RELOCATING PLANTS FROM SWIDDEN FALLOWS TO GARDENS IN SOUTHWESTERN CHINA[1]

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Key Words: plant transfer; fallow forests; house gardens; smallholder farmers; Xishuangbanna; Hani; China.

Throughout Southeast Asia smallholder farmers are losing access to forests and the resources those forests hold. Some farmers who live at the edges of mature forests have lost rights to harvest products when these areas were declared nature or wildlife reserves by the state; others have seen their forests fall to the logger's ax. As swidden-fallow cultivation systems are replaced by permanent agriculture in many areas of Southeast Asia, many villagers are also losing access to important resources from secondary growth or swidden-fallow forests. Smallholders have traditionally harvested non-wood forest products for family consumption, for trade, and for cash from their fallow forests (Fujisaka, Escobar, and Veneklaas 1997; Hgde et al. 1996). With few forests or swidden-fallows remaining in some areas, villagers are increasingly relocating many useful species that once grew in fallow forests into their house gardens.

These house (home) gardens usually combine multipurpose trees, shrubs, herbs, grasses, and livestock in a limited space. Although they have often been overlooked by agricultural scientists, house gardens have long been described as important agroecosystems by anthropologists, economic botanists, geographers, and other researchers. House gardens serve many purposes and fill many needs of small farmer households. They are typically productive throughout the year, provide a wide variety of products, often contribute significantly to household incomes, serve as areas for experimentation and observation of recently acquired species, harbor very high levels of economically important and often threatened biological diversity, and are very conveniently located, saving the household time

[1] Received 22 August 2002; accepted 30 January 2003.

and exertion (Fernandes and Nair 1986; Gajaseni and Gajaseni 1999; Mendez, Lok, and Somarriba 2001; Michon and Mary 1994; Soemarwoto 1987). In this article we will show how house gardens in one area of Southeast Asia are increasingly used to relocate economically important swidden-fallow plants for eventual consumption and sale.

It is well known that the plants and animals of house gardens may have different origins. In most regions, most are domesticated species planted or reared in the garden. Researchers have mentioned that, "wild" or spontaneously-occurring plants often play important roles in agricultural systems (Guijt, Hinchcliffe, and Melnyk 1995), there has however, been little focus on the practice of transferring plants from fallow forests to gardens. This process, we believe, has long been an important one and is increasingly important as the pressures of population growth, rural policy changes, and setting aside of nature reserves change both rural landscapes and the livelihoods of peoples throughout montane mainland Southeast Asia (Guo 1994). The practice of relocating plants from forests to gardens is also of growing conservation importance as house gardens become sites for preserving threatened species.

Experts acknowledge that most of the world's biodiversity is found outside of protected areas and more attention needs to be paid to conserving species in human-managed systems (Brookfield and Padoch 1994). In this article we will present information about a way in which smallholder farmers contribute to conservation while satisfying their economic needs. We report on the management of forest species in the house gardens of farmers in Daka in the Xishuangbanna Dai Autonomous Prefecture, southern Yunnan Province, China. We have spent more than seven years studying the biological diversity and the agroecosystems of Daka, one of a network of villages that have served as research and demonstration sites of the international United Nations University Project on People, Land Management and Environmental Change (Brookfield 2002).

Materials and Methods: Study Site

The Xishuangbanna Dai Autonomous Prefecture (Fig. 1) is characterized by both cultural and biological diversity. The agroecosystems of the region strongly reflect this dual richness. Among the distinctive land use types are swidden-fallow systems traditionally practiced by several ethnic minority peoples including the Hani, Jinuo, and Bulang nationalities (Pei 1982). The Hani are known in nearby areas of Thailand as the Akha. In Xishuangbanna, they form almost 20% of the total population and numbered about 161 543 people in 1999. Most individuals of the Hani nationality live in villages in the mountainous areas of Genanghe, Xiding, and Bada townships, Menghai county, as well as in the townships of Mangguoshu and Yiwu, Mengla county, and in the towns of Mengsong and Jinghong in Xishuangbanna. They are believed to have migrated from the north and arrived in Xishuangbanna over 1000 years ago. The Hani, like other groups in the region, may have chosen to farm the higher, mountainous areas to escape the malaria of low-lying valleys (Yang 1992).

The close relationship of the Hani with forests through history is reflected in their rich knowledge of forest resources and their management. Researchers have described a number of Hani forest-related activities including collecting of non-wood forest products, hunting, swidden-fallow cultivation, as well as the practice of planting tea under natural forest cover (Xu and Pei 1997; Yin 1994). The Hani have traditionally harvested wood, fuelwood, medicines, and foods for family consumption from forests, with the surplus quantities used for exchange and trade. Hani households have also long relied on house gardens as a source of their daily necessities (Long 1993).

Daka is a Hani village located in Menglun town, Mengla county, Xishuangbanna Prefecture. The most recent census recorded 304 people in 53 families in the village. Daka is located about eight kilometers from the town of Menglun and 10 kilometers from the Menglun State Nature Reserve, at approximately 21°41′N, 101°25′E. The average daily temperature in Daka ranges from 21.5°C to 10°C; rainfall averages 1563 mm per year. The prevailing soils are leached red earths. The original vegetation in the Daka area is tropical seasonal rainforest, now long managed by humans.

Field Methods

In order to assess the importance of the practice of transferring plants between fallows and house gardens in Daka, we carried out a series

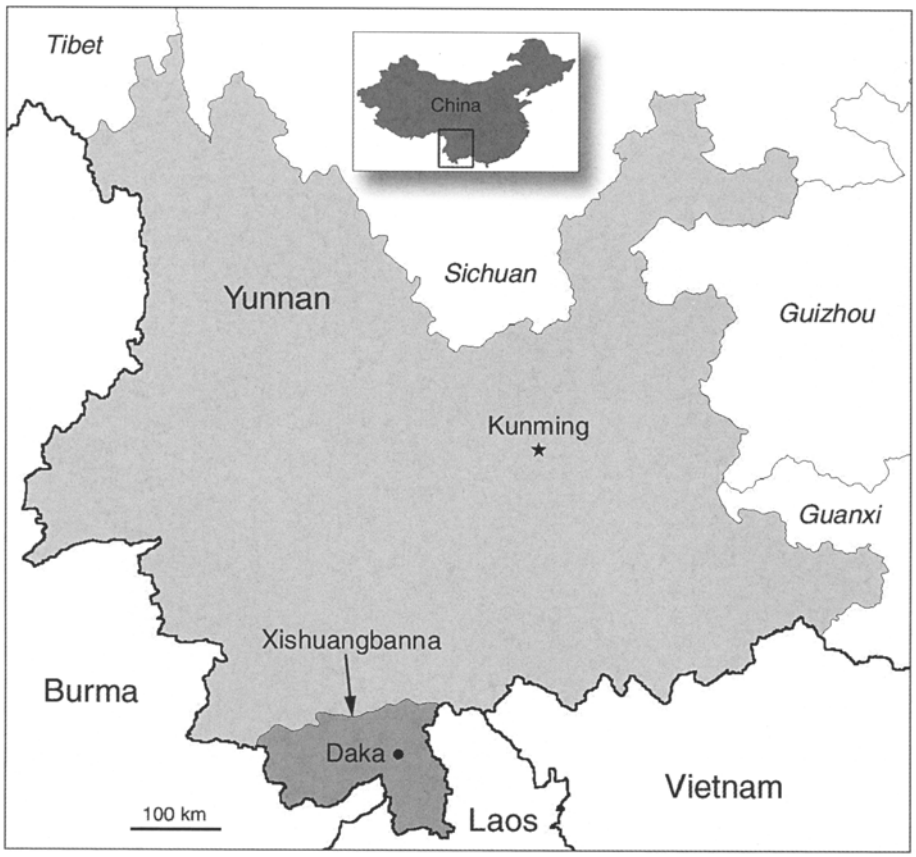

Fig. 1. The study area, Daka, in southernmost Yunnan Province, China.

of inventories and interviewed local households. We made five plots of (10 × 10 m) in swidden fallows of different ages in 1999. Two additional (10 × 10 m) plots were made in more mature (17 and 33 year-old) fallow forests that were considered community property. We used agro-biodiversity assessment methods commonly employed by the PLEC project (Zarin Guo and Enu-Kwen 1999). In these plots we inventoried all plant species, including useful species (Appendix 1). We also made complete inventories of house gardens belonging to nine Daka families following the household-based agro-biodiversity assessment (HH-ABA) methods discussed by Guo and others (Guo et al. 2000). All utilized species have their voucher specimens deposited at the herbarium of the Xishuangbanna Tropical Botanical Garden (HITBC).

To gain further information on the community and its population, we selected 30 households (or 60% percent of the households of Daka) for semi-structured interviews, using a questionnaire but at times departing from it to explore other questions. The interviews and questionnaires sought to assess the general socio-economic situation of the whole village, their income resources, and the income generated by swidden-fallow forest products for the three years, 1998 to 2000.

Results

Plant Use in Swidden Fallows and House Gardens

Fallow forests are important sites for the collection of fuelwood and construction materials for Daka households. These secondary forests also provide fruits, medicines, and wildlife habitats. The diversity of plant species in one and two-year old swidden fallows is high, although these stands are largely dominated by a few weedy species, especially *Chromolaena odorata*

TABLE 1. NUMBER AND PERCENTAGE OF UTILIZED SPECIES OF FALLOW FORESTS AND HOUSE GARDENS AT DAKA.

Sample plots	Area (m^2)	Number of all species	Number of utilized species	Percentage (%)
Fallow forests of different ages				
1-year	100	21	16	76.2
2-year	100	30	15	50.0
4-year	100	16	10	62.5
5-year	100	17	13	76.5
6-year	100	22	19	86.4
17-year	100	33	24	72.7
33-year	100	35	19	54.3
Sum of fallow forests	700	114	76	66.7
Sampled house gardens				
No. 1	240	51	38	74.5
No. 2	144	41	20	48.8
No. 3	340	35	27	77.1
No. 4	423	65	61	93.8
No. 5	151	45	39	86.7
No. 6	105	44	35	79.5
No. 7	240	32	24	75.0
No. 8	84	29	20	69.0
No. 9	65	32	28	87.5
Sum of house gardens	2092	165	126	76.4
Total	2782	237	180	75.9

(L.) R.M.King & H.Rob. and *Solanum coagulens* Forsk. There are also many young trees and shrubs including *Measa indica* A. DC and *Albizia lucidior* (Steud.) I. Nielsen in early fallows; these plants provide households with a variety of wild vegetables and ethnomedicines (Table 1). In four to six-year fallow forests, we found that other species such as *Mallotus macrostachys* Muell-Arg. and *Macaranga denticulata* Muell.-Arg. had replaced *Chromolaena odorata.* These forests begin to be important areas for fuelwood collection, while continuing to provide species used for food. Mature fallows, represented in our study by the 17 and 33-year old forests are considered to be community property and provide wood for construction. Smallholders used the wood of *Machilus rufipes* H. W. Li to build houses. However, according to their traditions, they prefer *Paramichelia baillonii* Hu for making coffins.

A diversity of wild vegetables is collected from swidden fallows. The economic importance of this activity varies temporally with the season and the phenology of the plant. For example, the collection time of *Solanum coagulens* Forsk. is from June to August, while *Bauhinia variegata* L. is collected for food from April to June. There are 76 species of plants collected from fallows of varying ages; these belong to 38 families and 64 genera. Most of the plants are used for household consumption. Many, if available in abundance, are also transported to local markets and sold. Of useful plants, the highest number of species we inventoried are used as medicines, followed by species used for wood, foods, and animal fodder (Table 2).

House gardens in Daka differ considerably, as is common in communities around the world (Padoch and De Jong 1991). Each reflects the particular needs, interests, and history of the garden manager and the farming household. We observed great variation in plant species richness in house gardens of different farmers. The garden richest in species contained 65 species of plants, while the least diverse had 29 species. Examination of the percentage of utilized garden plants used by Daka householders also shows distinct differences. In one garden 93.8% of all the plant species encountered were useful, while

TABLE 2. PERCENTAGE OF UTILIZED PLANTS IN FALLOW FORESTS AND HOUSE GARDENS IN DAKA.*

	House gardens	Fallow forest	In both garden and fallows
Number of utilized species**	126	76	22
% used for specific purposes			
Medicines	48	46	77
Wood	4	26	18
Fruit	18	5	5
Ornamentals	13	4	9
Vegetables	22	11	14
Fuelwood	2	4	5
Fodders	5	4	5
Beverage base	2	3	5
Fibers	1	7	5
Barriers	3	1	5
Flavorings	8	4	5
Cereals	1	1	0
Nuts	1	1	0
Soil improver	0	1	0
Starch	2	1	0
Sugar	1	0	0
Broom	0	3	0

* Multi-purpose species are counted more than once.
** Data consolidated from 9 house garden plots and 7 fallow forest plots.

in another only 48.8% of all plants were reported as used (Table 1).

House gardens also differed in the classes of plants that were grown by the different farmers. Some smallholders regarded ornamental plants as worthless and seldom planted any. Others considered ornamentals to be an important household resource and included a variety in their house gardens. Some smallholders did not plant wild vegetables in their gardens; instead, they relied on collection of these plants from the fallow forests. Others chose to plant these wild vegetables to assure that the family found their supply easily. In fact, some smallholders stated that they realized that over-harvesting of some species from fallows was beginning to destroy the resources upon which they all depended and were determined to keep as many as possible in the garden.

Many species that are locally considered indispensable were observed making the transition from forest plants to the gardens of Daka farming households. These included some medicinals, edible plants, fruits, and ornamentals. We found Daka smallholders transferring *Phyllanthus emblica* L. from fallow forests to house gardens for its edible fruit and the bark that is an important flavoring for traditional dishes. Among local hunters, *Solanum verbacifolium* L. is important since it is used as an ingredient in gunpowder. It is one of the plants that is now cultivated in some gardens. Daka households also tend to cultivate a large number of species, *Euphorbia royleana* Boiss, *Euphorbia tirucalli* L., *Jatropha curcas* L., *Acacia farnesiana* Willd, and *Rudbeckia laciniata* L., as living fences or barriers.

The percentage of plant species found in house gardens that are used by farming households averages 75.2%, somewhat higher than the percentage of useful plants found in fallow forests (Table 2). These collections of useful species are produced both by protecting existing plants on the site when a new garden is made and by planting or transplanting useful plants. One approach is to bring in plants from swidden fallows. Examples of species that commonly follow that route of introduction are *Acacia pennata* Willd, *Cleome gynandra* L., and *Mentha haplocalyx* Briq.

Fruit tree species have commonly been brought in from gardens in nearby villages including those settled by another nationality, the Dai. Species that Daka villagers have obtained this way include *Carica papaya* L., *Psidium guajava* L., and *Citrus maxima* Merr. A third approach is to bring new species from local research institutions and extension agencies. Daka villagers acquired plants such as *Bougainvillea glabra* Choisy, *Euphorbia pulcherrima* Willd, and *Passiflora altebilobata* Hemsl. in that manner.

USEFUL PLANTS IN FALLOW FORESTS AND HOUSE GARDENS FOR SUBSISTENCE AND INCOME

Plants that are commonly transferred from fallows to house gardens include species that are rare and difficult to find, such as *Paramichelia baillonii* Hu, as well as those that are in great demand, such as *Acacia pennata* Willd, which is eaten frequently as a vegetable. There are two ways of transferring fallow species to gardens. Either seeds are collected from swidden fallows and planted into the garden, as is the case with *Paramichelia baillonii* Hu, or smallholders dig seedlings from fallow forests and transplant them into their gardens. This last method is often

carried out with species such as *Clerodendron japonicum* Sweet and *Oroxylum indicum* Vent. Our data showed that 22 species that are used by Daka farmers, or over 28% of such species that we encountered in fallows, are also found transferred into house gardens. Conversely, about 17% of the plant species we found in house gardens had been moved from fallow forests (Table 2). We have no exact data on how many of these are threatened in the wild. We do know, however, that many Daka house gardens, like similar areas throughout the tropics, are rich in trees and are sites for the conservation of threatened and even disappearing indigenous plant species (Backes 2001).

Considering classes of use, we found that plants used as medicines are the species most commonly collected by villagers from swidden fallows. The second most common use class, is that used for wood, with vegetables and fodders in third and fourth place. Similarly, medicines are also the most common use class found in house gardens. Smallholders in other areas reportedly also regard house gardens as very important sources of medicinal plants (Agelet, Bonet and Valles 2000). In the case of house gardens, the second most diverse class is vegetables. This contrasts with the fallows, where wood is the second most diverse class. Fruit and ornamental plants are the third and fourth largest class in house gardens, compared with the fallows, where vegetables and fodder occupy those positions, respectively. The vegetable plants in house gardens are largely used to meet daily family consumption needs. Among such prized and commonly eaten vegetables are the young leaves of *Acacia pennata* mentioned above. One plant of that species is regarded by local smallholders as equivalent in value to a water buffalo. As vegetable-rich swiddens are increasingly replaced by permanent monocultures or near-monocultures, the vegetables originating from both house gardens and remaining swidden fallows become very important in satisfying family food and particular nutritional needs (Caron 1995).

The rich knowledge that many Hani villagers have of forest and fallow species is an essential basis for relocating wild plants to house gardens. The class of plants most commonly transferred is medicinals; comprising about 77% of plants transferred from fallow forests to house gardens. Important species in this class are *Clerodendranthus spicatus* C. Y. Wu, *Amomum aurantiacum* H. T. Tsai & S. W. Zhao, *Ieis wattii* Baker, *Gynostemma pentaphylla* Makino, and *Bryophyllum pinnatum* (Lam.)Oken. Daka smallholders have long harvested these and other medicinal plants from their swidden fallows and other forests to treat colds, abdominal pain, as well as injuries and wounds. Now they are transferring these essential plants from their house garden for the convenience of having them available in cases of family sickness. Having a plant of *Gendarussa vulgaris* Nees easily available for treatment of injuries and falls is very important to many of those we interviewed.

TABLE 3. AVERAGE CASH INCOME PER HOUSEHOLD FROM SWIDDEN-FALLOW FORESTS IN DAKA.

Year	Total cash income (U.S. $)	Cash income from swidden fallow species	Percentage
1998	431.6	7.7	2%
1999	382.1	49.4	13%
2000	1029.6	147.6	14%
Average	614.4	68.2	10%

Multi-purpose plants also commonly find their way in into house gardens. For example, forest plants such as *Acacia farnesiana,* used as a barrier and an ornamental, is found in house gardens. Smallholders also transfer *Phyllanthus emblica* to house gardens to use as a fruit, medicine, and flavoring. Another multi-purpose species that is often transferred is *Oroxylum indicum* Vent., it is used as both vegetable and medicine. Most commonly, plants such as these that serve both as medicines and as additions to the family diet are found in both fallow forests and in house gardens and are candidates for relocation.

Plant species found in swidden-fallows not only satisfy the consumption needs of local smallholder families by providing food, medical plants etc., they also contribute to cash income needs. Daka households on average earned a cash income of US$68.20/smallholder/yr from the marketing of fallow forest products. This was about 10% of the average of cash income earned by Daka families over the past three years (Table 3). As more and more smallholders appreciate the demand that exists for wild vegetables in local markets, the percentage of cash income from this source is sure to increase.

CONCLUSIONS

The farmers of Daka village harvest woods, fuelwood, medicines, and foods directly from swidden fallow-forests for family consumption, with surpluses available for market. As the Hani of Xishuangbanna and similar rural groups throughout Southeast Asia cease their swiddening and lose access to forests of many kinds, they increasingly collect both seeds and seedlings from dwindling forests to grow them in house gardens. As has happened in many areas and many epochs in the past, wild species are transformed into cultivated or semi-domesticated ones. Many of the plants that are being relocated are rare; some are at least locally, if not regionally or globally, threatened with extinction. Moving these species from wild environments to protected house gardens may be an important way to ensure not only food security, and health care for poor households, but also to conserve economically important species in the region. This study provides yet another example of the multi-functionality of smallholder agriculture in the tropics. It is not only the plants, but also the rich indigenous knowledge of how to transfer and manage them in new protected environments that is valuable for future development and conservation in the rapidly changing Southeast Asia.

ACKNOWLEDGMENTS

The support of Global Environmental Facility and United Nations University Project on People, Land Management and Environmental Change (GEF/UNU/PLEC) for this study is gratefully acknowledged. We also thank Kevin Coffey for helping with references on standard use classifications and Berry Brosi for redrawing the map.

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APPENDIX 1: RESULTS OF RAPID INVENTORY OF USEFUL PLANTS IN SWIDDEN-FALLOWS AND HOUSE GARDENS OF DAKA, XISHUANGBANNA, YUNNAN, SW CHINA.

Scientific name	Local name	Utilized part	Usage	Fallow forest	House garden
Acacia farnesiana Willd.	ye ye bie	entire plant	barrier	#	#
Acacia pennata Willd.	Te bo wo niu	leaf	vegetable		#*
Acanthopanax trifoliatus Merr.	Jiu duo	leaf	vegetable		#
Acronychia pedunculata Miq.		root, leaf, fruit	ethnomedicine		#
Aglaonema commutatum Schott		entire plant	ornamental		#*
Albizia lucidior L.	ka sa	wood	wood	#	
Aleurites moluccana Muell.-Arg.	ha tong me nu me ha	seed, leaf, wood	ethnomedicine, wood	#	
Allium fistulosum L.	se buo	entire plant	flavoring		#*
Allium hookeri Thw.	tao gu	entire plant	vegetable		#*
Alpinia officinalis Hance	me pi	root	ethnomedicine		#*
Amaranthus spinosus L.	wo zhu wo niu	leaf, entire plant	vegetable, fodder, ethnomedicine		#
Amomum aurantiacum H. T. Tsai & S. W. Zhao	mi cai mi huo	fruit	ethnomedicine		#*
Amorphophallus konjac K. Koch		tuber	starch	#	
Ananas comosus Merr.	ba die	fruit	fruit		#*
Anneslea fragrans Wall.	xi sha	root, bark, wood	ethnomedicine, wood	#	
Arachis hypogaea L.		seed	vegetable	#	
Ardisia solanacea Roxb.	wo qie wo bie	leaf, fruit	vegetable, fruit		#
Artocarpus heterophylla Lam.	ma mi	fruit	fruit		#*
Artocarpus tonkinensis A. Chev. ex Gagnep	wo pie	fruit	fruit		#
Baccaurea motleyana Muell.-Arg.	xi xiu	fruit	fruit		#*
Bauhinia acuminata L.	dao piao	flower, leaf	vegetable, ornamental		#
Belamcanda chinensis DC		root	ethnomedicine		#*
Blumea balsamifera DC	o sa la ma	entire plant	ethnomedicine	#	#
Bougainvillea glabra Choisy	mui bui la ma	flower	ornamental, ethnomedicine	#	#
Brassica integrifolia O. E. Schulz	hao ba o nie	entire plant	vegetable		#*
Bryophyllum pinnatum (Lam.) Oken		leaf	ethnomedicine		#*
Cajanus cajan (L.) Millsp.	ha ma jia ha	seed, leaf, root	vegetable, fodder, ethnomedicine	#	
Callicarpa arborea Roxb.	neng a ha zha	root, leaf	ethnomedicine		#
Callicarpa bodinieri Levl.	sa ang	entire plant	ethnomedicine	#	
Camellia sinensis O. Ktze. var. assamica Kitam	lao bo	leaf	beverage base		#*
Canthium parvifolium Roxb.	ha da	leaf, root	ethnomedicine	#	#
Capsicum annuum L.	na pi	fruit	flavoring		#*
Capsicum frutescens L.	na pi	fruit	flavoring		#*
Carica papaya L.	de ma a ao	fruit	fruit, vegetable		#*

APPENDIX 1: CONTINUED.

Scientific name	Local name	Utilized part	Usage	Fallow forest	House garden
Cassia siamea L.		wood	fuelwood		#*
Castanopsis indica A. DC	zi li	seed	nut		#
Chisocheton siamensis Craib	bu nu	wood	wood	#	
Cryptocarya yunnanensis H. W. Li		wood	wood		#
Citrus maxima Merr.	se lei	fruit	fruit		#*
Citrus sinensis Osbeck	shi le	fruit	fruit		#*
Clausena dunniana Levl.	ha ke ka ma mi xie	root	ethnomedicine		#
Clausena emarginata Huang	shi le	fruit	fruit		#
Clematis menglaensis M. C. Chang	da o	entire plant	ethnomedicine	#	
Cleome gynandra L.		entire plant	ethnomedicine		#*
Crataeva uniloculeris Buch.-Ham.	ji bu	leaf, root	vegetable, ethnomedicine		#*
Clerodendranthus spicatus C. Y. Wu	mi suo mi du	entire plant	ethnomedicine		#*
Clerodendron bungei Steud.	buo luo chi	root, leaf, flower	ethnomedicine	#	#
Clerodendron japonicum Sweet	han wen de qie	entire plant, root, flower	ethnomedicine, ornamental		#*
Colocasia esculenta Schott	nu ma	tuber	starch		#*
Commelina communis L.	a mi mi qian	entire plant	ethnomedicine		#
Coriandrum sativum L.	ha suo	entire plant	flavoring		#*
Costus speciosus Sm.	me guang	root	ethnomedicine	#	
Crassocephalum crepidioides S. Moore	guan dong wei niu	leaf	fodder, vegetable	#	#
Cratoxylon cochinchinensis Blume	bu xu	wood, root, bark, leaf	fuelwood, wood, ethnomedicine	#	#
Cratoxylon formosum Dogelin	su qie su lu	leaf, wood, root, bark	ethnomedicine, wood, tea substitute	#	#
Crinum asiaticum L.		flower	ornamental		#*
Cucumis sativus L.	xie wo	fruit	vegetable		#*
Cucurbita moschata Duchesne	ma de	fruit	vegetable		#*
Cymbopogon citratus Stapf	wo bie	leaf, tuber	fodder, starch		#*
Dalbergia fusca Pierre	sa la	wood	wood	#	
Dichrocephala integrifolia (L. F.) Kuntze		entire plant	ethnomedicine	#	
Digitaria ciliaris (Retz.) Koeler	mi zi bo zi zi ma	entire plant	fodder, ethnomedicine	#	
Dioscorea glabra Roxb.	a te mu ha	root	ethnomedicine	#	
Dolichandrone cauda-felina Benth. & Hook.f	ma ye	flower	vegetable		#
Elaeocarpus varunua Buch.-Ham. ex Mast.		wood	wood	#	
Ensete glaucum Cheesman		leaf	fodder		#*
Eryngium foetidum L.	mo ha suo	leaf	flavoring		#
Erythrina indica Lam.		bark	ethnomedicine		#*
Euodia lepta Merr.	sa qian we	root, leaf	ethnomedicine	#	

APPENDIX 1: CONTINUED.

Scientific name	Local name	Utilized part	Usage	Fallow forest	House garden
Euphorbia hirta L.	pa be ya mo	entire plant	ethnomedicine	#	
Euphorbia pulcherrima Willd.	kao lu ye	flower, entire plant	ornamental, ethnomedicine		#*
Euphorbia royleana Boiss.	suo li	entire plant	barrier, ethnomedicine		#*
Euphorbia tirucalli L.		entire plant	ornamental, ethnomedicine		#*
Fagopyrum tataricum Gaertn	wo qie bie	seed, leaf	cereal, ethnomedicine		#*
Ficus auriculata Lour.	xi bu	leaf, fruit	vegetable, fruit		#*
Ficus callosa Willd.	wo ni qie	leaf	vegetable		#*
Ficus hirta Vahl	le gu ne le	root	ethnomedicine	#	
Ficus hispida L.f.	wo li	leaf, root, bark	fodder, ethnomedicine		#
Ficus vasculosa Wall. ex Miq		leaf	vegetable		#
Flacourtia ramontchii L' Herit	a pui	fruit	fruit	#	
Flemingia macrophylla Merr.	ni ha qi ni	root	ethnomedicine, soil improver	#	
Flueggea virosa Baill.	nu za	root, leaf	ethnomedicine	#	
Garcinia cowa Roxb.		fruit	fruit		#*
Gendarussa vulgaris Nees		entire plant	ethnomedicine		#*
Glochidion puberum Hutch.	a sa a na	entire plant	ethnomedicine	#	
Glycine max (L.) Merr.		seed	vegetable	#	
Gossypium hirsutum L.		fiber	fiber	#	
Grewia henryi Burret		fiber, root	fiber, ethnomedicine	#	
Gynostemma pentaphylla Makino		entire plant	ethnomedicine		#*
Hedychium coronarium Koenig		flower	flavoring, ornamental	#	
Hedyotis auricularia L.	ye zi	entire plant	ethnomedicine	#	
Helicteres angustifolia L.	bui xi xi sa	fiber, entire plant	fiber, ethnomedicine	#	
Hevea brasiliensis (Willd. ex A. Juss.) Muell.-Arg.	jia ge a bo	gum	latex		#*
Hibiscus schizopetalus Hook.f.		flower, root, leaf	ornamental, ethnomedicine		#*
Hibiscus syriacus L.	bo luo ye zang	flower	ornamental		#*
Homalium laoticum Gagnep.	qi xui ha	wood	wood	#	
Hymenocallis littoralis Salisb.		flower	ornamental		#*
Iris wattii Baker		entire plant, flower	ethnomedicine, ornamental		#*
Jatropha curcas L.	ma hong	entire plant, leaf, root	barrier, ethnomedicine		#*
Jatropha multifida L.		entire plant	ornamental		#*
Kaempferia galanga L.	tuo zi zi la	tuber, flower	ethnomedicine, ornamental		#*
Lactuca sativa L.	wo ha pa pe	leaf	vegetable		#*
Lygodium japonicum Sw.		entire plant, leaf	ethnomedicine, vegetable	#	#

APPENDIX 1: CONTINUED.

Scientific name	Local name	Utilized part	Usage	Fallow forest	House garden
Litchi chinensis Sonn.	bi hong	fruit	fruit		***#*
Lithocarpus fenestratus Rehd.	zi pia	seed, wood	nut, wood	#	
Litsea cubeba Pers.		fruit, root, leaf	flavoring, ethnomedicine		#
Litsea glutinosa C. B. Rob.	ju bu ne ne	root, leaf, wood	wood, ethnomedicine	#	
Lucuma nervosa A. DC	dan huangguo	fruit	fruit		#*
Luffa cylindrica (L.) M. Roem.	bie ba	fruit, seed, leaf	vegetable, ethnomedicine		#*
Lycopersicum esculentum Mill.	wo ma le me	fruit	vegetable		#*
Macaranga denticulata Muell.-Arg.	long pia pia guo	root, bark, wood	ethnomedicine, fuelwood, wood	#	
Macaranga kurzii Pax et K. Hoffm.	nao long sha	leaf	ethnomedicine		#
Machilus rufipes H. W. Li	bi ba ba ha	wood	wood	#	
Mallotus barbatus Muell.-Arg.	long pia pia sa	root, leaf	ethnomedicine	#	
Mallotus paniculatus Muell.-Arg.	pa pei jie	bark	fiber	#	#
Mangifera indica L.	jia wu	fruit	fruit		#*
Measa indica A. DC	jia mang	entire plant	ethnomedicine	#	#
Melastoma affine D. Don	bie chong na ma ha jia	fruit, entire plant, flower	fruit, ethnomedicine, ornamental		#
Melia toosanden Sieb. & Zucc.	chi mia mia ha	fruit, wood	ethnomedicine, wood	#	
Mentha haplocalyx Briq	A ji duo	leaf	flavoring, vegetable		#*
Millettia leptobotrya Dunn	Ne	wood, root, leaf	wood, ethnomedicine	#	#
Millettia pachycarpa Benth.	a me ke	fruit	ethnomedicine	#	
Momordica charantia L.	ka ha	fruit, root, leaf, flower	vegetable, ethnomedicine		#*
Morinda angustifolia Roxb.		root	ethnomedicine		#
Morus alba L.	wang guo mi wo	fruit, leaf, flower, fruit	fruit, ethnomedicine		#*
Musa nana Lour.	a lu na lie	fruit	fruit		#*
Musa sapientum L.	ba luo a ma	leaf, fruit	fodder fruit		#*
Mussaenda breviloba S. Moore		root, bark	ethnomedicine	#	
Mussaenda hossei Craib	nong ne men	root, leaf	ethnomedicine	#	
Nicotiana tabacum L.	ya huo	leaf	smoking material		#*
Oroxylum indicum Vent.		fruit, seed, bark	vegetable, ethnomedicine	#	
Oryza sativa L. var. spontanea Mat.		seed	cereal	#	
Paramichelia baillonii Hu	pang lan a bo	wood	wood	#	#
Passiflora altebilobata Hemsl.	xifanglian	entire plant	ethnomedicine		#*
Passiflora edulis Sims		fruit, flower	beverage base, ornamental	#	#
Passiflora gracilis Jacq.		entire plant	ethnomedicine	#	
Pericampylus glauca Merr.	ne ju qi ni	entire plant	ethnomedicine	#	
Phaseolus vulgaris L.	a bie	seed	vegetable		#*

APPENDIX 1: CONTINUED.

Scientific name	Local name	Utilized part	Usage	Fallow forest	House garden
Phoebe lanceolata Ness	pou zhi zhi su	wood	wood	#	
Phrynium placentarium Merr.		leaf	wrappage		#
Phyllanthus emblica L.	qi ca	fruit, bark	fruit, flavoring, ethnomedicine	#	#
Phyllanthus flexuosus Muell.-Arg.	xi qia	root	ethnomedicine	#	
Phyllanthus urinaria L.	niu zai	entire plant	ethnomedicine	#	#
Pisum sativum L.	chou du	seed, leaf	vegetable		#*
Pithecellobium clyperia Benth.	mia sha	root	ethnomedicine	#	#
Plantago erosa Wall.	die ma ya mo	entire plant	ethnomedicine		#
Prunus salicina Lindl.		fruit	fruit		#*
Psidium guajava L.	tuo ma	fruit, leaf	fruit, ethnomedicine		#*
Pterocanthus alatus Bremek.	tie suo	entire plant	ethnomedicine, dyestuff		#
Rhus chinensis Mill.	xi ma	root, fruit	ethnomedicine, flavoring	#	
Rubus alceifolius Poir.	nu pe le o	fruit, root	fruit, ethnomedicine	#	
Rudbeckia laciniata L.	nong qia	entire plant	barrier		#*
Saccharum sinensis Roxb.	pu chui	stem	sugar		#*
Sansevieria trifasciata Prain	a luo mi la	entire plant	ornamental		#*
Sauropus androgynus Merr.	wo ni qie	leaf, root	vegetable, ethnomedicine		#*
Sedum erythristictum Miq.	ba de	entire plant	ornamental		#*
Sida acuta Burm.f.		root, leaf, entire plant	ethnomedicine, broom	#	
Sida szechuensis Mast.	huo pi o duo	entire plant	ethnomedicine	#	#
Smilax china L.	kou que luo ha	root, leaf	ethnomedicine	#	
Solanum coagulens Forsk.	xi ha la gou	fruit, root	vegetable, ethnomedicine	#	#
Solanum indicum L.	he bu	root	ethnomedicine	#	#
Solanum myriacanthum Dunal	mei hei bo	fruit, seed	ethnomedicine		#
Solanum spirale Roxb.	hai xi ba ha	leaf, entire plant	vegetable, ethnomedicine		#
Solanum verbacifolium L.		leaf, stem	washing, ethnomedicine, gunpowder material	#	#
Spatholobus suberectus Dunn		root	ethnomedicine	#	#
Spilanthes callimorpha A. H. Moore	huo mu ha bao	entire plant	ethnomedicine		#*
Spondias pinnata Kurz	pei nuo	fruit	fruit, flavoring		#
Stephania hernandifolia Walp.	a mi na guo	root	ethnomedicine		
Syzygium polypetaloideum Merr. & Perry	a wu	wood	wood	#	
Syzygium szemaoense Merr. & Perry	a wong de	fruit, wood	fruit, wood	#	
Tamarindus indica L.	xi bi qie	fruit	fruit		#*
Thevetia peruviana K. Schum.		flower	ornamental		#

APPENDIX 1: CONTINUED.

Scientific name	Local name	Utilized part	Usage	Fallow forest	House garden
Thysanolaena maxima Kuntze.		root, inflorescences	ethnomedicine, broom, vegetable	#	
Trema orientalis Blume	nuo tuo	wood, root, leaf, bark	fuelwood, wood, ethnomedicine, fiber	#	
Uncaria laevigata Wall.	a de ma sa	hook	ethnomedicine		#
Urena lobata L.	zi ga zi duo	entire plant	ethnomedicine	#	#
Vernonia volkameriaefolia DC	song ang	root, leaf	ethnomedicine	#	
Xanthophyllum siamensis Craib		leaf	vegetable		#
Zebrina pendula Schnizl		entire plant	ethnomedicine		#
Zingiber officinalis Roscoe	tao zi	root	flavoring		#*

#, present in fallow forest of home garden; *, planted or transplanted into the house garden.