriculture by its nature must always include local trial and learning from experience.

Information for the various categories of plants is presented in forms of generalities as text, and more specific information is given in the tables. The information in tables always includes one common name and the scientific or species name, and may include other information such as growth habitat, edible parts and uses, principal nutrients, and adaptation in terms of temperature, day length, flooding, drought, or climate region. Sometimes negative factors are mentioned. In addition, the various species are usually rated for their relative values for multiple purposes including food, animal feed, fiber, construction materials, fuel, soil amendment (soil improvement), erosion control, and climatic modification. These uses are more fully discussed in the corresponding portion of the manuscript dedicated to such crops. Return to Top

DESCRIPTIONS OF USEFUL PLANTS

PLANTS FOR FOOD: STAPLE CROPS

Cereal and Non-Leguminous Grains

Three kinds of edible seed from annual plants can be distinguished: the cereal grains from grasses, the pulses from legumes, and a miscellaneous group which, for convenience here, is called non-leguminous grains. All are annuals that are propagated from seeds.

Figure 1. Rrice (Oryza sativa) with maturing heads of grain.

Cereal grains are the staff of life for most of the people of the world, and wheat is number one. Rice follows, but while extremely important is low in protein. Corn has long been an important life support crop; however, as is the case with other cereal grains, it normally lacks sufficient lysine to fulfill all human dietary protein requirements. However, several high lysine corn varieties have been developed,

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making this crop the most important member of its class and a potentially useful lifesaver everywhere. The high protein grain triticale also has great promise. Choice of variety suited for the locale is always important for the cereals. Time of planting and harvest may also be critical.

The non-leguminous grains are an assortment of minor crops having special value in isolated regions. They should be considered as potentially valuable but experimental and only rarely could they replace a cereal grain.

On selecting a grain crop, familiarize yourself with the grain crops already grown in the region, including the varieties and their problems. Search first for improved varieties. Try to substitute high lysine (high quality protein) varieties of corn for current varieties. Then, add a little additional fertilizer to the soil and you will be repaid with generous yields. All of the grain crops in the following tables are annuals propagated from seed.

Table 1. **A COMPARISON OF GRAIN CROPS.**

Common Name	Species Name	Growth Habit	Edible Parts, And Uses	Principal Nutrients	Adaptation				Negative Factors
					Temp.	Daylength	Flood	Dry	
Amaranth	*A. cruentis* *A. hypochondriacus*	rapid, upright branched	seed in flour, popped	protein, starch	warm to hot	neutral	No	some	tiny seeds some heads shatter
Barley	*Hordeum vulgare*	branched grass	seed in flour, cereal, malt, grits	protein, starch	cool to warm	neutral	No	no	
Buckwheat	*Fagopyrum esculentum*	herbaceous bush	seed in flour, cereal, green manure	protein, starch	warm	neutral	No	no	high altitude crop
Corn, Maize	*Zea mays*	upright grass	cereal, starches, oil, seed in flour	protein, oil, starch	warm to hot	neutral To short	No	no	
Kañiwa Cañihua	*Chenopodium pallidicaule*	broadleaf herb	seed in flour	protein, starch	warm	neutral	No	some	small seeds, high altitude
Pearl Millet	*Pennisetum americanum*	upright grass	seed in flour, cereal	protein, starch	warm	neutral	No	yes	
Quinoa	*Chenopodium quinoa*	broadleaf herb	seed in flour	protein, starch	warm	neutral	No	some	tiny seeds, high altitude
Rice	*Oryza sativa*	branched grass	seed as staple food, flour, starch	starch, low protein	warm to hot	neutral	yes	no	relatively low protein
Rye	*Secale cereale*	branched grass	seed as flour, cereal	starch, high protein	warm	neutral	No	no	tiny seeds
Sorghum	*Sorghum bicolor*	upright grass	seed as flour, cereal	protein, starch	warm to hot	neutral	No	some	birds eat best varieties
Teff	*Eragrostis tef*	branched grass	seed in flour, Flat bread (injera)	protein, starch	cool	neutral	No	no	small seed, high altitude
Triticale	*X Triticosecale spp*.	branched grass	seed as flour, cereal, bread	starch, high protein	cool to warm	neutral	No	no	experimental, hard to get
Wheat, bread	*Triticum aestivum*	branched grass	seed as flour, cereal, bread	protein, starch	warm	neutral	No	no	
Wheat, pasta	*Triticum turgidum durum*	branched grass	seed as flour, cereal, pasta	protein, starch	warm	neutral	No	no	

Table 2. **USES AND RATINGS (0-5) OF USE FOR SELECTED GRAIN CROPS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Other Food Uses	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Amaranth	edible leaves	4	2	0	0	1	1	1	0
Cañihua	edible leaves	4	3	0	0	0	1	1	0
Corn	fresh seed	5	5	0	1	2	1	1	0
Kiwicha	edible leaves	4	3	0	0	0	1	1	0
Pearl Millet		4	4	0	1	1	1	1	0
Quinoa	edible leaves	5	0	0	0	1	1	1	0
Rice		5	3	0	0	1	1	1	0
Sorghum		4	5	0	2	2	1	1	0
Wheat		5	4	0	0	1	1	1	0

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Pulses (Leguminous Grains):

Figure 2. Pods of Pigeon Pea (Cajanus cajun), a good selection for semi-arid areas.

Pulses are the dried seeds of leguminous plants and are important as sources of protein for the diet. The same species are often useful for non-dry seeds and pods. As a group, they are limited in production per acre or hectare, but those that excel in protein content are particularly valuable. None are potentially more valuable than soybean with its high yields and content of protein and oil. But, soybean is limited in two ways: (1) it needs inoculation or to be in the presence of a specific bacterium in the soil and (2) it must mature during dry days.

For pulse crops, the appropriate variety for the locale and date of planting is extremely important, and they often have disease and/or insect problems. People often have very fixed habits with respect to these crops. Convincing them to change a variety may be very difficult. All of these crops are propagated chiefly by seeds.

Selecting an adequate pulse crop for any given region inevitably involves extensive testing of species and varieties and involving the local people in trials of suitable cooking methods that would be acceptable by the populace. The task of replacing a given pulse or introducing a new one is often quite difficult because of cultural preferences. Return to Top

Table 3. **COMPARISON OF PULSES (DRIED LEGUMES USED FOR COOKING).**

Common Name	Species Name	Annual/ Perennial	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation				Negative Factors
						Temp.	Day-length	Flood	Dry	
Bambara nut	*Vigna subterranea*	annual	compact, bushy herb	seeds ground or boiled, pods boiled	Protein	hot	mostly neutral	no	no	hard seed
Bean, common	*Phaseolus lunatus*	annual	bushy herb or vine	boiled seeds, mashing and refrying	protein, Starch	warm	mostly neutral	no	some	limited adaptation to the tropics
Chick pea, garbanzo	*Cicer arietinum*	annual	bushy herb or vine	boiled seeds	protein, Starch	cool to warm	neutral	no	yes	temperate climate only
Cowpea	*Vigna unguiculata*	annual	bushy herb or vine	boiled seeds, immature pods, leaves	protein, vit. B	hot	mostly neutral	no	some	diseases & insects
Faba bean	*Vicia faba* var. *faba*	annual	bush	boiled seed, roasted, ground meal	protein, Starch	cool to warm	mostly neutral	no	some	Fabism (a disease) is linked to this bean
Horse gram	*Macrotyloma uniflorum*	annual	bush or weak vine	boiled seed	protein, starch, oil	hot	mostly short day	no	some	
Lablab	*Lablab purpureus*	annual	climbing vine	boiled seed, mature seeds and pods	protein, Starch	warm	short day	some	some	excessive vine growth during long days
Lima bean	*Phaseolus vulgaris*	annual	bush or vine	boiled seed or green pod	protein, vit. B, Starch	hot	variable	no	some	foliage contains HCN
Moth bean	*Vigna acontifolia*	annual	low trailing vine	boiled seed, ground or fried forage	protein, Starch	mostly hot	neutral, short day	no	yes	difficult to harvest
Mung bean	*Vigna radiata*	annual	Small bush or vine	boiled and sprouted seed, edible pods	protein, Starch	cool to warm	neutral, short day	no	yes	rhizobium inoculation needed in some soils
Popping bean Nuña	*Phaseolus vulgaris*	annual	vine	popped before eating	protein, Starch	cool to warm	mostly short day	no	some	adapted to Andes mtns.
Pea, garden	*Pisum sativum*	annual	weak vine	boiled seed, ground meal	protein, Starch	mostly hot	mostly neutral	no	no	temperate climate only
Peanut	*Arachis hypogaea*	annual	small bush	dry nuts, boiled seed	oil, Protein	hot	neutral, short day	no	some	diseases
Pigeon pea	*Cajanus cajan*	annual or weak perennial	tall bush	boiled seed, mature seed	Protein	warm to hot	neutral, short day	some	some	insect susceptibility
Rice bean	*Vigna umbellata*	annual or weak perennial	small vine	boiled seed, edible pods, leaves	protein, Starch	warm to hot	mostly short day	no	yes	poor yields
Scarlet runner bean	*Phaseolus coccineus*	annual or perennial	vine	boiled seed, mature seed, leaves, roots	protein, Starch	cool to warm	mostly neutral	no	no	adapted to cool or temperate climate

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Table 3. **COMPARISON OF PULSES (DRIED LEGUMES USED FOR COOKING),** continued.

Common Name	Species Name	Annual/ Perennial	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation				Negative Factors
						Temp.	Daylength	Flood	Dry	
Soybean	*Glycine max*	annual	mostly bushy	boiled, ground, extracted, processed	oil, high Protein	hot	short day	no	some	rhizobium inoculation needed in some soils
Tarwi Tarhui Chocho	*Lupinus mutabilis*	annual	bush	boiled seed	oil, high Protein	cool to warm	mostly neutral	no	some	seed contains poisonous alkaloids, must boil seed
Tepary bean	*Phaseolus acutifolius*	annual	bush or weak vine	boiled or ground seed	protein, Starch	warm to hot	mostly short day	no	yes	adapted only to desert conditions
Urd bean	*Vigna mungo*	annual	bush	boiled or ground seed	protein, Starch	very hot	neutral, short day	no	some	adapted only to dry conditions
Velvet bean	*Mucuna pruriens* var. *utilis*	annual or weak perennial	climbing or trailing vine	roasted seed as coffee sub., or in tempeh	protein, oil	warm to hot	mostly short day	yes	some	seed contains poisonous alkaloids, must boil seed

Table 4. **USES AND RATINGS (0-5) OF USE FOR SELECTED PULSE CROPS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Bambara nut	3	2	0	0	0	1	1	0
Common bean	5	3	0	0	1	2	1	0
Cowpea	5	3	0	0	1	2	2	1
Lablab bean	4	4	0	0	0	3	3	1
Lima bean	4	0	0	0	0	2	1	1
Mat bean	3	3	0	0	0	1	1	0
Mung bean	4	2	0	0	0	1	1	0
Nuña	4	2	0	0	0	2	1	0
Peanut	5	4	0	0	0	3	2	0
Pigeon pea	4	3	0	0	1	3	2	0
Rice bean	3	1	0	0	0	1	1	0
Soybean	5	5	0	0	1	3	1	1
Tarwi	3	1	0	0	0	1	1	0
Tepary bean	3	1	0	0	0	1	1	0

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Roots and Tubers:

Root and tuber crops throughout the world include: (1) annual, enlarged roots and tubers of little food value and (2) perennial roots and tubers high in starch. These structures are used by the plant for regrowth after an unfavorable season. Roots and tubers are widely used throughout the tropics as staple crops, and indeed are major sources of carbohydrates. Because they are limited in protein, excessive reliance upon them for food may be detrimental to health. It is difficult to pick the best because each has its advantages and disadvantages;

Figure 3. Tubers of Jicama (Pachyrrhizus erosus),well adapted to hot, humid climate.

however, cassava is the worst because of its low, poor-quality protein. Some people favor the sweet potato because it can be produced in four months, leaving the ground free for other crops. Root and tuber crops are usually widely adapted and easy to grow, but there is frequently a problem of obtaining good varieties.

Table 5. **A COMPARISON CHART OF ROOTS & TUBERS.**

Common Name	Species Name	Annual, Bi/ Perennial	Propa-gation	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation				Negative Factors
							Temp.	Day-Length	Flood	Dry	
Beet	*Beta vulgaris*	bi, grown as annual	seed	herbaceous	roots, leaves cooked	roots-low nutrients	cool	neutral	no	no	temperate climate
Carrot	*Dacus carota*	bi, grown as annual	seed	herbaceous	roots, raw or cooked	high in vit. A	cool / warm	neutral	no	no	temperate climate
Cassava	*Manihot esculenta*	per. grown as annual	cutting	Bush	tuberous root, leaf, cooked	starch	hot	short day	no	no	some var. poisonous untreated
Dasheen	*Colocasia esculenta*	per. grown as annual	offshoot	herbaceous	corm, cooked	starch, vit. C	hot	short day	some	no	
Edible Canna	*Canna edulis*	per. grown as annual	offshoot	upright herbaceous	rhizome, cooked	starch	hot	neutral	some	no	poor quality vegetable
Jícama	*Pachyrrhizus erosus*	weak per. used as annual	seed	vining	tuberous root, cooked	starch, protein	hot	neutral	no	some	pods, leaf poisonous
Potato	*Solanum tuberosum*	per. grown as annual	tuber cutting	herbaceous	tuber, cooked	starch, vit. C	cool / warm	neutral	no	no	not tropical
Sweet Potato	*Ipomea batatas* var. *batatas*	per. grown as annual	cutting	trailing Vine	vine tips & tuberous root, cooked	starch, vit. C, maybe A	hot	mostly short day	no	no	insect problems
Tanier	*Xanthosoma* spp.	per. grown as annual	offshoot	herbaceous	corm, cooked	starch	hot	mostly short day	some	no	disease problems
Taro	*Colocasia esculenta*	per. grown as annual	offshoot	herbaceous	corm, cooked	starch, vit. C	hot	mostly short day	yes	no	needs paddy culture
Yam	*Dioscorea* spp.	per. grown as annual	tuber cutting	climbing vine	tuber, cooked	starch, protein	hot	mostly neutral	some	no	very seasonal

Table 6. **USES AND RATINGS (0-5) OF USE FOR SELECTED ROOT AND TUBER CROPS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food Uses	Food	Feed	Fiber	Con-struction	Fuel	Soil Amend	Erosion Control	Modify Climate
African yam Bean	root, fresh dried seed	4	1	0	0	0	1	0	0
Ahipa	root	3	1	0	0	0	2	1	0
Arrowroot	rhizome	3	2	0	0	0	0	1	0
Cassava	root, leaves	4	4	0	1	1	0	1	0
Edible canna	corm	2	1	0	0	0	0	1	0
Potato	tuber	5	3	0	0	0	0	1	0
Sweet Potato	root, leaves	5	5	0	0	0	0	2	0
Tannier	corm, leaves	5	0	0	0	0	0	1	0
Taro	corm, leaves	5	0	0	0	0	0	1	0
Yam	tuber	5	0	0	0	0	0	2	1
Yam bean	root	4	1	0	0	0	1	0	0

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PLANTS FOR FOOD: VEGETABLE CROPS

Leguminous Vegetables:

Legumes are excellent providers of at least some of most nutrients. However, they are subject to many disease and insect problems. The challenge with these crops is to find those that are well suited to a particular area and that will produce a crop throughout the year. This is a difficult, but all can be produced from seeds. Winged beans may also be propagated by tubers. Some produce a crop in winter and some in summer. Therefore, developing a selection of leguminous vegetables for a farming area requires careful trials of both species and available

Figure 4. Winged Bean (Psophocarpus tetragonolobus) pods- may be eaten fresh when young and flexible.

varieties, with attention to seasonal parameters for optimal production. Generally, several selections are desirable to assure year-round production. Return to Top

Table 7. **A COMPARISON OF LEGUMINOUS VEGETABLES.**

Common Name	Species Name	Annual/ Perennial	Growth Habit	Edible Parts, Uses	Principal Nutrients	Adaptation				Negative Factors
						Temp.	Day-Length	Flood	Dry	
Bean, Common	*Phaseolus vulgaris*	annual	vine or bush	pod, dry seed	general nut., starch	warm	mostly neutral	no	no	
Chickpea, Garbanzo	*Cicer arietinum*	annual	bush	undried and dry seed	protein, starch	cool to warm	mostly neutral	no	some	
Cowpea	*Vigna unguiculata*	annual	bush or vine	undried and dry seed	protein, starch	hot	mostly neutral	no	some	
Faba bean	*Vicia faba*	annual	bush	pod, dry and undried seed	protein, starch	warm	mostly neutral	no	some	consumption related to a disease
Jack bean	*Canavalia ensiformis*	annual	mostly bush	small young pod	protein, starch	hot	neutral / short day	some	no	poisonous and risky to use when older
Lablab	*Lablab purpureus*	weak perennial	vine or bush	dry and undried seed, pod	protein, starch	hot	short day	some	some	excessive vining in summer
Lima bean	*Phaseolus lunatus*	annual	vine or bush	undried seed	protein, starch	warm to hot	mostly neutral	no	no	
Pea	*Pisum sativum*	annual	weak vine	pod, dry, undried seed	protein, starch	cool to warm	Neutral	no	no	strictly temperate
Peanut	*Arachis hypogaea*	annual	Bush	dry and undried seed	oil, high protein	hot	mostly neutral	no	some	wet seeds become poisonous
Pigeon Pea	*Canjanus cajun*	weak perennial	tall bush	dry and undried seed	protein, starch	hot	neutral / short day	no	no	
Soybean	*Glycine max*	annual	bush	dry and undried seed	oil, starch, high protein	warm to hot	short day	no	no	often needs rhizobium inoculant
Sword Bean	*Canavalia gladiata*	annual	vine	young pod	protein, starch	hot	Neutral	no	no	pods and beans may be slightly poisonous
Winged Bean	*Psophocarpus tetragonolobus*	weak perennial	vine	young pod, leaf, root, flower	oil, starch, high protein	hot	mostly short day	some	no	
Yardlong Bean	*Vigna unguiculata ssp. sesquipedalis*	annual	vine	pod	general nutrients	hot	mostly neutral	no	no	

Table 8. **USES AND RATINGS (0-5) OF USES FOR SELECTED LEGUMINOUS VEGETABLES.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Basul	4	3	0	2	3	4	2	2
Common bean	5	3	0	0	1	2	1	0
Cowpea	5	3	0	0	1	2	2	1
Horse bean	1	3	0	0	0	2	2	1
Inga	2	2	0	2	2	2	1	1
Lablab bean	4	4	0	0	0	3	3	1
Lima bean	4	0	0	0	0	2	1	1
Mat bean	3	3	0	0	0	1	1	0
Mung bean	4	2	0	0	0	1	1	0
Paterno	2	2	0	2	3	2	2	1
Peanut	5	4	0	0	0	3	2	0
Pigeon pea	4	3	0	0	1	3	2	0
Rice bean	3	1	0	0	0	1	1	0
Soybean	5	5	0	0	1	3	1	1
Tarwi	3	1	0	0	0	1	1	0
Tepary bean	3	1	0	0	0	1	1	0
Sword bean	2	2	0	0	0	2	2	1
Winged bean	4	3	0	0	0	3	2	1
Yardlong bean	5	2	0	0	0	1	1	1

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Non-Leguminous Fruit Vegetables:

Fruit vegetables are a miscellaneous classification that includes some produce with very excellent and some with practically no food value. There are many hundreds in the tropics, yet a relatively small number, as listed here, are proven favorites almost everywhere. Some favor the tropical pumpkin because of its high nutritive value and the many ways it can be prepared for food. The pepper and the tomato, in spite of differences in appearance and use, have much the same nutritive value. Cucumber,

Figure 5. Tropical Pumpkin (Cucurbita moschata) fruits.

eggplant, melon and watermelon are interesting and entertain the palate, but they have low food value. Most are propagated by seeds, and some can also be propagated by cuttings. Except for okra, a summer vegetable, they can be produced at any time of the year. Variety is almost always important when selecting a fruit vegetable. Finding an appropriate variety may require extensive search and trial.

Table 9. **A COMPARISON OF FRUIT VEGETABLES.**

Common Name	Species Name	Annual/ Perennial	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation			Negative Factors
						Temp.	Flood	Dry	
Angled loofa	*Luffa acutangula*	annual	climbing vine	young fruit	low nut. value	hot	No	no	poisonous seeds
Bitter gourd	*Momordica charantia*	annual	climbing vine	young fruit	vit. C	hot	No	yes	very bitter
Bottle gourd	*Lagenaria siceraria*	annual	climbing vine	young fruit, seed	low nut. value, seed high in oil & protein	warm / hot	No	no	low nut. value
Cucuzzi, Italian	*Lagenaria siceraria*	annual	climbing vine	young fruit, seed	low nut. value, seed high in oil & protein	warm / hot	No	no	low nut. value
Chayote	*Sechium edulis*	perennial	climbing vine	mature fruit, vine tips, roots	tips high in vitamins, minerals	warm	Some	no	needs cool nights

Table 9. **A COMPARISON OF FRUIT VEGETABLES,** continued

Common Name	Species Name	Annual/ Perennial	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation			Negative Factors
						Temp.	Flood	Dry	
Eggplant	*Solanum melongena*	weak perennial	bush	young fruit	low nut. value	warm / hot	No	some	low nut. value
Okra	*Abelmoschus esculentus*	annual	bush	young fruit, dried seed	fair source of most nutrients	hot	No	some	summer only
Pepper	*Capsicum annuum*	weak perennial	bush	young/mature fruit, leaves	vit. A & C	warm / hot	No	some	virus susceptible
Pumpkin tropical	*Cucurbita moschata*	weak perennial	trailing vine	young/mature fruit, seeds, vine tips	vit. A & C, seed high in oil & protein	hot	Some	no	mildew
Snake gourd	*Trichosanthes cucumerina*	annual	climbing vine	young fruit	low nut. value	hot	No	no	poor quality
Sponge gourd	*Luffa cylindrica*	annual	climbing vine	young fruit, mature sponges	low nut. value	hot	No	no	low nut. value
Tomato	*Lycopersicon esculentum*	annual / weak perennial	bush or weak vine	young/mature fruit	vit. A & C	warm	No	no	many diseases
Wax gourd	*Benincasa hispida*	annual	climbing vine	young fruit, seed or oil	low nut. value, seed high in oil & protein	hot	No	no	low nut. value

Table 10. **USES AND RATING (0-5) OF USES FOR SELECTED TROPICAL FRUIT VEGETABLES.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Bitter gourd	3	0	0	0	0	0	1	0
Chayote	2	1	0	0	0	0	2	1
Melon	3	1	0	0	0	0	1	0
Okra	4	1	0	0	2	0	1	0
Pepper	5	0	0	0	0	0	0	0
Pumpkin	5	3	0	0	0	0	1	1
Tomato	4	0	0	0	0	0	0	0

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Leafy Vegetables:

As a rule, leaves have high value as food, especially the dark green leaves, but always contain too much fiber and often contain various antinutrients such as oxalic acid. Leaves as a part of the diet can eliminate blindness in children caused by a lack of sufficient vitamin A in their diet. There are many leafy vegetables to choose from. A good rule is to vary them in the diet. A half-cup of cooked leaves every day is a good amount to consume.

Figure 6. Highly nutritious leaves of Drumstick or Horseradish (Moringa oleifera) tree. Photo by Tim Motis.

Most of the typical tropical leafy vegetables do not have varietal names, but all of them are highly adapted to tropical conditions.

Table 11. **A COMPARISON OF LEAFY VEGETABLES.**

Common Name	Species Name	Annual/ Perennial	Propa-gation	Growth Habit	Edible Parts, and Uses	Rela-tive Yield	Relative Quality	Adaptation				Neg. Factors
								Temp.	Day-length	Flood	Dry	
Amaranth	*Amaranthus gangeticus, A. tricolor A. hypochon-driacus*	annual	seed	herb	leaf, whole plant, cooked	high	high	hot	mostly short day	no	some	short life span, insects
Belembe	*Xanthosoma brasiliense*	perennial	off-shoot	herb	leaf and stem, cooked	low	very high	hot	neutral	yes	no	low produc-tion
Bok choi	*Brassica rapa* subsp. *chinensisis*	annual	seed	herb	leaf, head, raw or cooked	med-ium	medium	cool to warm	neutral	no	no	
Bush okra	*Corchous olitorius*	annual	seed	herb	leaf and hoot, cooked	high	medium	hot	neutral	no	some	weedy
Cassava	*Manihot esculenta*	perennial	cutting	bush	leaf and shoot, cooked	med-ium	medium	hot	neutral	no	some	needs cooking or is toxic
Chaya	*Cnidoscolus chayamansa*	perennial	cutting	bush	leaf and shoot, cooked	very high	high	warm to hot	neutral	some	some	some-what toxic
False roselle	*Hibiscus acetosella*	weak perennial	seed	bush	leaf and shoot, cooked	med-ium	medium	warm to hot	short day	no	some	weedy nature
Horse-radish tree	*Moringa oleifera*	perennial	seed, cutting	tree	leaf, young fruit, flower, root	very high	high	hot	neutral	no	some	too vigor-ous
Indian lettuce	*Lactuca Indica*	annual	seed, cutting	tall herb	leaf, raw	high	high	warm to hot	short day	no	no	very tall
Kai choi	*Brassica juncea*	annual	seed	herb	leaf, head, raw or cooked	med-ium	high	warm	neutral	no	no	
Kale, Ethiopian	*Brassica carinata*	annual	seed	herb	leaf, raw or cooked	high	medium	warm	neutral	no	no	
Katuk	*Sauropus androgynus*	perennial	seed, cutting	bush	shoot, cooked	med-ium	high	hot	neutral	no	no	
Lagos spinach	*Celosia argentea*	annual	seed	herb	leaf and shoot, cooked	high	medium	hot	short day	no	no	weedy
Lettuce	*Lactuca sativa*	annual	seed	herb	leaf, head, raw	med-ium	medium	cool to warm	short day	no	no	
Spinach, Malabar	*Basella rubra*	perennial	seed, cutting	climb-ing vine	leaf and shoot, cooked	high	low	hot	short day	no	no	fruits during short days
Spinach, pacific	*Abelmoschus manihot*	perennial	cutting	tall bush	leaf and shoot, cooked	high	medium	hot	short day	no	no	slimy when cooked
Spinach, water	*Ipomea aquatica*	perennial	cutting seed	trailing vine	leaf and shoot, cooked	high	low	warm to hot	short day	yes	no	weedy in canals
Sweet potato	*Ipomea batatas*	perennial	cutting	trailing vine	shoot, cooked	med-ium	medium	hot	short day	no	no	weevils

Table 12. **USES AND RATINGS (0-5) OF USES FOR SELECTED LEAFY VEGETABLES.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Amaranth	5	1	0	0	1	0	0	0
Belembe	5	1	0	0	0	0	0	0
Cassava	5	5	0	1	1	0	1	0
Ceylon spinach	4	0	0	0	0	0	1	1
Chaya	4	1	0	0	0	0	1	0
Horseradish tree	5	3	0	0	1	1	2	2
Indian lettuce	4	3	0	0	0	0	0	0
Indian mustard	5	4	0	0	0	0	0	0
Kangkong	5	3	0	0	0	0	1	1
Katuk	5	2	0	1	0	1	1	0
Leucaena	4	4	0	2	4	4	3	2
Okinawa spinach	3	2	0	0	0	1	2	0
Pacific spinach	5	2	0	0	0	1	1	0
Lagos spinach	4	0	0	0	0	1	1	0
Sissoo spinach	3	0	0	0	0	1	3	0
Sweet Potato	5	5	0	0	0	0	3	0
Watercress	5	3	0	0	0	0	0	0

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Miscellaneous Vegetables:

Some of the very best of the tropical vegetables do not conveniently fit into any other category. The edible part is highly variable, and production is often inefficient (however, water chestnut is very highly productive). Most of these species are perennials. Almost all are of high quality. Taken as a group, they are highly valuable, gourmet species. Few of these vegetables have selected varieties.

Figure 7. Egusi Melon (Citrullus lanatus) fruit

Many are easy to grow and successful almost everywhere. They are all worth trying where space permits. In some cases, the production technology and markets for these crops has already been developed.

Table 13. **A COMPARISON OF MISCELLANEOUS VEGETABLES.**

Common Name	Species Name	Annual/ Perennial	Propa-gation	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation				Negative Factors
							Temp.	Day-length	Flood	Dry	
Asparagus	*Asparagus officinale*	perennial	seed offshoot	bush, large rhizomes	young tender shoots, cooked Pickled	vit. C	cool to warm	Neutral	no	some	
Buffalo gourd	*Cucurbita foetidissima*	perennial	seed	bush / vine	seed for oil and flour	oil, high protein	warm to hot		no	yes	
Bunching onion	*Allium fisulosum*	perennial	seed offshoot	herb with bulb	entire plant as condiment	vit. C	cool to warm	short day	no	no	
Chinese chives	*Allium tuberosum*	perennial	offshoot	herb	green foliage as spinach	vit. A & C	warm to hot	short day	no	no	
Coconut sprout	*Cocos nucifera*	perennial	seed	tall tree	root ball after germination		hot	Neutral	some	some	
Egusi	*Citrullus lanatus*	annual	seed	trailing vine	roasted seed as snack or ground	high protein	warm to hot		no	yes	

Table 13. **A COMPARISON OF MISCELLANEOUS VEGETABLES**, continued.

Common Name	Species Name	Annual/ Perennial	Propa-gation	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation				Negative Factors
							Temp.	Day-length	Flood	Dry	
Izote	*Yucca* spp.	perennial	seed cutting	large woody bush	mature bud and flower raw or cooked, heart must be cooked	flower-vit. C, heart-calcium	warm to hot	Neutral	no	no	chiefly for other uses, inefficient production
Onion	*Allium cepa*	perennial	seed bulbs	herb	bulb as a condiment	vit. C	warm	short day	no	no	specific varieties & planting dates
Pitpit	*Setaria palmifolia*	perennial	cutting	large grass	bottled up flower cooked as vegetable	protein	hot	short day	some	no	inefficient production
Rhubarb	*Rheum rhaponti*	annual in tropics	seed offshoot	large herb	petioles cooked	vit. C	cool to warm	Neutral	some	no	mostly temperate
Roselle	*Hibiscus sabdariffa*	annual	seed	large woody herb	calyxes of pod as fruit	vit. C	warm	short day	no	some	
Sweet Corn	*Zea mays*	annual	seed	tall herb	immature ear	carbo-hydrate, P, niacin	warm	short day to neutral	no	no	

Tables 14. **USES AND RATINGS (0-5) OF USES FOR MISCELLANEOUS VEGETABLES.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Bamboo	3	2	0	4	3	0	4	4
Coconut sprout	5	4	3	4	2	2	4	4
Izote	2	1	1	0	0	0	1	0
Pacaya	3	0	0	0	0	0	1	0
Palm hearts	3	1	1	3	2	2	1	1
Pitpit	2	2	0	0	0	1	2	0
Sweet corn	4	2	0	1	1	0	1	0
Water chestnut	4	0	0	0	0	0	0	0

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PLANTS FOR FOOD: FRUIT AND NUT CROPS

Basic Survival Fruits:

The banana, plantain, breadfruit, and coconut are basic survival foods with much in common with the root and tuber crops. However, they are high in carbohydrates and low in protein. These crops can be grown on most farms in the tropics. They produce a lot of food for the efforts necessary to grow them. They might be seasonal, however, and by themselves they are not a complete diet. It is very difficult to add even one more species to this short, valuable list. These fruits probably occur already in every region where climate and soils permit. If not, they need introduction. These common fruits are often unappreciated for their fine qualities.

Figure 8. Fruit of a FHIA (Honduran Foundation for Agricultural Research) banana (Musa spp.) variety with resistance to the fungal disease, Black Sigatoka.

Table 15. **A COMPARISON OF BASIC SURVIVAL FRUITS.**

Common Name	Species Name	Propagation	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation		
						Temp.	Flood	Dry
Banana/ Plantain	*Musa* spp.	offshoots	large herb	fruit, raw, cooked	starch	hot	some	little
Breadfruit	*Artocarpus altilis*	root cuttings	med. tree	fruit cooked	starch	hot	some	some
Coconut	*Cocos nucifera*	seeds	tall palm	fruit, many uses	protein, oil	hot	some	some

Table 16. **USES AND RATINGS (0-5) OF USES FOR BASIC SURVIVAL FRUITS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Banana	5	4	1	1	0	1	1	1
Plantain	4	3	0	0	0	0	2	0
Breadfruit	4	3	0	1	1	1	2	2
Coconut	5	4	3	4	2	2	4	4

High Value Fruits: Return to Top

The tropics are rich in highly varied, delicious and nutritive fruits. Of the hundreds that exist, only a few of the most superb and easy-to-grow (e.g. prickly pear) fruits are listed here. Fruits that are high in nutritive value, easy to grow, and versatile in their use will be especially beneficial on the small farm.

Figure 9. Atemoya (Annona cherimola X A. squamosa), a delicious dessert fruit. Photo by Tim Motis.

Table 17. **A COMPARISON OF SELECTED TROPICAL FRUIT CROPS.**

Common Name	Species Name	Propa-gation	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation			Negative Factors
						Temp.	Flood	Dry	
Atemoya	*Annona* hybrid	grafts	small tree	fruit, raw	vit. C	warm	no	some	
Avocado	*Persia americana*	seed, grafts	med. tree	fruit, raw	oil	warm to hot	no	some	
Banana	*Musa* spp.	offshoots	large herb	fruit, raw, cooked	starch	hot	some	little	
Black sapote	*Diospyros digyna*	seed, graft	med. tree	fruit, cooked	carbohydrate	hot	some	no	
Breadfruit	*Artocarpus altilis*	root cuttings	med. tree	fruit, cooked	starch	hot	some	some	
Canistel	*Pouteria campechiana*	seed, grafts	small tree	fruit, raw, processed	starch, vit. A & C	hot	no	some	
Carambola	*Averrhoa carambola*	seed, grafts	small tree	fruit, raw	vit. C	hot	some	no	
Cherimoya	*Annon cherimola*	seed, grafts	med. tree	fruit, raw	vit. C	hot	no	no	
Citrus	*Citrus* spp.	grafts	med. tree	fruit, raw	vit. A & C	warm to hot	no	some	
Coconut	*Cocos nucifera*	seed	tall palm	fruit, many uses	protein, oil	hot	some	some	
Date	*Phoenix dactylifera*	seed, offshoots	tall palm	fruit, dried	carbohydrate	very hot	no	yes	
Durian	*Durio zibethinus*	seed, grafts	large tree	fruit, raw	protein, carbohydrate	hot	some	no	odor of fruit
Guava	*Psidium guajava*	seed, airlayers	small tree	fruit, raw, cooked	vit. C	hot	some	some	
Jaboticaba	*Myrciaria cauliflora*	seed, grafts	small tree	fruit, raw	vit. C	warm	some	no	needs cool winter
Jackfruit	*Artocarpus heterophyllus*	seed, grafts	med. tree	fruit, raw	vit. A & C	hot	some	no	
Lansium (Langsat)	*Lansium domesticum*	seed	med. tree	fruit, raw		hot	some	no	
Lychee	*Litchi chinensis*	seed, airlayers	med. tree	fruit, raw	vit. C	warm	no	no	needs cool winter
Loquat	*Eriobotrya japonica*	seed, grafts	med. tree	fruit, raw, cooked	vit. A & C	warm to hot	no	no	
Mango	*Mangifera indica*	grafts	tall tree	fruit, raw, cooked	vit. A & C	hot	some	some	
Mamey sapote	*Pouteria sapote*	seed, grafts	med. tree	fruit, raw	vit. C	warm to hot	no	some	
Mammy-apple	*Mammea americana*	seed, grafts	large tree	fruit, raw, cooked	vit. A & C	hot	some	some	somewhat poisonous

Table 17. **A COMPARISON OF SELECTED TROPICAL FRUIT CROPS,** continued..

Common Name	Species Name	Propa-gation	Growth Habit	Edible Parts, and Uses	Principal Nutrients	Adaptation			Negative Factors
						Temp.	Flood	Dry	
Papaya	*Carica papaya*	seed	large tree	fruit, raw	vit. A & C	hot	some	some	fruit too soft
Passion fruit	*Passiflora edulis*	seed, cuttings	vine	fruit, raw juice	vit. A & C	warm to hot	some	some	
Rambutan	*Nephelium lappaceum*	seed, grafts	med. tree	fruit, raw	vit. C	hot	some	no	
Salak	*Salacca zalacca*	seed, grafts	small palm	fruit, raw		very hot	yes	no	
Tamarind	*Tamarindus indica*	seed, offshoots	large tree	fruit, raw juice	vit. C	hot	no	yes	
White sapote	*Casimiroa edulis*	seed, grafts	med. tree	fruit, raw	vit. C	warm	no	some	

Table 18. **USES AND RATINGS (0-5) OF USES FOR SELECTED HIGH VALUE FRUITS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Avocado	5	1	0	1	1	2	1	2
Canistel	4	0	0	1	2	1	1	1
Citrus	5	2	0	1	2	1	1	1
Date	5	4	3	3	2	1	1	3
Durian	3	1	0	3	3	2	1	3
Guava	5	3	0	0	3	2	1	0
Mango	5	3	0	3	3	3	1	4
Papaya	5	1	0	0	0	1	1	0
Passion fruit	4	0	0	0	0	1	2	1
Peach palm	4	3	0	2	1	2	1	1
Pineapple	4	2	0	0	0	0	1	0
Prickly pear	3	1	0	0	0	0	1	0

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Outstanding Nuts:

Nuts are concentrated packages of high nutritional value, almost always protein, oil, and B and E vitamins. Most can be stored. All are good foods, and some are of gourmet quality. They are often not widely adapted but always worth producing on the small farm. In selecting nut crops for the small farm, special attention should be given to size of the tree and years to maturity. Most of the nut species (except macadamia) are not found as named varieties. Generally, special technologies for producing these species have yet to be developed. However, this does not make them less valuable.

Figure 10. Guinea Peanut (Pachira glabra) fruit, similar to Malabar Chestnut (P. aquatica). Fruits split open when ripe, revealing seeds used as nuts. Photo by Tim Motis.

Table 19. **A COMPARISON OF NUT CROPS.**

Common Name	Species Name	Propagation	Edible Parts, and Uses	Principal Nutrients	Adaptation	
					Flood	Dry
African breadfruit	*Treculia africana*	seed	seed	protein	yes	no
African walnut	*Coula edulis*	seed	seed	protein	yes	some
Basul	*Erythrina edulis*	seed	seed, foliage			
Betelnut	*Areca catechu*	seed, offshoots	none	alkaloids	yes	no
Breadnut	*Artocarpus altilis*	seed, offshoots	seed	carbohydrate	yes	no
Canary nut	*Canarium indicum*	seed	seed	protein	no	yes
Cashew	*Anacardium occidentale*	seed, grafts		protein	no	yes
Coconut	*Cocos nucifera*	seed	seed, other	protein	yes	no
Guiana-chestnut	*Pachira aquatica*	seed	seed	oil	yes	no
Jackfruit	*Artocarpus heterophyllus*	seed, grafts	seed, pulp	carbohydrate	yes	no
Macadamia	*Macadamia spp.*	seed, grafts	seed	protein	some	some
Mamey sapote	*Pouteria sapota*	seed, grafts	pulp, seed	protein	no	some
Mexican breadnut	*Brosimum alicastrum*	seed			yes	no
Okari nut	*Terminalia kaernbachii*	seed	seed	protein, oil	yes	no
Paradise nut	*Lecythis zabucaja*	seed	seed	protein	some	no
Paterno	*Inga jinicuil*	seed	seed	carbohydrate	no	some
Peach palm	*Bacrtis gasipaes*	seed, offshoots	seed, pulp	carbohydrate	yes	no
Pili nut	*Canarium ovatum*	seed, grafts	seed, pulp	protein	yes	no
Spanish joint fir	*Gnetum genemon*	seed	seed	protein	some	no
Tahiti chestnut	*Inocarpus fagifer*	seed	seed		some	
Tropical almond	*Terminalia catappa*	seed	seed	protein, oil	yes	no

Table 20. **USES AND RATINGS (0-5) OF USES FOR SOME SELECTED NUTS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control	Modify Climate
Breadnut	4	2	0	2	2	2	1	3
Cashew	4	0	0	0	0	2	3	1
Coconut	5	4	3	4	2	2	4	4
Indian almond	3	1	0	3	3	2	1	3
Jackfruit	4	2	0	3	3	0	0	3
Joint fir	4	2	1	2	2	2	1	2
Macadamia	5	0	0	1	1	2	1	1
Malabar chestnut	5	2	0	2	1	2	1	2
Paradise nut	3	0	0	1	1	1	1	1
Pili nut	5	3	0	2	2	2	1	2
Tahiti chestnut	3	2	0	2	2	3	1	2

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PLANTS FOR FOOD: BEVERAGES, OIL, SPICES AND SUGAR

The beverage crops, by themselves, are highly appreciated as stimulants but have little nutritional value. There are many good species of oil palms, particularly in South America, but the African Oil Palm continues to dominate the world's markets. The oil from palms contains more than desirable amounts of the saturated fatty acids and is not as desirable in the diet as that of other oil sources including corn, soybean, and olives.

Figure 11. Nuts of African Oil Palm (Elaeis guineensis). Photo by Tim Motis.

Spices are delightful to grow but are priced low in world markets and have little food value. Condiment herbs are useful on any small farm. Each has its special needs and its particular adaptations.

Sugarcane continues to be a common and easily grown source of sugar. Starch can be extracted from root and tuber crops, but is especially abundant in sago palms.

The production and marketing of specialty food crops is usually associated with definite regions and established markets. Some of these crops, however, may be suitable for small-scale use on the small farm. Return to Top

Table 21. **A COMPARISON OF SOME SPECIALTY CROPS.**

Common Name	Species Name	Annual/ Perennial	Growth Habit	Adaptation				Other uses
				Temp.	Day-length	Flood	Dry	
BEVERAGES								
Cacao	*Theobroma cacao*	perennial	small tree	hot	neutral	no	no	household
Coffee	*Coffea arabica C. robusta*	perennial	small tree	hot	neutral	no	no	household
Tea	*Camellia sinensis*	perennial	shrub	warm	neutral	no	no	household
OIL								
Coconut	*Cocos nucifera*	perennial	tall palm	hot	neutral	some	some	multiple
Oil palm	*Elaeis guineensis*	perennial	palm	hot	neutral	some	some	
Olive	*Olea europaea*	perennial	tree	warm to hot	neutral	no	yes	many
Peanut	*Arachis hypogaea*	annual	herb	hot	long day	no	some	as food
Sesame	*Sesamum indicum*	annual	herb	warm	short day	no	some	as food
Soybean	*Glycine max*	annual	herb	hot	short day	no	some	as food
Tung	*Vernicia* spp.	perennial	tree	hot	neutral	no	some	
SPICES								
Cloves	*Syzygium aromaticum*	perennial	small tree	hot	neutral	some	no	
Nutmeg & Mace	*Myristica fragrans*	perennial	tree	hot	neutral	some	no	
Pepper	*Piper nigrum*	perennial	vine	hot	neutral	some	no	
Vanilla	*Vanilla fragrans*	perennial	vine	hot	neutral	some	no	
SUGAR								
Sugar cane	*Saccharum officinarum*	perennial	grass	hot	neutral	yes	some	food

Table 22. **USES AND RATINGS (0-5) OF USES FOR SOME SPECIALTY FOOD CROPS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control
BEVERAGES							
Cacao	1	0	0	0	1	1	1
Coffee	1	2	0	1	2	1	2
Guarana	0	0	0	0	1	1	1
Mate	0	0	0	0	1	1	1
Tea	0	0	0	0	1	1	2

Table 22. **USES AND RATINGS (0-5) OF USES FOR SOME SPECIALTY FOOD CROPS,** continued.
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control
OIL							
African oil palm	2	0	0	2	1	1	3
American oil palm	2	0	0	2	1	1	1
Coconut	5	3	3	4	1	1	1
Peanut	5	4	0	0	1	2	1
Soybean	5	3	0	0	1	1	1
SPICES							
Allspice	0	0	0	0	1	1	1
Black pepper	0	0	0	0	0	0	1
Clove	0	0	0	0	1	2	1
Nutmeg, mace	0	0	0	1	1	2	1
Vanilla	0	0	0	0	0	0	0
Sago	0	0	0	1	0	0	0
SUGAR							
Sugar cane	3	3	0	2	1	1	3
Sugar palm	3	0	0	2	1	1	1

PLANTS FOR MEDICINAL PURPOSES

There are a very large group of plants that are used for all kinds of medical purposes in the tropics. Several problems exist in the use of such plants including the validity of the usages, the presence of a mixture of substances, the variation from plant to plant, and the difficulty of adjusting dosages. While recognizing the importance of such plants, they are far beyond the scope of this publication. Return to Top

PLANTS FOR FEEDING ANIMALS

Feed Grasses:

The tropics are favored by many excellent grasses for forage and for cut feed. The grass selected will depend on many factors, including the level of management to be given. The literature on this subject is very extensive. Introduction of an improved grass variety and good pasture management can greatly improve animal production.

Figure12. Napier grass (Pennisetum purpureum), useful for forage. Photo by Tim Motis.

Table 23. **A COMPARISON OF SOME OF THE SPECIES OF GRASS USED FOR ANIMAL FEED.**

Common Name	Species Name	Annual or Perennial	Propagation	Growth Habit	Adaptation		
					Temp.	Flood	Dry
Bermuda	*Cynodon dactylon*	perennial	cuttings	spread grass	hot	no	some
Guinea	*Panicum maximum*	perennial	seed, cuttings	clump grass	hot	some	some
Kikuyu	*Pennisetum clandestinum*	perennial	cuttings	spread grass	cool to warm	no	some
Napier	*Pennisetum purpureum*	perennial	seed, cuttings	tall grass	hot	yes	no
Pangola	*Digitaria eriantha*	perennial	cuttings	spread grass	hot	some	some
Star	*Cynodon nlemfuensis*	perennial	cuttings	spread grass	hot	no	some
Sudan	*Sorghum bicolor* subsp. *drummondii*	annual	seed	tall grass	hot	no	some

Table 24. **USES AND RATINGS (0-5) OF USES FOR SELECTED GRASS SPECIES.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Species Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control
Bermuda	*Cynodon dactylon*	0	5	0	0	0	0	4
Guinea	*Megathyrsus maximus*	0	4	0	1	0	0	2
Kikuyu	*Pennisetum clandestinum*	0	5	0	0	0	0	4
Napier	*Pennisetum purpureum*	0	5	0	2	1	0	4
Pangola	*Digitaria eriantha*	0	5	0	0	0	0	4
Star	*Cynodon nlemfuensis*	0	5	0	0	0	0	4
Sudan	*Sorghum bicolor* subsp. *drummondii*	0	5	0	2	1	0	1

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Feed Legumes:

Legumes are especially valuable for feeding animals because of their high nutritional value. They are seldom used alone but in mixtures with grasses. Such mixed pastures are often used in the temperate zone to increase the nutritional value of grass diets for animals. In the tropics, however, it is especially difficult to establish stable mixtures. Indeed, it has often been said

Figure13. Apple Ring Acacia (Faidherbia albida), often intercropped with grain crops. Photo by Tim Motis

that the tropics lack a good clover or equivalent. There are some special exceptions to this rule, and perhaps the best of these are leguminous, nitrogen fixing trees, often of but not confined to desert regions. Some of these trees are weedy and their introduction can have widespread ecological effects.

Table 25. **A COMPARISON OF TROPICAL FEED LEGUMES.**

Common Name	Species Name	Annual/ Perennial	Propagation	Growth Habit	Adaptation		
					Temp.	Flood	Dry
Apple ring acacia	*Faidherbia albida*	perennial	seed	tree	hot	no	some
Centro	*Centrosema pubescens*	perennial	seed	vine	hot	no	some
Jack bean	*Canavalia ensiformis*	annual	seed	bush	hot	no	some
Leucaena	*Leucaena* spp.	perennial	seed	tree	hot	no	yes
Mesquite	*Prosopis* spp.	perennial	seed	tree	hot	no	yes
Mother-of-cacao	*Gliricidia sepium*	perennial	seed, cuttings	tree	hot	some	some
Prickly sesban	*Sesbania bispinosa*	perennial	seed	shrub	hot	no	some
Spanish tick-clover	*Desmodium uncinatum*	perennial	seed	vine	hot	no	some
Tropical kudzu	*Pueraria phaseoloides*	perennial	seed	vine	hot	some	some
Umbrella thorn	*Acacia tortilis*	perennial	seed	tree	hot	no	yes

Table 26. **USES AND RATINGS (0-5) OF USES FOR SELECTED LEGUMES.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control
Apple ring acacia	0	5	0	3	3	4	3
Centro	0	4	0	0	0	4	4
Jack bean	1	3	0	0	0	2	2
Leucaena	4	4	0	2	4	4	3
Tropical kudzu	0	4	0	0	0	3	4

Table 26. **USES AND RATINGS (0-5) OF USES FOR SELECTED LEGUMES,** continued.
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control
Mesquite	2	5	0	3	4	3	4
Mother-of-cacao	2	3	0	3	3	3	3
Prickly sesban	2	3	0	3	3	3	3
Spanish tick-clover	0	4	0	0	0	4	4
St. John's bread	4	5	0	2	4	2	2
Umbrella thorn	0	4	0	4	4	4	4

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Other Feed Plants:

The number of other feed plant species in the tropics is very high but few if any of these can compare to grasses or legumes in forage value.

PLANTS FOR SUPPLEMENTAL HUMAN NEEDS

Fibers:

Few tropical small farms will produce their own fiber, but many will produce fiber as a crop to sell. There are many good fiber crops available. Some weeds are used as fibers.

Figure14. Jute (Corchorus spp.), used to produce fiber for making twine, cloth, and burlap. Photo by Tim Motis

Table 27. **A COMPARISON OF FIBER CROPS.**

Common Name	Species Name	Annual or Perennial	Growth Habit	Adaptation				Other Uses
				Temp.	Daylength	Flooding	Drought	
Cotton	*Gossypium* spp.	annual	large herb	hot	neutral	no	no	stuffing
Hemp	*Cannabis sativa*	annual	large herb	warm-hot	neutral	yes	no	yes
Jute	*Corchorus capsularis*	annual	herb	hot	neutral	no	no	cord
Kapok	*Ceiba pendandra*	perennial	tree	hot	neutral	no	no	stuffing
Kenaf	*Hibiscus* spp.	annual	herb	hot	longday	no	no	cord, leaves
Mahoe	*Hibiscus tiliaceus*	perennial	tree	hot	neutral	yes	yes	no
Abaca	*Musa textilis*	perennial	large herb	hot	neutral	some	no	cord
Ramie	*Boehmeria nivea*	annual	herb	hot	longday	no	no	cord
Sisal	*Agava sisalana*	perennial	herb	hot	neutral	no	yes	cord

Table 28. **USES AND RATINGS (0-5) OF THE USES OF SELECTED FIBER CROPS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control
Cotton	3	3	5	0	2	0	1
Hemp	1	0	1	0	0	0	1
Jute	2	1	3	1	0	0	0
Kapok	2	1	2	1	2	0	0
Kenaf	1	1	2	0	0	0	1
Mahoe	2	1	2	1	2	0	0
Manila hemp	0	0	2	0	0	0	1
Ramie	1	1	3	0	1	0	1
Sisal	1	0	2	0	0	0	1

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Materials for Thatching and Weaving:

The list of materials used for weaving and thatching would be very long. It would also vary from place to place; for any given area, many locally occurring plants are used for this purpose. Grasses are often abundant, and reeds of various kinds are also often available. Palm leaves in the entirety of their leaflets are very common weaving and thatching materials.

Other Materials for Making Clothes:

Cloth has often been made in the tropics by beating other fibers of a selected plant, usually the cortex, until the fibers become a thin sheet of what could be called vegetable felt. Some of the plants are as follows:
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Table 29. **A COMPARISON OF OTHER MATERIALS FOR MAKING CLOTHES.**

Common Name	Species Name	Growth Habit	Propagation	Adaptation
Baobab	*Adansonia digitata*	large tree	seeds	dry savannahs
Mahoe	*Taliparitiliaceum*	medium tree	seeds, cuttings	wet tropics
Paper mulberry	*Broussonetia papyrifera*	large shrub	seeds, cuttings	wide climatic adaptation

Timber and Useful Woods:

The tropics have some excellent timber trees that need years for production and thus are not very feasible for the small farm.

Figure 15. Mahogany (Swietenia spp.) bark and leaves. A valuable timber species now regulated by international trade laws. Photo by Tim Motis

Table 30. **USES AND RATINGS (0-5) OF USES FOR TROPICAL LUMBER-PRODUCING SPECIES.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Species Name	Food	Feed	Fiber	Construction	Fuel	Soil Amend.	Erosion Control
African-teak	*Pericopsis elata*	0	0	0	5	5	4	2
Bamboo	*Bambusa* spp, others	2	2	0	4	3	0	4
Intsia	*Intsia* spp.	0	0	0	5	5	4	2
Mahogany	*Swietenia mahagoni*	0	0	0	5	4	0	2
Monkey pod	*Samanea saman*	1	3	0	4	4	2	1
Narra	*Pterocarpus indicus*	0	0	0	4	4	4	2
Rosewood	*Dalbergia* spp.	0	0	0	3	4	3	2
Teak	*Tectona grandis*	0	0	0	5	4	0	2
Tropical pines	*Pinus* spp.	0	0	0	5	5	1	2

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Fuel Woods:

Many trees, if not all, can be used as sources of fuel. In this table, only the species for the hot, humid tropics are emphasized. In most parts of the tropics, wood is not used as a source of heat for the house itself. Rather, it is used only for cooking and baking. Small caliber, soft wood burns rapidly; however, dense wood burns hotter and longer for cooking. There is a great need to include fuel wood as a component of almost every small farm. When possible, farm fuel wood can be produced from the prunings of living fences and alley cropping trees.

Figure 16. Wood harvested from small woodlot (mostly Leucaena leucocephala) at ECHO. Photo by Tim Motis.

Table 31. **USES AND USE RATINGS (0-5) OF COMMON FUEL WOODS OF THE HOT HUMID TROPICS.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Species Name	Food	Feed	Construction	Fuel	Soil Amend.	Erosion Control	Other
Agati	*Sesbania grandiflora*	2	4	1	4	4	4	pulp
Batai	*Falcataria moluccana*	0	0	3	4	5	5	pulp
Bracatinga	*Mimosa scabrella*	1	1	1	4	4	4	pulp
Calliandra	*Calliandra calothyrsus*	0	5	2	5	5	5	honey
Capulin	*Muntingia calabura*	1	0	0	3	3	1	
Casuarina	*Casuarina equisitefolia*	0	0	4	5	1	4	pulp
Derris	*Derris indica*	0	3	3	5	5	1	insect
Earleaf acacia	*Acacia auriculiformis*	0	0	1	4	4	1	pulp
Gmelina	*Gmelina arborea*	0	0	3	4	1	2	honey
Guacima	*Guazuma ulmifolia*	3	3	3	4	1	2	
Guava	*Psidium guajava*	5	4	3	5	1	1	
Gumbo limbo	*Bursera simaruba*	0	0	2	4	1	1	fence
Honduras pine	*Pinus caribaea*	0	0	5	4	1	3	
Leucaena	*Leucaena leucocephala*	3	5	2	3	5	4	
Mahoe	*Taliparitі tiliaceum*	2	0	3	3	1	3	
Mindanao gum	*Eucalyptus deglupta*	0	0	4	4	1	1	beauty
Mother cacao	*Gliricidia sepium*	2	4	3	4	5	4	fence
Musizi	*Maesopsis eminii*	1	2	3	4	1	1	
Prickly sesban	*Sesbania bispinosa*	0	2	4	1	4	4	gum
Red gum	*Eucalyptus camauldulensis*	0	0	4	4	1	1	
Red mahogany	*Eucalyptus pellita*	0	0	5	4	1	1	
Seagrape	*Cocoloba uvifera*	2	0	3	5	1	3	beauty
Timor white gum	*Eucalyptus urophylla*	0	0	3	4	1	1	

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PLANTS FOR THE FARM ITSELF: CROPS TO CONSERVE OR IMPROVE THE SOIL

Nitrogen Fixing Trees:

Any plant that can add nitrogen to the soil in a chemically fixed, plant available form is especially valuable on the small farm. While plants of many families can do this, the ability is especially well developed among the legumes. The tropics are rich in nitrogen-fixing trees, and many of these are useful for multiple purposes such as animal feed, construction and fuel woods, alley cropping, and even minor food uses. **Warning!** Many of these trees are "weedy" (i.e. can become nuisance) and can cause serious ecological problems, not only by replacing other vegetation but by mining ground water and thus lowering water tables. Therefore, widespread introduction is not recommended unless precautions are taken to avoid the development of new problems. Practices such as pruning hedgerows (e.g. *Leucaena* spp.) can limit seeding. Some of the best of these trees are mentioned below.

Figure 17. Leucaena (Leucaena leucocephala), a fast-growing and multi-purpose leguminous tree. Photo by Tim Motis.

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Table 32. **COMPARISON OF NITROGEN-FIXING TREES.**

Common Names	Species Name	Some Uses	Adaptation
Apple-ring acacia	*Acacia albida*	multipurpose, animal feed	hot, dry tropics
Calliandra	*Calliandra calothyrsis*	multipurpose, fuelwood	wet tropics
Casuarina	*Casuarina* spp.	lumber, windbreak	intermediate tropics
Coral beans	*Erythrina* spp.	multipurpose, crop shade	wet tropics
Egyptian acacia	*Acacia nilotica*	multipurpose, alley cropping	hot, dry tropics
Leucaena	*Leucaena leucocephala*	multipurpose, alley cropping	intermediate tropics
Mother-of-cacao	*Gliricidia sepium*	multipurpose, live fence	intermediate tropics
Sesban	*Sesbania grandflora*	multipurpose, feed, food	intermediate tropics
Siamese acacia	*Senna siamea*	multipurpose, fuel, hardwood	intermediate tropics
Tagasaste	*Chamaecytisus prolifer* var. *palmensis*	multipurpose, alley cropping	tropical upland

Miners of Deeply Placed Minerals:

It is generally supposed, usually without rigorous proof, that deeply rooting trees, and this often includes very large trees and trees adapted to the hot, dry tropics, can obtain minerals available at deep levels of the soil that cannot be reached by shallow-rooted plants. As leaves fall from the deeply rooted trees, these minerals are then released to the soil and can be used by the shallower rooting plants. It is not possible at this time to produce a good list of such plants, but they are believed to be common. Return to Top

Manure Crops:

Manure crops are those that are planted specifically to produce a large amount of green or dry material that may be mixed into the soil to improve its fertility and texture. Such crops are often equally useful in suppressing weeds, or they may be used as temporary ground covers. They are planted from seeds. All of the plants mentioned in this chart can be used as feed for animals. However, feeding them to livestock limits their effectiveness as green manures and

Figure 18. Pods (not edible) of Velvet Bean (Mucuna pruriens), a green manure commonly intercropped with corn.

cover crops. The distinction between green manures and cover crops is minimal, and often the two words are used interchangeably. The following definitions show the difference in emphasis of the two terms. Green manure crops are those grown for the purpose of incorporation into the soil when the plant is fresh and green (thus high in nitrogen), resulting in soil enrichment and a greater water holding capacity. Ground cover crops grow vigorously to outcompete weeds and provide a good soil covering and mulch. These crops are also good for soil improvement and erosion prevention. Return to Top

Table 33. **A COMPARISON OF MANURE CROPS FOR THE SMALL FARM.**

Common Name	Species Name	Growth Habit	Adaptation
Calopo	*Calopogonium mucunoides*	trailing vine	hot, humid tropics
Cowpea	*Vigna unguiculata*	bush or vine	intermediate tropics
Indigo	*Indigofera* spp.	herbs	hot, wet tropics
Jackbean	*Canavalia ensiformis*	bushy herb	hot, wet tropics
Sunnhemp	*Crotalaria juncea*	tall herb	intermediate tropics
Velvet bean	*Mucuna spp.*	trailing vine	tropics

Borders Against Erosion:

These important crops, chiefly grasses, are capable of growing under adverse conditions. By virtue of their deep roots and extensive vegetative growth, they serve as barriers to erosion, filtering soil being carried away from the running water, and often resulting in the filling in of deep erosion channels with collected soil.

Table 34. **USES AND RATINGS (0-5) OF USES OF SOME BORDERS AGAINST EROSION.**
0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Species Name	Alley Crop	Nitrogen Fixing	Ground Cover	Erosion Control	Mulch	Wind Break	Shade
Lemon grass	*Cymbopogon citratus*	2	0	1	4	2	0	0
Napier grass	*Pennesitum purpureum*	1	0	0	5	2	0	0
Vetiver	*Chrysopogon zizaniodes*	1	0	3	3	3	0	0

Mulch:

Mulch is especially useful around crop plants to protect against loss of moisture, to reduce the temperature at the ground level, and to slowly release nutrients to the soil. No comprehensive list of such plants can be developed, for mulch is usually obtained from whatever plants are available, including the residues of crops. Casuarina is a very good source of mulch. Return to Top

Cover Crops:

Ground covers must be distinguished from green manure crops on the basis of purpose. Some of the same species are used for both purposes. Ground covers protect the soil from erosion and intense sunlight. They also shade out weeds and can improve the aesthetic value of the land. They may be established from seed or cuttings as short- or long-term plantings. Some species of weeds (e.g. shade-loving) may flourish under long-term ground covers. Nevertheless, ground covers can be extremely useful, work-reducing plants. Return to Top

Figure 19. Lablab Bean (Lablab purpureus) vines covering the ground. Photo by Tim Motis

Table 35. **ADAPTATION AND RATINGS (0-5) OF USES OF SOME OF THE PRINCIPAL SPECIES USED FOR COVER CROPS.** 0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Species Name	Adapt*	Propagation	Nitrogen Fixation	Ground Cover	Erosion Control	Mulch
Desmodium	*Desmodium* spp.	W	seeds	4	3-5	3-5	3
Indigo	*Indigofera* spp.	I,W	seeds	4	5	5	3
Jack bean	*Canavalia ensiformis*	I,W	seeds	4	4	3	3
Kudzu	*Pueraria phaseoloides*	W	seeds	4	5	5	2
Lablab bean	*Lablab purpureus*	I,W	seeds	4	1-5	1-5	2
Perennial peanut	*Arachis* spp.	I	seeds, cuttings	4	4-5	5	2
Perennial soybean	*Neonotonia wightii*	I,W	seeds	4	5	5	3
Sarawak-bean	*Vigna hosei*	I,W	cuttings	4	5	4	5
Velvet bean	*Mucuna pruriens*	I,W	seeds	4	5	5	3

*Key to adaptation: D = dry tropics, I = intermediate tropics, W = wet tropics

PLANTS FOR THE FARM ITSELF: CROPS TO MODIFY THE CLIMATE

Windbreaks:

A good windbreak should be tall but not spreading. It should be comprised of trees with roots that penetrate the soil vertically and that do not extend far horizontally. Furthermore, such trees should not spread as weeds or become difficult to control and manage. There are few such trees. Return to Top

Table 36. **COMPARISON OF WINDBREAK PLANTS.**

Common Name	Species Name	Tree Form	Other Uses	Disadvantages
Casuarina	*Casuarina* spp.	tall, narrow	excellent wood mulch	some species spread by root shoots
Indian coral tree	*Erythrina variegata*	tall, very narrow	mulch, feed, alley cropping	
Swamp mahogany	*Eucalyptus robusta*	large, spreading	lumber, wood pulp	bulky nature
Tamarisk	*Tamarix* spp.	large, spreading	mulch, erosion control	bulky nature

Plants for Shade:

Shade is often needed on the small farm, not only for comfort around the home, but also for the same purpose over animal cages. In addition, a few crop plants, especially coffee, cacao, and vanilla are grown under shade. Shade can be obtained from trees themselves or from vines grown on trellises. A few tropical trees lose their leaves

Figure 20. Madre de Cacao (Gliricidia sepium), traditionally grown to shade cocoas. Photo by Tim Motis

during the dry season. Others can be pruned during winter to permit more light to enter and to utilize the excess growth as fuel, wood, or mulch. The list of plants used for shade would be excessively large. Yet, with repect to trees that provide shade to other crops, a few names of prominent genera can be mentioned: *Inga, Erythrina, Gliricidia,* and *Sesbania*. Return to Top

PLANTS FOR THE FARM ITSELF: OTHER SPECIAL PURPOSE PLANTS

Living Fences:

Living fences can be of great value in the tropics where termites abound and rapidly devour fence posts or iron posts rust rapidly. The ideal fence post is one that can be planted as a large cutting that can be strung with wire or animal fencing immediately, and quickly roots, and which can then be used for other purposes as well. However, a few fences are constructed as plants side-by-side without the use of wire. Hundreds of creative variations can be used. Return to Top

Figure 21. Cuttings of Gliricidia sepium planted to form a living fence. Photo by Tim Motis.

Table 37. **ADAPTATION AND RATINGS (0-5) FOR MULTIPLE USES OF SOME OF THE BETTER LIVING FENCES OF THE TROPICS.** 0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Species Name	Adapt*	Alley Crop	Nitrogen Fixation	Erosion Control	Mulch	Windbreak	Shade
Babul acacia	*Acacia nylotica*	D	3	4	3	1	1	1
Basul	*Erythrina edulis*	I,W	1	4	2	2	2	2
Gumbolimbo	*Bursera simaruba*	D,I	1	0	1	1	1	1
Hedge cactus	*Cereus hildmannianus*	D	0	0	0	0	2	0
Horseradish tree	*Moringa oleifera*	I	4	0	1	2	0	1
Izote	*Yucca guatemalensis*	I,W	1	0	2	0	0	0
Mahoe	*Talipariti tiliaceum*	W	1	0	3	2	3	3
Mother cacao	*Gliricidia sepium*	I	3	4	3	3	0	2
Palmillo	*Dracaena fragrans*	W	1	0	1	0	1	0
Pencil tree	*Euphorbia tirucalli*	D	0	0	2	1	0	0
Pito	*Erythrina berteroana*	W	4	5	3	2	1	1
Tree tobacco	*Acnistus arborescens*	I	1	0	1	1	1	0
Tuna (prickly pear)	*Opuntia* spp.	D	0	0	2	0	0	0

*Key to adaptation: D = Dry tropics, I = intermediate, W = wet tropics

Plants for Alley Cropping:

As a system for crop production in the tropics, especially on hillsides, alley cropping appears promising. Some excellent plants are available, and there can be no doubt of the importance of this area of development. Unless a particular species for making the alley has been selected already in a particular region, local trial and error is always desirable. Some of the species used for alley cropping have proved to be weedy. Care must be exercised to avoid such long-term ecological damage. Frequently, hedge-row species are chosen that produce some valuable product. Alley cropping is less effective in semi-arid regions due to competition with crop plants for moisture. Return to Top

Figure 22. Ground being prepared for planting corn in alleys between rows of pruned Leucaena (Leucaena. leucocephala) trees in Haiti. Photo by Tim Motis.

Table 38. **ADAPTATION AND RATINGS (0-5) OF USES OF SOME OF THE PRINCIPAL SPECIES USED FOR ALLEY CROPPING.** 0=none of the characteristic; 5=the maximum expression of the characteristic

Common Name	Species Name	Adapt*	Alley Crop	Nitrogen Fixing	Erosion Control	Mulch	Wind-Break	Shade
Agati	*Sesbania grandiflora*	I	5	3	4	2	1	1
Egyptian acacia	*Acacia nilotica*	D	5	5	2	2	4	4
Flemingia	*Flemingia macrophylla*	W	5	5	2	1	2	0
Horseradish tree	*Moringa oleifera*	I	4	0	1	2	0	1
Indian coral tree	*Erythrina variegata*	I,W	4	4	1	2	2	2
Leucaena	*Leucaena leucocephala*	I	5	5	2	3	1	1
Madre de cacao	*Gliricidia sepium*	I	4	4	2	3	1	3
Pito	*Erythrina berteroana*	I,W	4	5	3	2	1	1
Prairie acacia	*Acacia angustissima*	I,W	4	5	2	4	1	0
Pigeon pea	*Cajanus cajan*	I	5	4	3	3	0	0
Tagasaste	*Chamaecytisus prolifer*	U	5	4	2	3	0	0

*Key to adaptation: W = hot wet tropics, U = upland tropics, D = dry tropics, I = intermediate, neither too wet nor too dry.