Chapter 4

Results

A total of 673 homgardens were surveyed in 15 villages. There were 552 species and most of them belonged to the *environmental uses* (260 species.) and *food* (194 species) categories (Fig. 4.1). Plant species, richness, and diversity in homegardens were different among different ethnic groups. The number of species found in each village ranged from 42 in Huai Nam Dang (Lisu) to 300 in Ta Krai (Thai Yuan) (Table 4.1). The mean number of species found in the homegardens was highest in Thong Phai and Ta Krai (both are Thai Yuan villages), respecitively. The largest plant categories in all the studied villages were *food* and *environmental uses*. These two categories contributed at least 70% of the total species found in each village. Yard and homegarden boundaries were the most important zones for keeping the plants in the homegardens in most studied villages. Pots were another important zone, however, the proportion of this zone in homegardens varied among the different ethnicities. For example, all studied homegardens in Suk Rue Thai (Yunnan Chinese) had at least one pot in their homegardens while in Muser Pak Tang, only 20% of studied homegardens had pots.

The lists of dominant and common species in each village were differed from each other. A few species: mango and jack fruit, were noted as one of the most common and dominant species among different villages.

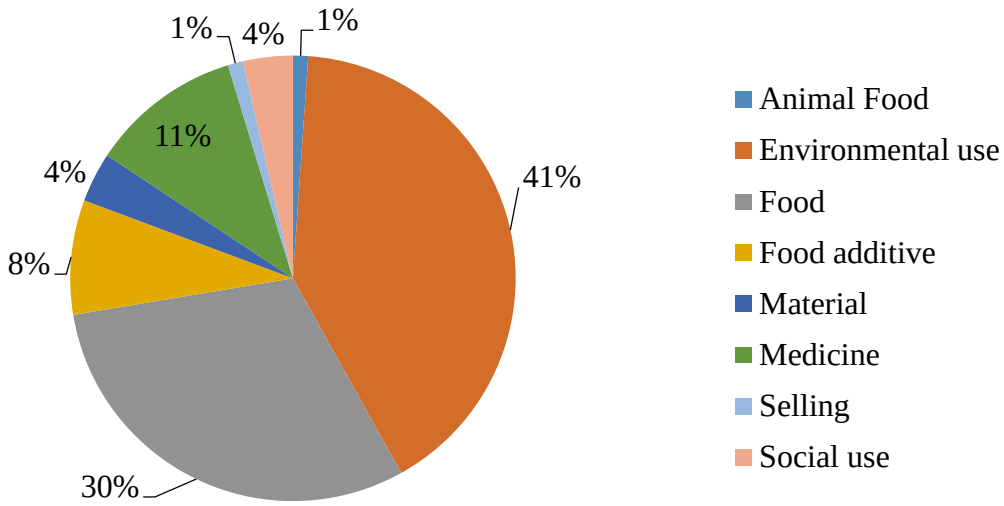

Fig. 4.1 Proportion of 552 plant species in each category recorded form 673 homegardens.

The studied villages were located at elevations ranging from 320–1306 meters above sea level. Nearest urban center to each village were located 2–100 km away (Table 4.1).

Table 4.1 Physical data and the number of plants in each of the 15 studied village

Village	Aruno thai	Ban Hor	Doi Kam	Huai Hia	Huai Nam Dang	Huai Phak Dap	Khun Jae	Khun Tuen Noi	Mae Tom	Meuang Ka	Muser Pak Tang	Pha Nok Kok	Suk Ruethai	Ta Krai	Thong Phai
Ethnicity	Yunnan Chinese	Lawa	Hmong	Karen	Lisu	Lahu	Lisu	Karen	Karen	Lawa	Lahu	Hmong	Yunnan Chinese	Thai Yuan	Thai Yuan
Elevation (m.a.s.l.)	583	532	1200	725	1141	593	1292	1185	826	612	1306	1003	755	320	512
No. of generation since foundation	1	2	2	2	1	2	1	3	2	3	2	2	1	3	3
Average homegarden size (m^2)	174	358	263	307	272	324	301	350	402	338	314	254	195	389	397
No. of studied homegardens (% of total in the village)	85 (5)	50 (31)	40 (20)	13 (100)	50 (20)	40 (50)	52 (21)	21 (30)	19 (12)	40 (46)	60 (20)	40 (34)	51 (40)	50 (20)	62 (37)
Distance from nearest urban center (length of	2 (0)	50 (0)	12 (10)	20 (18)	37 (5)	16 (10)	23 (0)	100 (60)	13 (0)	21 (0)	56 (30)	16.5 (0)	26 (0)	15 (0)	10 (0)

Table 4.1 (continued)

Village	Aruno thai	Ban Hor	Doi Kam	Huai Hia	Huai Nam Dang	Huai Phak Dap	Khun Jae	Khun Tuen Noi	Mae Tom	Meuang Ka	Muser Pak Tang	Pha Nok Kok	Suk Ruethai	Ta Krai	Thong Phai
dirt road) km.															
No. of species	83	116	123	101	42	80	107	136	95	156	58	127	75	300	211
No. of plant families	42	48	55	44	32	41	49	58	44	66	32	55	36	87	69
Mean of species in each homegarden	14	20	13	23	7	13	21	30	20	34	12	15	10	32	36

4.1 Hmong homegarden

General characteristics

Hmong people kept most of their plants in three horizontal zones: homegarden boundaries, yards, and pots. The yards were divided into front yard and back yard without fences or hedgerows in between (Fig. 4.2). The front yards were small and their plants were usually also small and planted in pots and they were mostly ornamentals (*environmental use*). The back yard was larger and included more plants than the front yard. Pigs were raised in roofed pens at the homegarden boundaries or in a separate area. Most chicken were allowed to roam freely in the homegardens.

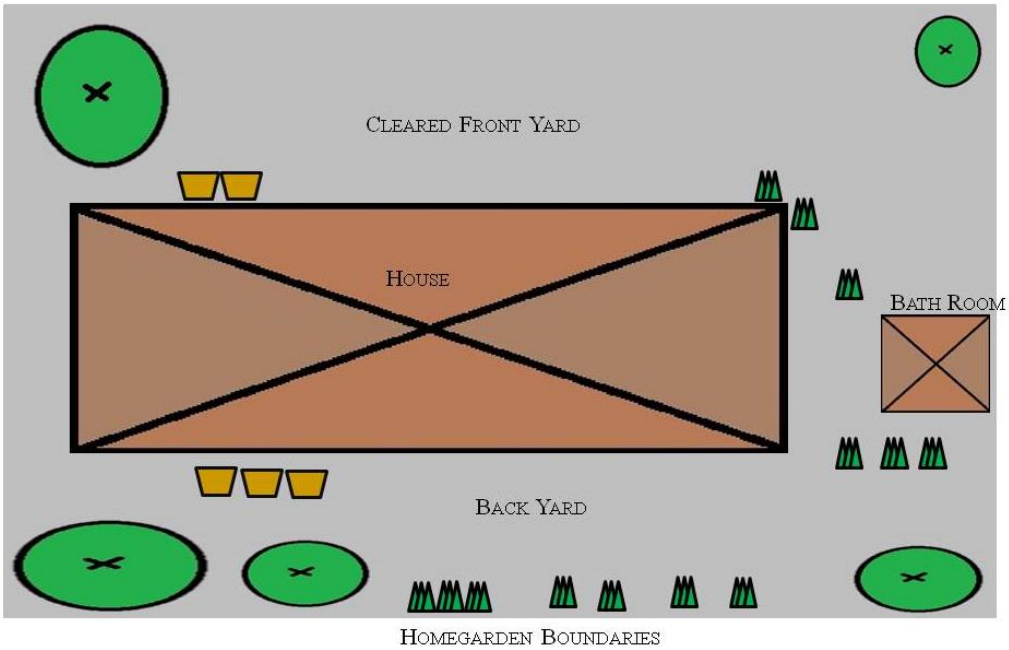

Fig. 4.2 Diagram of Hmong homegarden

Plant species and diversity in Hmong homegardens

A total of 185 species were recorded from the two studied Hmong villages (Table 4.2), with 119 and 125 spp. in Doi Kum and Pha Nok Kok, respectively. The average

number of species per homegarden in Doi Kum and Pha Nok Kok was 13 and 15, respectively. The important plant categories in Hmong homegardens were plants with *environmental use*, and plants used for *food*, *food additives,* and *medicines.* These four categories contributed more than 90% of all the species found in both villages. *Environmental use* is the largest category in both villages followed by the *food* category. There were 31 (25%) and 19 (15%) species with medicinal uses in Doi Kum and Pha Nok Kok, respectively. *Food additives*, another important category, had 22 (18%) and 19 (15%) species in Doi Kum and Pha Nok Kok, respectively.

Distribution and composition in zones

The yards (Y), homegarden boundaries (HB), and pots (P) were the most important zones of homegardens in both Hmong villages (Fig. 4.3). These three zones were found in at least 70% of the surveyed homegardens in both villages.

Woody species: Diversity, dominance, function, and horizontal distribution

There were 49 woody species in total in Doi Kum and Pha Nok Kok. The number of woody species and individuals in both villages were very low. Doi Kum village had higher median of species richness than Pha Nok Kok village, but lower median of number of individual in homegarden (abundance).

Table 4.2 The two Hmong villages where the homegardens were examined for plant species diversity, zonification, and use categories

Village	**Doi Kam**	**Pha Nok Kok**
Geographic coordinates	N 18°10'04" E098°30'06"	N18 °51'08" E098°49'54"
Elevation (m.a.s.l.)	1200	1003
No. of generation since foundation	2	2
No. of studied homegardens (% of total in the village)	40 (20%)	40 (34%)
Distance from nearest urban center (length of dirt road)	12 (10)	16.5 (0)
No. of species (total 195)	123	127
No. of plant families	55	55
Mean of species in each homegarden	13	15
No. of animal food species (%)	2 (1.6)	1 (0.8)
No. of environmental use species (%)	46 (38)	52 (41)
No. of food species (%)	36 (29)	40 (32)
No. of food additive species (%)	22 (18)	18 (15)
No. of material species (%)	1 (0.8)	1 (0.8)
No. of medicinal species (%)	17 (25)	14 (15)
No. of selling species (%)	1 (0.8)	0 (0)
No. of social use species (%)	2 (1.6)	0 (0)
Mean of animal food species/homegarden	0.4	0.3
Mean of environmental use species /homegarden	3.8	5.2
Mean of food species /homegarden	4.7	5.5
Mean of food additive species /homegarden	2.6	3.0
Mean of material species /homegarden	0.1	0.1
Mean of medicinal species /homegarden	1.4	1.3
Mean of selling species /homegarden	0.1	0
Mean of social use species /homegarden	0.3	0.1

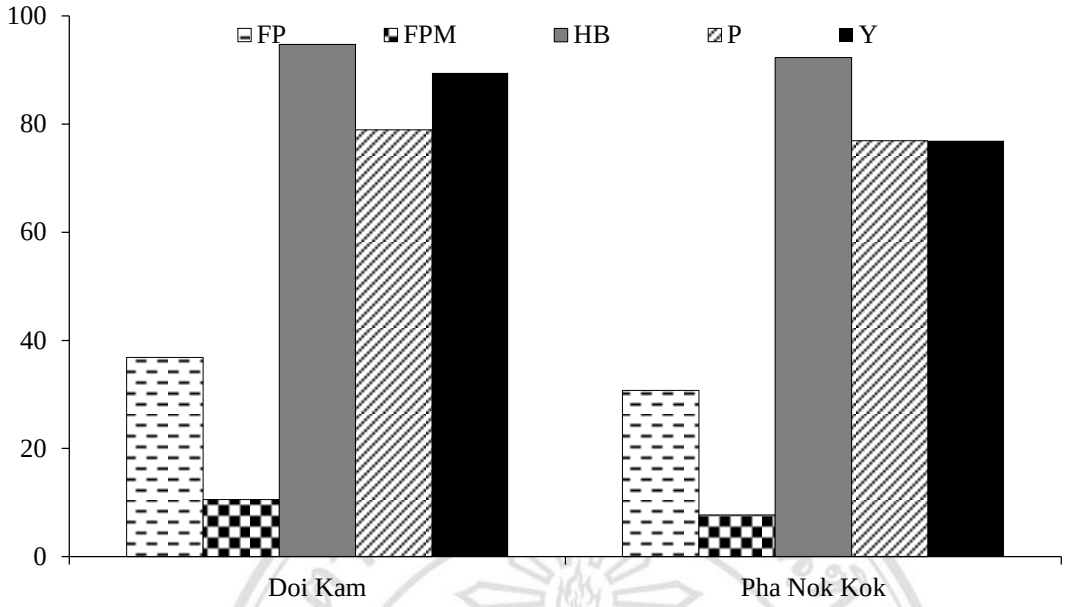

Fig. 4.3 Percentage cover of each zonation in homegardens in the two studied Hmong village. (FP = fence plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

The median Shannon score in Pha Nok Kok was lower than in Doi Kum. The evenness scores were high in both villages (Table 4.4).

The lists of the most dominant species in the two villages were quite similar (Table 4.5). The dominant species found in the villages included four fruit trees: *Psidium guajava* L., *Persea americana* Mill., *Mangifera indica* L., *Carica papaya* L., and one ornamental species, *Dracaena fragrans* (L.) Ker Gawl. The other dominant species in Doi Kum village included *Sambucus canadensis* L., *Coffea arabica* L., and *Hibiscus rosa-sinensis* L. In Pha Nok Kok, the other dominant species included *Jatropha podagrica* Hook. f., *Cordyline fruticosa* (L.) A. Chev., and *Debregeasia* sp.

The list of the most common species in both villages were similar to the list of the most dominant species (Table 4.6). The most common species found in the villages included three fruit tree: *Carica papaya* L., *Dracaena fragrans* (L.) Ker Gawl., *Persea americana* Mill., and *Psidium guajava* L., and the ornamental *Dracaena fragrans* (L.) Ker Gawl. The other most common species in Doi Kum villages were *Hibiscus rosa-*

sinensis L., *Sambucus canadensis* L., *Acacia pennata* (L.) Willd. subsp. *insuavis (*Lace) I. C. Nielsen, and *Artocarpus heterophyllus* Lam.

Most individuals and species of woody plant in both villages were in the categories *food* and *environmental use* (Fig. 4.4 and 4.5). This two categories contributed to more than 80% of both individuals and species in both villages. In both villages *food* was the largest category according to the number of individuals but *environmental use* was largest category according to number of species. In both villages, most tree species and individuals were found in the yard or along the homegarden boundaries (Fig. 4.6 and 4.7)

Table 4.3 Species found in homegardens in the Hmong villages Doi Kum (DK) and Pha Nok Kok (PK) and their use categories.

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Abelmoschus esculentus (L.) Moench	Malvaceae	Young fruit: Vegetables	Food	PK	Exotic	325
Acacia pennata subsp. *insuavis* (Lace) I. C. Nielsen	Leguminosae	Leaves: Vegetables	Food	DK, PK	Native	374
Adenium obesum (Forssk.) Roem. & Schult.	Apocynaceae	Ornamentals	Environmental use	DK	Exotic	395
Agave vivipara L.	Asparagaceae	Ornamentals	Environmental use	DK	Exotic	375
Aglaomorpha cornucopia (Copel.) M. C. Roos	Polypodiaceae	Ornamentals	Environmental use	PK	Native	420
Allium ascalonicum L.	Amaryllidaceae	Bulbs: Spices	Food additive	PK	Exotic	440
Allium hookeri Thwaites	Amaryllidaceae	Bulbs: Spices	Food additive	DK, PK	Native	377
Allium schoenoprasum L.	Amaryllidaceae	Leaves: Herbs	Food additive	PK	Exotic	457
Alocasia cucullata (Lour.) G. Don	Araceae	Ornamentals	Environmental use	DK, PK	Exotic	387

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Aloe vera (L.) Burm.f.	Xanthorrhoeaceae	Ornamentals	Environmental use	PK	Exotic	434
		Leaves: Skin burned	Medicine	DK	Exotic	381
Alpinia galanga (L.) Willd.	Zingiberaceae	Rhizome: Spices	Food additive	DK, PK	Exotic	376
Alstonia scholaris (L.) R. Br.	Apocynaceae	Shade	Environmental use	DK	Native	393
Alternanthera ramosissima (Mart.) Chodat & Hassl.	Amaranthaceae	Ornamentals	Environmental use	DK, PK	Exotic	398
Amaranthus cruentus L.	Amaranthaceae	Entire plant: pigs	Animal food	DK	Native	399
Amorphophallus spp.	Araceae	Inflorescences: Vegetables	Food	DK, PK	Native	419
Ananas comosus (L.) Merr.	Bromeliaceae	Dessert fruits	Food	DK	Exotic	380
Andrographis paniculata (Burm.f.) Nees	Acanthaceae	Leaves: Fever	Medicine	PK	Exotic	444
Anethum graveolens L.	Apiaceae	Leaves: Herbs	Food additive	DK	Exotic	391

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Angiopteris evecta (G. Forst.) Hoffm.	Marattiaceae	Ornamentals	Environmental use	PK	Native	417
Artemisia annua L.	Compositae	Fruits: Spices	Food additive	DK	Exotic	368
Artemisia lactiflora Wall. ex DC.	Compositae	Young fruit: Vegetables	Food	DK, PK	Exotic	425
Artocarpus heterophyllus Lam.	Moraceae	Dessert fruits	Food	DK, PK	Exotic	414
Asplenium nidus L.	Aspleniaceae	Ornamentals	Environmental use	DK, PK	Exotic	411
Basella alba L.	Basellaceae	Inflorescences: Vegetables	Food	DK	Native	365
Boesenbergia rotunda (L.) Mansf.	Zingiberaceae	Root: Spices	Food additive	DK	Native	369
Bougainvillea glabra Choisy	Nyctaginaceae	Ornamentals	Environmental use	PK	Exotic	426
Brugmansia × *candida* Pers.	Solanaceae	Ornamentals	Environmental use	DK	Native	397
Bryophyllum pinnatum (Lam.) Oken	Crassulaceae	Leaves: Vegetables	Food	DK, PK	Exotic	362

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
		Leaves: Body nourishment	Medicine	DK	Exotic	364
Calathea majestica (Linden) H. A. Kenn.	Marantaceae	Ornamentals	Environmental use	PK	Native	442
Calliandra haematocephala Hassk.	Leguminosae	Ornamentals	Environmental use	DK	Exotic	361
Callisia repens (Jacq.) L.	Commelinaceae	Whole plants: Diabetes	Medicine	DK, PK	Native	373
Canna indica L.	Cannaceae	Ornamentals	Environmental use	PK	Exotic	423
		Root: Starch	Food	DK	Exotic	360
Cannabis sativa L.	Cannabaceae	Fibres: Clothes	Material	PK	Native	465
Capsicum annuum L.	Solanaceae	Fruits: Spices	Food additive	DK, PK	Exotic	394
Carica papaya L.	Caricaceae	Fruits: Vegetables, Dessert fruits	Food	DK, PK	Exotic	454
Catharanthus roseus (L.) G. Don	Apocynaceae	Ornamentals	Environmental use	DK	Exotic	366

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Cayratia tenuifolia (Wight & Arn.) Gagnep.	Vitaceae	Leaves: Itching	Medicine	PK	Native	459
Celosia argentea L.	Amaranthaceae	Ornamentals	Environmental use	PK	Exotic	400
Chlorophytum laxum R. Br.	Asparagaceae	Ornamentals	Environmental use	PK	Exotic	453
Chlorophytum sp.	Asparagaceae	Leaves: Vegetables	Food	PK	Native	469
Cissus nodosa Blume	Vitaceae	Ornamentals	Environmental use	DK	Native	383
Citrus aurantifolia (Christm.) Swingle	Rutaceae	Fruit juice: Souring agents	Food additive	DK, PK	Native	372
Citrus hystrix DC.	Rutaceae	Fruit juice: Souring agents	Food additive	DK, PK	Exotic	429
Citrus maxima (Burm.) Merr.	Rutaceae	Dessert fruits	Food	DK	Exotic	378
Clinacanthus nutans (Burm.f.) Lindau	Acanthaceae	Leaves: Common cold, fever	Medicine	PK	Native	410

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Clitoria ternatea L.	Leguminosae	Flower: Colourings (deep blue)	Food additive	DK	Exotic	363
Cocos nucifera L.	Arecaceae	Dessert fruits	Food	PK	Exotic	456
Codiaeum variegatum (L.) Rumph. ex A.Juss.	Euphorbiaceae	Ornamentals	Environmental use	PK	Exotic	463
Coffea arabica L.	Rubiaceae	Ornamentals	Environmental use	PK	Exotic	474
		Fruits	Selling	DK	Exotic	357
Colocasia esculenta (L.) Schott	Araceae	Unspecified aerial parts: pigs	Animal food	DK, PK	Native	449
Colocasia gigantea (Blume) Hook.f.	Araceae	Aerail parts: Vegetables	Food	PK	Native	466
Combretum indicum (L.) DeFilipps	Combretaceae	Ornamentals	Environmental use	PK	Exotic	418
Cordyline fruticosa (L.) A.Chev.	Asparagaceae	Ornamentals	Environmental use	DK, PK	Exotic	428
Coriandrum sativum L.	Apiaceae	Fruits: Spices	Food additive	DK	Exotic	315

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Crinum asiaticum L.	Amaryllidaceae	Ornamentals	Environmental use	DK	Native	326
		Leaves: Pain	Medicine	DK	Native	
Cucurbita moschata Duchesne	Cucurbitaceae	Fruits: Vegetable	Food	DK, PK	Exotic	371
Cuphea hyssopifolia Kunth	Lythraceae	Ornamentals	Environmental use	DK	Exotic	314
Curcuma comosa Roxb.	Zingiberaceae	Rhizomes: Flatulence	Medicine	DK	Native	318
Curcuma longa L.	Zingiberaceae	Rhizome: Spices	Food additive	DK, PK	Native	312
Curcuma sp.	Zingiberaceae	Rhizomes: Flatulence	Medicine	PK	Native	467
Cymbopogon citratus (DC.) Stapf	Poaceae	Bulbs: Spices	Food additive	DK, PK	Exotic	356
Debregeasia sp.	Urticaceae	Ornamentals	Environmental use	PK	Native	471
Dieffenbachia seguine (Jacq.) Schott	Araceae	Ornamentals	Environmental use	PK	Exotic	451

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Dimocarpus longan Lour.	Sapindaceae	Dessert fruits	Food	PK	Native	468
Dioscorea alata L.	Dioscoreaceae	Root: Starch	Food	PK	Native	413
Dioscorea sp.	Dioscoreaceae	Bulbils: Pain	Medicine	DK	Native	370
Dischidia imbricata (Blume) Steud.	Apocynaceae	Ornamentals	Environmental use	PK	Native	475
Dracaena braunii Engl.	Asparagaceae	Ornamentals	Environmental use	DK	Native	324
		Ornamentals	Environmental use	DK	Native	354
Dracaena fragrans (L.) Ker Gawl.	Asparagaceae	Ornamentals	Environmental use	DK, PK	Exotic	386
Duranta erecta L.	Verbenaceae	Ornamentals	Environmental use	DK, PK	Exotic	389
Dypsis lutescens (H.Wendl.) Beentje & J. Dransf.	Arecaceae	Ornamentals	Environmental use	PK	Exotic	464
Ehretia microphylla Lam.	Boraginaceae	Ornamentals	Environmental use	PK	Exotic	473

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Elaeocarpus grandiflorus Sm.	Elaeocarpaceae	Ornamentals	Environmental use	DK	Native	351
Eleutherine bulbosa (Mill.) Urb.	Iridaceae	Ornamentals	Environmental use	DK	Exotic	348
		Bulbs: Insect sting	Medicine	PK	Exotic	409
Elsholtzia penduliflora W. W. Sm.	Lamiaceae	Leaves: Herbs	Food additive	DK	Native	347
Elsholtzia sp.	Lamiaceae	Leaves: Herbs	Food additive	DK, PK	Native	353
Epipremnum aureum (Linden & André) G. S. Bunting	Araceae	Ornamentals	Environmental use	PK	Exotic	430
Eryngium foetidum L.	Apiaceae	Leaves: Herbs	Food additive	DK, PK	Exotic	469
Erythropalum scandens Blume	Olacaceae	Leaves: Vegetables	Food	PK	Native	415
Etlingera elatior (Jack) R. M.Sm.	Zingiberaceae	Ornamentals	Environmental use	PK	Exotic	432
Eucharis grandiflora Planch. & Linden	Amaryllidaceae	Ornamentals	Environmental use	PK	Exotic	421

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Eupatorium fortunei Turcz.	Compositae	Shoots: Vegetalbes	Food	PK	Exotic	447
Euphorbia milii Des Moul.	Euphorbiaceae	Ornamentals	Environmental use	DK, PK	Native	462
Ficus hispida L.f.	Moraceae	Shade	Environmental use	DK	Native	436
Foeniculum vulgare Mill.	Apiaceae	Fruits: Spices	Food additive	PK	Exotic	446
Gardenia jasminoides J. Ellis	Rubiaceae	Ornamentals	Environmental use	PK	Exotic	412
Gerbera jamesonii Bolus ex Hook.f.	Compositae	Ornamentals	Environmental use	DK	Exotic	323
Gladiolus hortulanus L. H. Bailey	Iridaceae	Ornamentals	Environmental use	DK	Native	336
Gomphocarpus physocarpus E. Mey.	Apocynaceae	Ornamentals	Environmental use	DK, PK	Exotic	339
Gynura bicolor (Roxb. ex Willd.) DC.	Compositae	Leaves: Vegetables	Food	DK	Native	341
Hemigraphis alternata (Burm.f.) T. Anderson	Acanthaceae	Ornamentals	Environmental use	DK	Native	307

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Hibiscus rosa-sinensis L.	Malvaceae	Ornamentals	Environmental use	DK, PK	Exotic	346
Hibiscus sabdariffa L.	Malvaceae	Fruits: Drink	Food	PK	Exotic	470
Houttuynia cordata Thunb.	Saururaceae	Leaves: Vegetables	Food	PK	Native	438
Hylocereus undatus (Haw.) Britton & Rose	Cactaceae	Dessert fruits	Food	DK, PK	Exotic	403
Impatiens balsamina L.	Balsaminaceae	Ornamentals	Environmental use	DK	Exotic	319
Ipomoea aquatica Forssk.	Convolvulaceae	Leaves: Vegetables	Food	DK	Native	350
Ipomoea batatas (L.) Lam.	Convolvulaceae	Leaves: Vegetables	Food	DK	Exotic	328
Iresine herbstii Hook.	Amaranthaceae	Leaves: Vegetables	Food	DK, PK	Exotic	320
Iris domestica (L.) Goldblatt & Mabb.	Iridaceae	Ornamentals	Environmental use	DK	Exotic	334
Ixora chinensis Lam.	Rubiaceae	Ornamentals	Environmental use	DK	Exotic	321

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Jasminum sambac (L.) Aiton	Oleaceae	Ornamentals	Environmental use	DK	Exotic	359
Jatropha curcas L.	Euphorbiaceae	Ornamentals	Environmental use	DK	Exotic	344
Jatropha podagrica Hook.	Euphorbiaceae	Exudate: bleeding wound	Medicine	PK	Exotic	408
Justicia adhatoda L.	Acanthaceae	Ornamentals	Environmental use	PK	Native	455
Justicia betonica L.	Acanthaceae	Ornamentals	Environmental use	PK	Exotic	404
Kaempferia elegans (Wall.) Baker	Zingiberaceae	Ornamentals	Environmental use	PK	Native	461
		Rhizomes: Body pain	Medicine	DK, PK	Native	309
		Ornamentals	Environmental use	DK	Native	331
		Rhizomes: Body nourishment	Medicine	DK, PK	Native	402

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Kaempferia sp.	Zingiberaceae	Rhizomes: Body pain	Medicine	DK	Native	306
Kalanchoe integra (Medik.) Kuntze	Crassulaceae	Leaves: Vegetables	Food	PK	Native	458
Kalanchoe sp.	Crassulaceae	Leaves: Vegetables	Food	DK	Exotic	316
		Leaves: Body nourishment	Medicine	DK	Exotic	322
Lantana camara L.	Verbenaceae	Ornamentals	Environmental use	DK	Exotic	304
Litchi chinensis Sonn.	Sapindaceae	Dessert fruits	Food	PK	Exotic	450
Litsea sp.	Lauraceae	Ornamentals	Environmental use	DK	Native	302
Mangifera indica L.	Anacardiaceae	Dessert fruits, Leaves: Vegetables	Food	DK, PK	Native	452
Manihot esculenta Crantz	Euphorbiaceae	Roots: Starch	Food	PK	Exotic	427
Maranta arundinacea L.	Marantaceae	Roots: Starch	Food	PK	Exotic	472

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Mentha × *villosa* Huds.	Lamiaceae	Leaves: Herbs	Food additive	DK, PK	Exotic	445
Mirabilis jalapa L.	Nyctaginaceae	Ornamentals	Environmental use	DK, PK	Exotic	404
Molineria capitulata (Lour.) Herb.	Hypoxidaceae	Rhizome: Burn	Medicine	DK	Native	311
Momordica charantia L.	Cucurbitaceae	Fruits: Vegetables	Food	PK	Native	443
Morus alba L.	Moraceae	Dessert fruits	Food	DK	Exotic	299
Murdannia loriformis (Hassk.) R. S. Rao & Kammathy	Commelinaceae	Leaves: Hemorrhoids	Medicine	PK	Native	437
Nicotiana tabacum L.	Solanaceae	Leaves: Smoking	Social use	DK, PK	Exotic	441
Ocimum × *africanum* Lour.	Lamiaceae	Leaves: Herbs	Food additive	DK, PK	Native	431
Ocimum basilicum L.	Lamiaceae	Leaves: Herbs	Food additive	DK	Exotic	310
Ocimum tenuiflorum L.	Lamiaceae	Leaves: Herbs	Food additive	DK, PK	Native	297
Oenanthe javanica (Blume) DC.	Apiaceae	Fruits: Spices	Food additive	PK	Native	329

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Opuntia sp.	Cactaceae	Ornamentals	Environmental use	DK, PK	Exotic	435
Oroxylum indicum (L.) Kurz	Bignoniaceae	Fruits: Vegetables	Food	DK	Native	281
Oxalis triangularis A. St.-Hil.	Oxalidaceae	Ornamentals	Environmental use	DK, PK	Native	290
Pachira aquatica Aubl.	Malvaceae	Ornamentals	Environmental use	PK	Exotic	296
Pandanus humilis Lour.	Pandanaceae	Ornamentals	Environmental use	DK	Native	385
		Leaves: Essences	Food additive	PK	Native	278
Paris polyphylla Sm.	Melanthiaceae	Rhizomes: Pain	Medicine	DK	Native	284
Passiflora laurifolia L.	Passifloraceae	Dessert fruits	Food	DK	Exotic	300
Passiflora quadrangularis L.	Passifloraceae	Dessert fruits	Food	PK	Exotic	382
Persea americana Mill.	Lauraceae	Dessert fruits	Food	DK, PK	Exotic	275

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Philodendron bipinnatifidum Schott ex Endl.	Araceae	Ornamentals	Environmental use	PK	Exotic	286
Phyllanthus sp.	Phyllanthaceae	Leaves: Cold and Fever	Medicine	DK	Native	292
Phytolacca americana L.	Phytolaccaceae	Leaves: Vegetables	Food	DK, PK	Exotic	308
Piper rostratum Roxb.	Piperaceae	Leaves: Vegetables	Food	PK	Native	279
Pithecellobium dulce (Roxb.) Benth.	Leguminosae	Ornamentals	Environmental use	PK	Exotic	273
Plantago major L.	Plantaginaceae	Leaves: Pain	Medicine	PK	Native	283
Polygonum odoratum Lour.	Polygonaceae	Leaves: Herbs	Food additive	DK	Native	298
Polyscias fruticosa (L.) Harms	Araliaceae	Ornamentals	Environmental use	PK	Exotic	295
		Seeds: snack	Food	DK	Exotic	327
Prunus sp.	Rosaceae	Dessert fruits	Food	DK	Native	333

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Psidium guajava L.	Myrtaceae	Ornamentals	Environmental use	DK	Exotic	392
		Dessert fruits	Food	DK, PK	Exotic	358
Punica granatum L.	Lythraceae	Dessert fruits	Food	PK	Exotic	303
Rhapis excelsa (Thunb.) Henry	Arecaceae	Ornamentals	Environmental use	PK	Exotic	313
Rhinacanthus nasutus (L.) Kurz	Acanthaceae	Leaves: Fever	Medicine	PK	Native	332
Ricinus communis L.	Euphorbiaceae	Ornamentals	Environmental use	DK, PK	Native	272
Ruellia simplex C. Wright	Acanthaceae	Ornamentals	Environmental use	PK	Native	343
Rumex crispus L.	Polygonaceae	Leaves: Vegetables	Food	DK	Native	294
		Leaves: Souring agents	Food additive	DK	Native	
Saccharum officinarum L.	Poaceae	Cane Juice	Food	DK, PK	Exotic	289

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Sambucus canadensis L.	Adoxaceae	Ornamentals	Environmental use	DK	Exotic	338
		Flowers: Religion uses	Social use	DK	Exotic	
Sansevieria cylindrica Bojer ex Hook.	Asparagaceae	Ornamentals	Environmental use	PK	Native	287
Sansevieria trifasciata Prain	Asparagaceae	Ornamentals	Environmental use	PK	Exotic	388
Sauropus androgynus (L.) Merr.	Phyllanthaceae	Leaves: Vegetables	Food	DK, PK	Native	271
Scadoxus multiflorus (Martyn) Raf.	Amaryllidaceae	Ornamentals	Environmental use	DK, PK	Exotic	276
Sechium edule (Jacq.) Sw.	Cucurbitaceae	Fruits: Vegetables	Food	DK, PK	Exotic	270
Senna alata (L.) Roxb.	Leguminosae	Leaves: Laxative	Medicine	PK	Exotic	342
Solanum americanum Mill.	Solanaceae	Leaves: Vegetables	Food	DK	Native	305
Solanum incanum L.	Solanaceae	Fruits: Vegetables	Food	DK, PK	Native	293

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Solanum indicum L.	Solanaceae	Fruits: Vegetables	Food	PK	Native	349
Solanum melongena L.	Solanaceae	Fruits: Vegetables	Food	DK, PK	Native	288
Solanum torvum Sw.	Solanaceae	Fruits: Vegetables	Food	DK	Native	291
Stephania pierrei Diels	Menispermaceae	Leaves: Body pain	Medicine	DK	Native	340
Syngonium podophyllum Schott	Araceae	Ornamentals	Environmental use	PK	Native	290
		Ornamentals	Environmental use	PK	Native	
Syzygium jambos (L.) Alston	Myrtaceae	Dessert fruits	Food	DK	Native	407
Tagetes erecta L.	Compositae	Ornamentals	Environmental use	DK	Exotic	345
Talinum paniculatum (Jacq.) Gaertn.	Talinaceae	Ornamentals	Environmental use	PK	Native	277
		Leaves: Body nourishment	Medicine	DK	Native	401

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Terminalia ivorensis A. Chev.	Combretaceae	Ornamentals	Environmental use	PK	Exotic	330
Thunbergia erecta (Benth.) T. Anderson	Acanthaceae	Ornamentals	Environmental use	PK	Exotic	274
Thysanolaena latifolia (Roxb. ex Hornem.) Honda	Poaceae	Cane: Containers	Material	DK	Native	282
Tradescantia zebrina Bosse	Commelinaceae	Ornamentals	Environmental use	PK	Exotic	416
		Leaves: Vegetables	Food	PK	Exotic	
Trevesia palmata (Roxb. ex Lindl.) Vis.	Araliaceae	Inflorescences: Vegetables	Food	PK	Native	439
Typhonium trilobatum (L.) Schott	Araceae	Ornamentals	Environmental use	DK	Native	448
		Leaves: Body pain	Medicine	DK	Native	
Vigna unguiculata (L.) Walp.	Leguminosae	Fruits: Vegetables	Food	DK	Exotic	355
Wrightia religiosa (Teijsm. & Binn.) Benth. ex Kurz	Apocynaceae	Ornamentals	Environmental use	PK	Native	301

Table 4.3 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P. Prateep coll.)
Zamioculcas zamiifolia (Lodd.) Engl.	Araceae	Ornamentals	Environmental use	DK, PK	Native	352
Zea mays L.	Poaceae	Grains: Cereal	Food	PK	Exotic	335
Zephyranthes rosea Lindl.	Amaryllidaceae	Ornamentals	Environmental use	DK	Exotic	285
Zingiber officinale Roscoe	Zingiberaceae	Rhizome: Spices	Food additive	DK, PK	Native	337
Zingiber ottensii Valeton	Zingiberaceae	Rhizomes: Flatulence	Medicine	DK, PK	Native	280
Zinnia violacea Cav.	Compositae	Ornamentals	Environmental use	DK	Exotic	379

Table 4.4 Diversity indices of woody plants in two Hmong homegardens

Dieversity index		Doi Kum	Pha Nok Kok
Richness	Median	3	5
	Max	9	7
	Min	1	2
Abundance	Median	6	5.5
	Max	19	8
	Min	1	2
Shannon	Median	1.10	1.59
	Max	1.99	1.95
	Min	0	0.69
Evenness	Median	0.94	1.00
	Max	1.00	1.00
	Min	0.73	0.88

Table 4.5 The most dominant woody species in two Hmong villages (arranged in order of dominance).

Doi Kum	Pha Nok Kok
Psidium guajava L.	*Mangifera indica* L.
Dracaena fragrans (L.) Ker Gawl.	*Psidium guajava* L.
Persea americana Mill.	*Dracaena fragrans* (L.) Ker Gawl.
Sambucus canadensis L.	*Carica papaya* L.
Carica papaya L.	*Jatropha podagrica* Hook. f.
Coffea arabica L.	*Persea americana* Mill.
Mangifera indica L.	*Cordyline fruticosa* (L.) A. Chev.
Hibiscus rosa-sinensis L.	*Debregeasia* sp.

Table 4.6 The most common (in all homegardens studied) woody species in two Hmong villages (arranged in order of commonness).

Doi Kum	Pha Nok Kok
Psidium guajava L.	*Mangifera indica* L.
Persea americana Mill.	*Psidium guajava* L.
Dracaena fragrans (L.) Ker Gawl.	*Dracaena fragrans* (L.) Ker Gawl.
Carica papaya L.	*Carica papaya* L.
Hibiscus rosa-sinensis L.	*Jatropha podagrica* Hook. f.
Sambucus canadensis L.	*Persea americana* Mill.
Acacia pennata (L.) Willd. subsp. *insuavis* (Lace) I. C. Nielsen	*Cordyline fruticosa* (L.) A. Chev.
Artocarpus heterophyllus Lam.	*Debregeasia* sp.

Non-woody species: Function, commonness, and horizontal distribution

There were a total of 151 species of non-woody species in the two studied Hmong villages. The three largest categories in both villages were *environmental use, food,* and *food additives* (Fig. 4.8) which contributed 37%, 27%, and 18% of all species in the two villages, respectively.

Many species on the most common list were found in both villages (Table 4.7), including: *Alpinia galanga* (L.) Willd., *Capsicum annuum* L., *Colocasia esculenta* (L.) Schott, *Curcuma longa* L., *Cymbopogon citratus* Stapf, *Gynura bicolor* (Roxb. ex Willd.) DC., *Hylocereus undatus* (Haw.) Britton & Rose, and *Saccharum officinarum* L., and most of them belonged to the *food additives* category.

Most species were found in pots and yards. More than 50% of all the plant species in both villages were found in these zones. Another important zone was homegarden boundaries where about 25% of all plant species were found (Fig. 4.9). Fenced plot margin (FPM) was the least common zone where less than 5% of non-woody species were found.

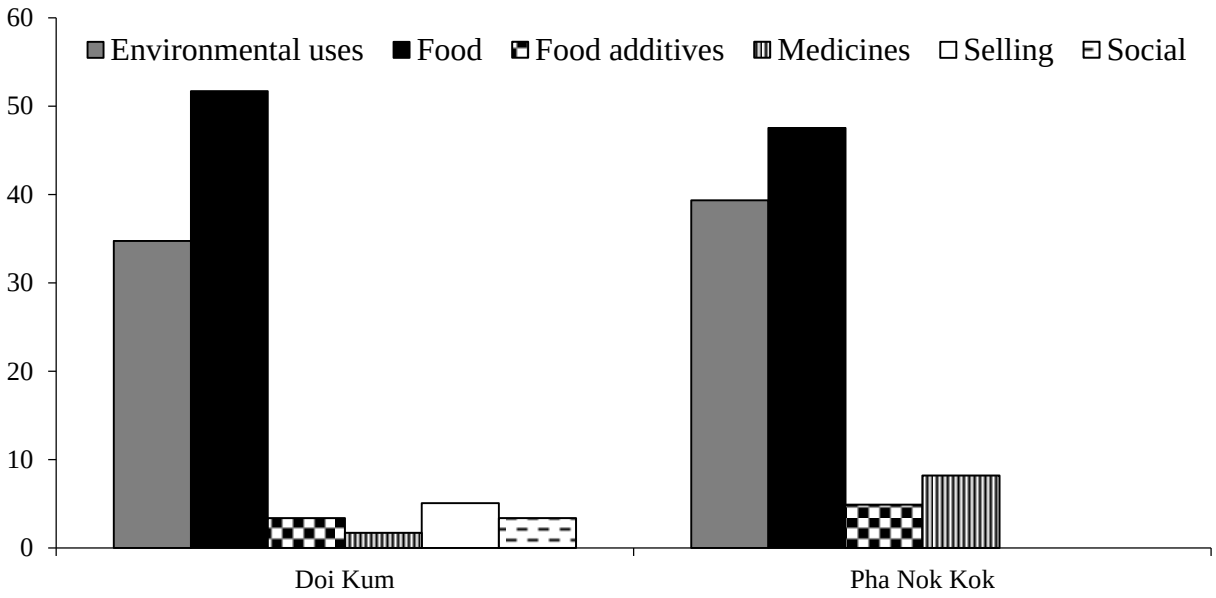

Fig. 4.4 The percentage of woody plant individuals in each use category of woody species in two Hmong homegardens.

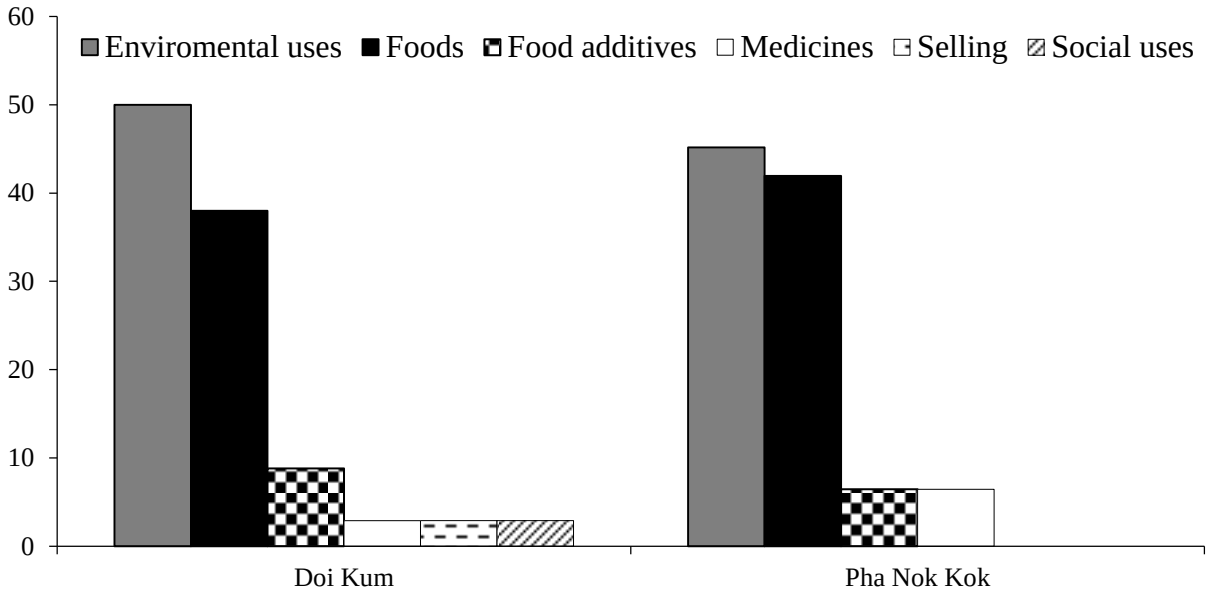

Fig. 4.5 The percentage of species in each use category of woody species in homegardens of two Hmong

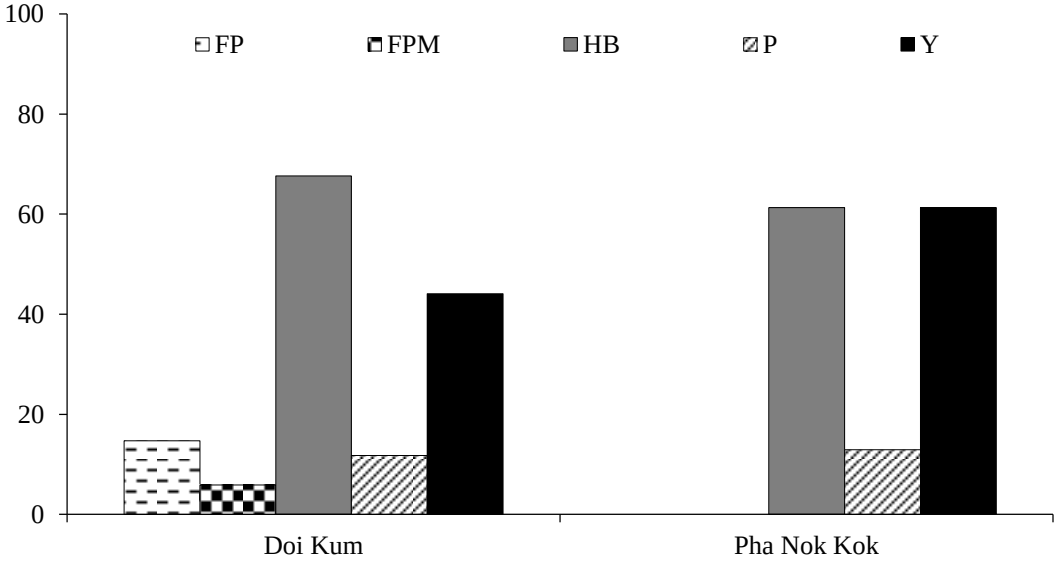

Fig. 4.6 The percentage of woody plant individuals in five horizontal zones in homegardens in two Hmong village (FP = fence plot, FPM= fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

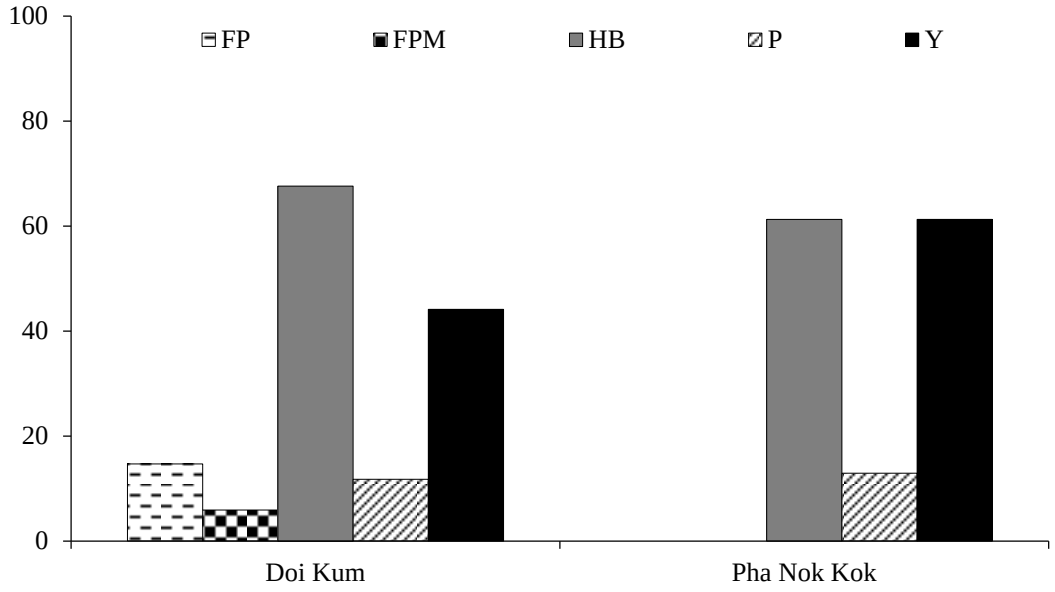

Fig. 4.7 The percentage of woody species in five horizontal zones of homegardens in two Hmong villages (FP = fenced plot, FPM= fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

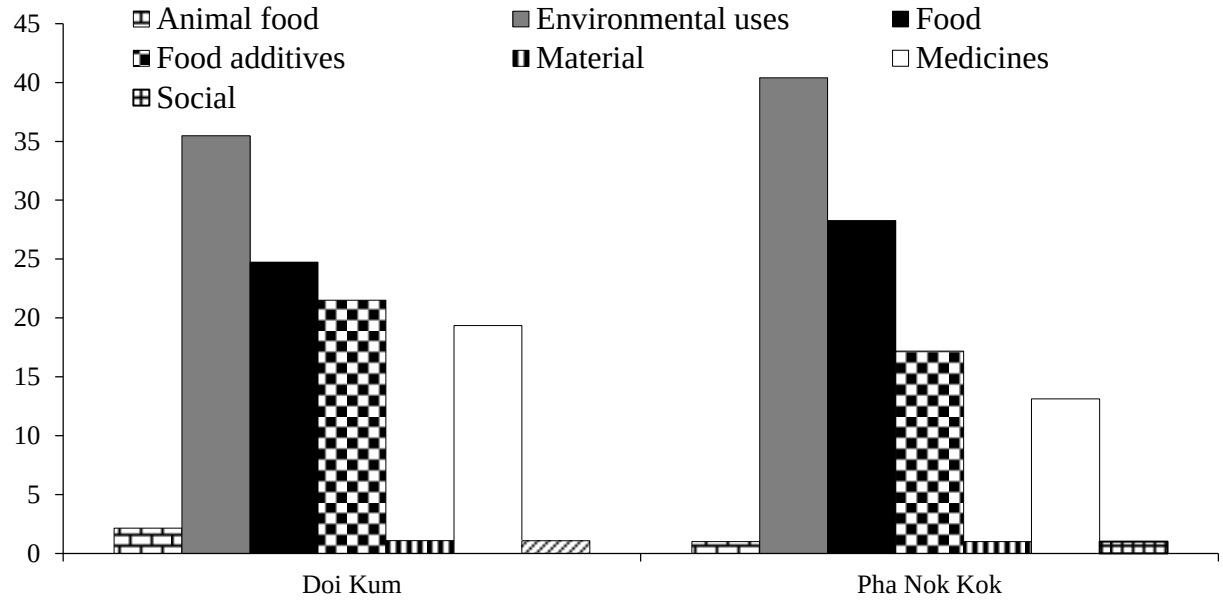

Fig. 4.8 The percentage of non-woody species divided among eight use categories in homegardens in two Hmong villages

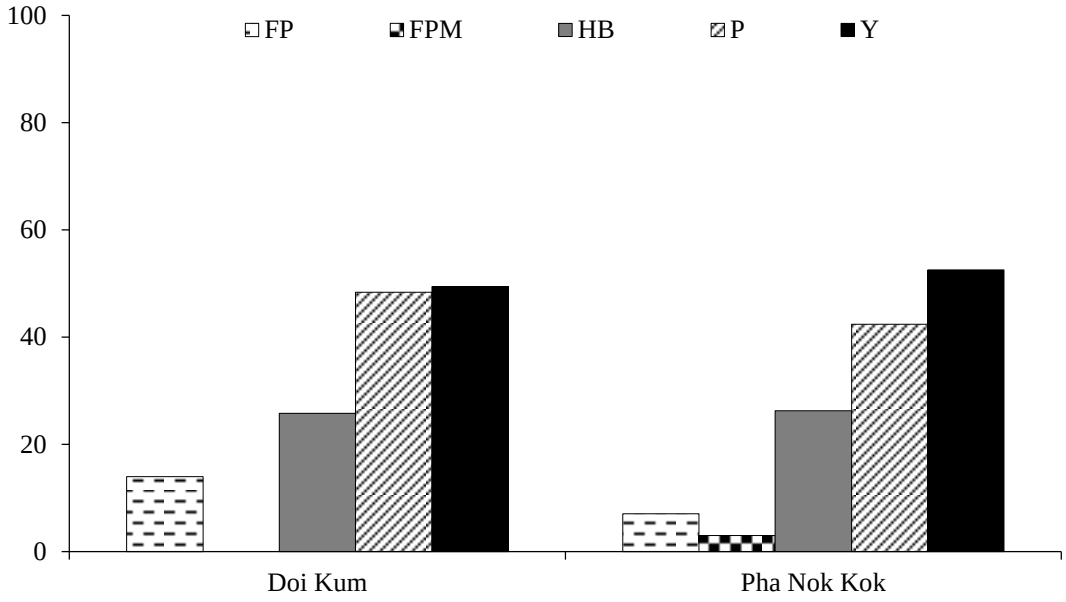

Fig. 4.9 The percentage of non-woody species found in five horizontal zones in homegardens in two Hmong villages (FP = fenced plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

Table 4.7 The most common non-woody species in homegardens of two Hmong villages (arranged in order of commoness).

Doi Kum	Pha Nok Kok
Cymbopogon citratus Stapf	*Hylocereus undatus* (Haw.) Britton & Rose
Saccharum officinarum L.	*Curcuma longa* L.
Colocasia esculenta (L.) Schott	*Saccharum officinarum* L.
Cucurbita moschata Duchesne	*Colocasia esculenta* (L.) Schott
Cuphea hyssopifolia Kunth	*Alpinia galanga* (L.) Willd.
Alpinia galanga (L.) Willd.	*Canna indica* L.
Basella alba L.	*Cymbopogon citratus* Stapf
Capsicum frutescens L.	*Capsicum frutescens* L.
Crinum asiaticum L.	*Allium hookeri* Thwaites
Curcuma longa L.	*Phytolacca americana* L.
Gynura bicolor (Roxb. ex Willd.) DC.	*Erythropalum scandens* Blume
Hylocereus undatus (Haw.) Britton & Rose	*Foeniculum vulgare* Mill.
Kaempferia parviflora Wall. ex Baker	
Mentha cordifolia Opiz ex Fresen	
Nicotiana tabacum L.	
Solanum incanum L.	

4.2 Karen Homegarden

General characteristics

The Karen kept most of their plants within two of the homegarden zones: the yard (Y) and the homegarden boundary (HB). Yards were found in all the studied homegardens. Usually the Karen planted many species at the homegarden border, mainly to delimit their territory especially at the backyard. These species were the most common *Cestrum nocturnum* L., *Euphorbia cotinifolia* L., and *Jatropha curcas* L., but included some others (Fig. 4.10). The front yard, which is connected to the village road, and the side yard, which is always connected to other homegardens, needs clear borders and it is why fences are made. Many homegarden front yards are clear and clean areas because they are used for drying farm products. Many plants with environmental use are cultivated along this fence together with many food and food additive species.

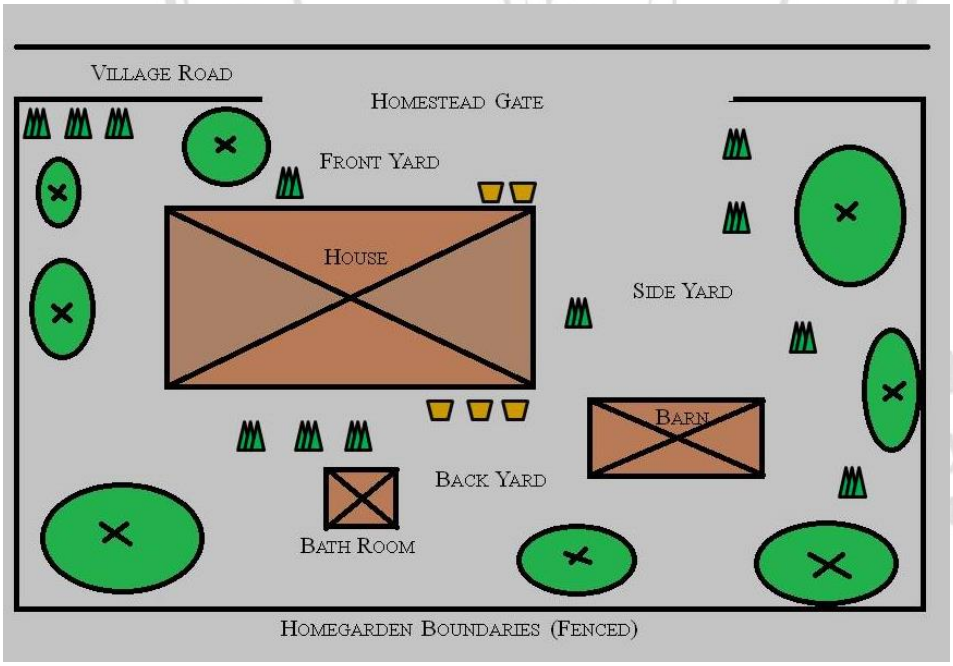

Fig. 4.10 The diagram of Karen homegarden

Plant species and diversity in Karen homegardens

A total of 221 species were recorded from three Karen villages (Table 4.8) ranging from 95–136 species per village. Khun Tuen Noi had the highest total number of species, averaging 30.4 species per homegarden while Mae Tom had the lowest number of species, averaging 20.1 species per homegarden. Most species in all the villages represented the categories *environmental use* and *food*. Unlike other villages, the *environmental use* in Khun Tuen Noi had the highest number of species while in the other two, the category *food* had the highest number of species. The three most important use categories, according to their number of species, in all the villages were *food*, *environmental use*, and *food additives*. These three categories contributed more than 80% of all the species in each village. Comparing the average number of plant species in each category, *food* had the highest mean followed by *environmental use* or *food additive* depending on the village. There were no significant differences between the average number of *food* species in each village. So there was about 10 species of food plants per homegarden.

Table 4.8 Karen villages where the homegardens were examined for plant species diversity, zonification, and use categories

Village	Huai Hia	Khun Tuen Noi	Mae Tom
Geographic coordinates	N18°45.66' E098° 42.56'	N17°18.98' E098° 19.98'	N17°48.03' E098° 21.33'
Elevation (m.a.s.l.)	725	1185	826
No. of generation since foundation	2	3	2
No. of studied homegardens (% of total in the village)	13 (100)	21 (30)	19 (12)
Distance from nearest urban center (length of dirt road)	20 km. (18)	100 km. (60)	13 km. (0)
No. of species (total 268)	101	136	95
No. of plant families	44	58	44
Mean of species in each homegarden	23.38	30.4	20.1
No. of animal food species (%)	2 (2)	3 (2)	2 (2)
No. of environmental use species (%)	22 (22)	54 (41)	26 (26)
No. of food species (%)	48 (47)	47 (33)	42 (42)
No. of food additive species (%)	14 (14)	17 (12)	16 (16)
No. of material species (%)	2 (2)	5 (3)	5 (4)
No. of medicinal species (%)	10 (9)	8 (5)	4 (6)
No. of social use species (%)	3 (3)	4 (3)	3 (3)
No. of species for selling (%)	2 (2)	1 (1)	2 (2)
Mean of animal food species/homegarden	1.38a	2.20b	1.45a

Table 4.8 (continued)

Village	Huai Hia	Khun Tuen Noi	Mae Tom
Mean of food species /homegarden	10.75	10.40	9.10
Mean of food additive species /homegarden	4.62	5.27	4.36
Mean of material species /homegarden	0.62	0.47	0.54
Mean of medicinal species /homegarden	2.12d	1.2	0.54
Mean of social use species /homegarden	0.38	1.2	0.54
Mean of species for selling /homegarden	0.38	0.67	0.23

Distribution and composition in zones

The yards (Y) and homegarden boundaries (HB) were the most important zones of homegardens in all the three studied Karen villages (Fig. 4.11). There were plants in all the yards in the studied Karen homegardens and more than 80% of the homegardens had some plants in homegarden boundaries zone. Pots were another zone that was found in all the Karen villages. The percentage was highest in Khun Thuen Noi where 60% of all the homegardens had pots.

Woody species: Diversity, dominance, function, and horizontal distribution

There were 89 woody species in total in the three Karen villages. The median richness per homegardens were lower than the number of individuals in all the three villages (Table 4.10). The Shannon scores varied from 1.71–2.21. Mae Tom had the highest median Shanon index, however only a bit higher than the other two. The median evenness were high, even if the lowest score was 0.78 from Mae Tom.

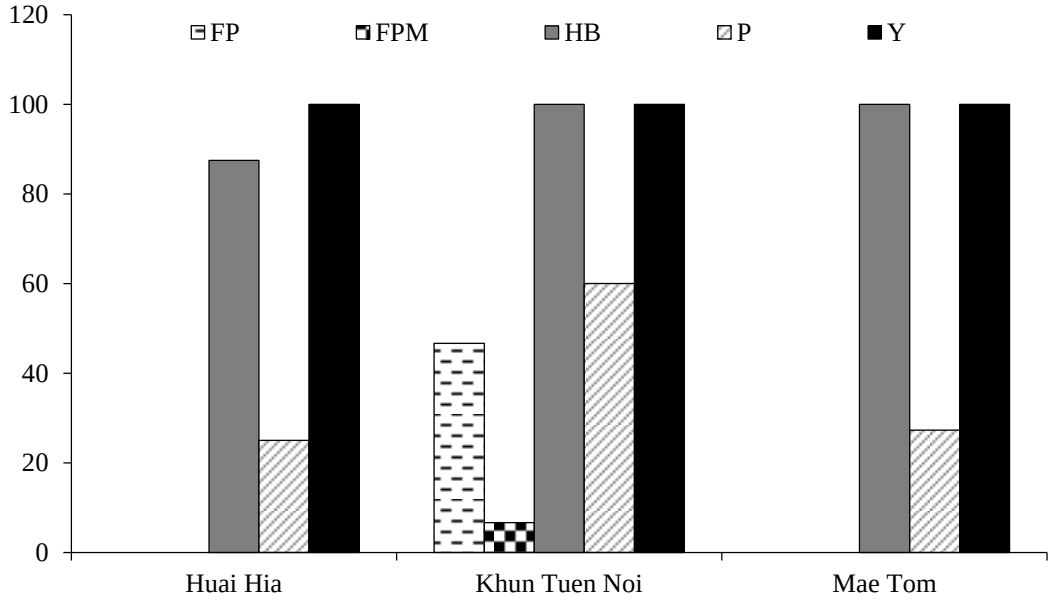

Fig. 4.12 Percentage of zonation presented in three Karen homegardens (FP = fence plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

Table 4.9 Species found in homegardens in three Karen villages and their use categories with indication of village (KTN: Khun Tuen Noi, HH: Huai Hia, MT: Mae Tom)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Acalypha wilkesiana Müll. Arg.	Euphorbiaceae	Ornamentals	Environmental use	HH	Exotic	177
Acanthus montanus T. Anderson	Acanthaceae	Ornamentals	Environmental use	KTN	Native	003
Acer sp.	Sapindaceae	Ornamentals	Environmental use	KTN	Exotic	004
Acmella oleracea (L.) R. K. Jansen	Compositae	Aerial part: Vegetables	Food	MT	Native	005
Acorus calamus L.	Acoraceae	Leaves: Cold and Fever	Medicine	KTN	Native	100
Agave americana L.	Asparagaceae	Ornamentals	Environmental use	KTN	Exotic	096
Allium hookeri Thwaites	Amaryllidaceae	Root: Spices	Food additive	KTN, MT	Native	124
Alocasia cucullata (Lour.) G. Don	Araceae	Unspecified aerial parts: pigs	Animal Food	KTN	Exotic	079

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
		Ornamentals	Environmental use	HH, KTN,	Exotic	
Aloe vera (L.) Burm.f.	Xanthorrhoeaceae	Leaves: Skin burned	Medicine	HH, MT	Exotic	202
Alpinia galanga (L.) Willd.	Zingiberaceae	Rhizome: Spices	Food additive	HH, KTN	Exotic	042
Alpinia malaccensis (Burm.f.) Roscoe	Zingiberaceae	Dessert fruits	Food	HH, KTN	Native	008
Alstonia scholaris (L.) R. Br.	Apocynaceae	Shade	Environmental use	MT	Native	009
Alternanthera brasiliana (L.) Kuntze	Amaranthaceae	Ornamentals	Environmental use	KTN	Native	015
Amomum sp.	Zingiberaceae	Inflorescences: Vegetables	Food	HH, MT	Native	011
Amomum villosum var. *xanthioides* (Wall. ex Baker) T. L. Wu & S. J. Chen	Zingiberaceae	Fruits: Spices	Food additive	KTN	Native	010
Amorphophallus spp.	Araceae	Inflorescences: Vegetables	Food	KTN	Native	012
Ananas comosus (L.) Merr.	Bromeliaceae	Dessert fruits	Food	KTN	Exotic	104

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Annona muricata L.	Annonaceae	Dessert fruits	Food	HH, MT	Exotic	101
Annona reticulata L.	Annonaceae	Dessert fruits	Food	MT	Exotic	133
Archidendron clypearia (Jack) I. C. Nielsen	Leguminosae	Shade	Environmental use	KTN	Native	014
Archidendron jiringa (Jack) I. C. Nielsen	Leguminosae	Seed: Vegetables	Food	KTN	Native	015
Areca catechu L.	Arecaceae	Fruits: Chewing with betel	Social use	KTN	Native	002
Artemisia lactiflora Wall. ex DC.	Compositae	Ornamentals	Environmental use	HH	Exotic	090
Artocarpus heterophyllus Lam.	Moraceae	Dessert fruits	Food	HH, KTN,	Exotic	220
Asplenium nidus L.	Aspleniaceae	Ornamentals	Environmental use	HH	Exotic	143
Averrhoa carambola L.	Oxalidaceae	Dessert fruits	Food	HH	Exotic	196
Baccaurea ramiflora Lour.	Phyllanthaceae	Dessert fruits	Food	HH	Native	206

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Bambusa sp.	Poaceae	Cane: Containers	Material	HH, MT	Native	017
Barleria lupulina Lindl.	Acanthaceae	Leaves: Vegetables	Food	HH	Native	001
Bauhinia purpurea L.	Leguminosae	Ornamentals	Environmental use	MT	Exotic	107
Benincasa hispida (Thunb.) Cogn.	Cucurbitaceae	Fruits: Vegetables	Food	HH	Exotic	232
Bixa orellana L.	Bixaceae	Dyestuffs	Material	MT	Exotic	142
Blumea balsamifera (L.) DC.	Compositae	Leaves: Common cold, fever (children)	Medicine	HH	Native	141
Bougainvillea glabra Choisy	Nyctaginaceae	Ornamentals	Environmental use	HH	Exotic	187
Brassica rapa L.	Brassicaceae	Leaves: Vegetables	Food	KTN	Exotic	197
Brugmansia × *candida* Pers.	Solanaceae	Ornamentals	Environmental use	MT	Native	251
Bryophyllum pinnatum (Lam.) Oken	Crassulaceae	Ornamentals	Environmental use	KTN, MT	Exotic	091

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Cajanus cajan (L.) Millsp.	Leguminosae	Leaves: Vegetables	Food	KTN, MT	Exotic	019
Caladium bicolor (Aiton) Vent.	Araceae	Ornamentals	Environmental use	KTN	Exotic	084
Calamus sp.	Arecaceae	Leaves: Vegetables	Food	HH	Native	020
Canna indica L.	Cannaceae	Ornamentals	Environmental use	MT	Exotic	192
		Root: Starch	Food	KTN, MT	Exotic	
Cannabis sativa L.	Cannabaceae	Fibres: Clothes	Material	KTN	Native	131
Capsicum annuum L.	Solanaceae	Fruits: Spices	Food additive	HH, KTN,	Exotic	245
Carica papaya L.	Caricaceae	Fruits: Vegetables, Dessert fruits	Food	HH, KTN,	Exotic	199
Caryota mitis Lour.	Arecaceae	Leaves: Vegetables	Food	HH	Native	022

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Centella asiatica (L.) Urb.	Apiaceae	Leaves: Vegetables	Food	HH, KTN,	Exotic	147
Cestrum nocturnum L.	Solanaceae	Ornamentals	Environmental use	KTN	Exotic	258
Chromolaena odorata (L.) R. M. King & H. Rob.	Compositae	Leaves: Bleeding wound	Medicine	HH	Exotic	135
Chrysophyllum cainito L.	Sapotaceae	Dessert fruits	Food	MT	Exotic	238
Chrysopogon zizanioides (L.) Roberty	Poaceae	Ornamentals	Environmental use	KTN	Native	
Citrus aurantifolia (Christm.) Swingle	Rutaceae	Fruit juice: Souring agents	Food additive	HH, KTN,	Native	094
Citrus hystrix DC.	Rutaceae	Fruit juice: Souring agents	Food additive	HH, KTN,	Exotic	227
Citrus maxima (Burm.) Merr.	Rutaceae	Dessert fruits	Food	HH, KTN,	Exotic	250
Citrus medica L.	Rutaceae	Fruits: Common cold, fever	Medicine	KTN	Exotic	246

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Cleome spinosa Jacq.	Cleomaceae	Leaves: Vegetables	Food	KTN	Native	182
Clerodendrum glandulosum Lindl.	Lamiaceae	Ornamentals	Environmental use	HH, KTN	Native	023
		Leaves: Vegetables	Food	KTN	Native	
Coccinia grandis (L.) Voigt	Cucurbitaceae	Leaves: Vegetables	Food	KTN	Native	116
Cocos nucifera L.	Arecaceae	Dessert fruits	Food	HH, KTN	Exotic	005
Codiaeum variegatum (L.) Rumph. ex A. Juss.	Euphorbiaceae	Ornamentals	Environmental use	KTN	Exotic	097
Coffea arabica L.	Rubiaceae	Fruits	Selling	HH KTN,	Exotic	177
Coix lacryma-jobi var. *stenocarpa* Oliv.	Poaceae	Dry Fruits: Decorated clothhes	Material	MT	Native	024
Coix lacryma-jobi L.	Poaceae	Dry Fruits: Decorated clothhes	Material	MT	Exotic	007
Colocasia esculenta (L.) Schott	Araceae	Unspecified aerial parts: pigs	Animal Food	HH, KTN,	Native	098

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Cordyline fruticosa (L.) A. Chev.	Asparagaceae	Ornamentals	Environmental use	HH, KTN,	Exotic	117
Coriandrum sativum L.	Apiaceae	Fruits: Spices	Food additive	KTN	Exotic	153
Crateva religiosa G .Forst.	Capparaceae	Ornamentals	Environmental use	HH, KTN	Native	025
Crinum asiaticum L.	Amaryllidaceae	Ornamentals	Environmental use	HH, KTN	Native	132
Cucurbita moschata Duchesne	Cucurbitaceae	Fruits: Vegetable	Food	KTN, MT	Exotic	167
Cuphea hyssopifolia Kunth	Lythraceae	Ornamentals	Environmental use	HH, KTN,	Exotic	115
Curcuma aeruginosa Roxb.	Zingiberaceae	Rhizomes: Flatulence	Medicine	HH	Native	235
Curcuma angustifolia Roxb.	Zingiberaceae	Leaves: Chickens	Animal Food	HH	Native	243
Curcuma longa L.	Zingiberaceae	Rhizome: Spices	Food additive	HH, KTN,	Native	253
Curcuma sp.	Zingiberaceae	Ornamentals	Environmental use	KTN	Native	026

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Cymbopogon citratus (DC.) Stapf	Poaceae	Bulbs: Spices	Food additive	HH, KTN,	Exotic	191
Dillenia sp.	Dilleniaceae	Ornamentals	Environmental use	KTN	Native	029
Dimocarpus longan Lour.	Sapindaceae	Dessert fruits	Food	HH, KTN,	Native	237
Dioscorea alata L.	Dioscoreaceae	Root: Starch	Food	HH, KTN	Native	230
Dioscorea esculenta (Lour.) Burkill	Dioscoreaceae	Root: Starch	Food	HH	Native	169
Dioscorea pentaphylla L.	Dioscoreaceae	Root: Starch	Food	KTN	Native	179
Dracaena braunii Engl.	Asparagaceae	Ornamentals	Environmental use	KTN	Native	090
Dracaena fragrans (L.) Ker Gawl.	Asparagaceae	Ornamentals	Environmental use	HH, KTN,	Exotic	159
Dregea volubilis (L.f.) Benth. ex Hook.f.	Apocynaceae	Leaves: Vegetables	Food	HH	Native	161
Duranta erecta L.	Verbenaceae	Ornamentals	Environmental use	HH, KTN	Exotic	071

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Elaeagnus latifolia L.	Elaeagnaceae	Dessert fruits	Food	HH, KTN,	Native	213
Eryngium foetidum L.	Apiaceae	Leaves: Herbs	Food additive	HH, KTN,	Exotic	152
Erythrina stricta Roxb.	Leguminosae	Ornamentals	Environmental use	KTN	Native	030
Euphorbia cotinifolia L.	Euphorbiaceae	Ornamentals	Environmental use	KTN, MT	Exotic	212
Euphorbia milii Des Moul.	Euphorbiaceae	Ornamentals	Environmental use	HH, KTN,	Native	210
Euphorbia pulcherrima Willd. ex Klotzsch	Euphorbiaceae	Ornamentals	Environmental use	HH, KTN,	Exotic	211
Euphorbia sp.	Euphorbiaceae	Ornamentals	Environmental use	KTN	Native	031
Euphorbia tithymaloides L.	Euphorbiaceae	Ornamentals	Environmental use	KTN, MT	Exotic	122
Euphorbia viguieri Denis	Euphorbiaceae	Ornamentals	Environmental use	MT	Native	109

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Ficus auriculata Lour.	Moraceae	Fruits: Vegetable	Food	MT	Native	032
Ficus hispida L.f.	Moraceae	Dessert fruits	Food	KTN	Native	033
Ficus semicordata Buch.-Ham. ex Sm.	Moraceae	Dessert fruits	Food	KTN	Native	164
Ficus virens Aiton	Moraceae	Leaves: Vegetables	Food	HH	Native	034
Fraxinus griffithii C. B. Clarke	Oleaceae	Boundaries	Environmental use	KTN	Native	176
Gardenia jasminoides J. Ellis	Rubiaceae	Ornamentals	Environmental use	KTN, MT	Exotic	178
Gardenia sootepensis Hutch.	Rubiaceae	Ornamentals	Environmental use	KTN	Native	035
Gmelina arborea Roxb.	Lamiaceae	Flowers: Colouring (yellow)	Food additive	MT	Native	148
Gomphrena globosa L.	Amaranthaceae	Ornamentals	Environmental use	KTN, MT	Exotic	076
Gossypium sp.	Malvaceae	Fibres: Clothes	Material	MT	Native	036

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Hedychium aureum C. B. Clarke & H. Mann ex Baker	Zingiberaceae	Ornamentals	Environmental use	KTN	Native	037
Hibiscus rosa-sinensis L.	Malvaceae	Ornamentals	Environmental use	MT	Exotic	120
Hippeastrum johnsonii Bury	Amaryllidaceae	Ornamentals	Environmental use	KTN	Exotic	038
Homalocladium platycladum (F. Muell.) L. H. Bailey	Polygonaceae	Exudate: Centipede bite	Medicine	HH	Native	039
Houttuynia cordata Thunb.	Saururaceae	Leaves: Vegetables	Food	MT	Native	239
Ipomoea aquatica Forssk.	Convolvulaceae	Leaves: Vegetables	Food	MT	Native	106
Ipomoea batatas (L.) Lam.	Convolvulaceae	Unspecified aerial parts: pigs	Animal Food	KTN, MT	Exotic	151
Iresine herbstii Hook.	Amaranthaceae	Ornamentals	Environmental use	KTN	Exotic	041
Jatropha curcas L.	Euphorbiaceae	Ornamentals	Environmental use	KTN, MT	Exotic	145

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Kaempferia elegans (Wall.) Baker	Zingiberaceae	Ornamentals	Environmental use	KTN	Native	043
Kaempferia galanga L.	Zingiberaceae	Rhizomes: Flatulence	Medicine	KTN	Native	044
Kaempferia parviflora Wall. ex Baker	Zingiberaceae	Rhizomes: Body nourishment	Medicine	HH	Native	045
Kaempferia rotunda L.	Zingiberaceae	Rhizomes: Body pain	Medicine	HH	Native	046
Kalimeris indica (L.) Sch.Bip.	Compositae	Ornamentals	Environmental use	KTN	Exotic	198
Lablab purpureus (L.) Sweet	Leguminosae	Fruits: Vegetables	Food	KTN, MT	Native	233
Lasia spinosa (L.) Thwaites	Araceae	Inflorescences: Vegetables	Food	KTN	Native	085
Leucaena leucocephala (Lam.) de Wit	Leguminosae	Leaves: Vegetables	Food	MT	Exotic	108
Litchi chinensis Sonn.	Sapindaceae	Dessert fruits	Food	HH	Exotic	180
Luffa cylindrica (L.) M. Roem.	Cucurbitaceae	Fruits: Vegetables	Food	HH, KTN,	Native	118

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Macadamia tetraphylla L. A. S. Johnson	Proteaceae	Nut	Food	KTN	Native	049
Macaranga denticulata (Blume) Müll. Arg.	Euphorbiaceae	Containers: Leaves	Material	KTN	Native	050
Mangifera indica L.	Anacardiaceae	Dessert fruits, Leaves: Vegetables	Food	HH, KTN,	Native	080
Manihot esculenta Crantz	Euphorbiaceae	Roots: Starch	Food	HH KTN,	Exotic	162
Markhamia stipulata (Wall.) Seem.	Bignoniaceae	Fruits: Vegetables	Food	HH	Native	051
Mentha longifolia (L.) L.	Lamiaceae	Leaves: Herbs	Food additive	KTN, MT	Native	149
Mirabilis jalapa L.	Nyctaginaceae	Ornamentals	Environmental use	HH	Exotic	195
Momordica charantia L.	Cucurbitaceae	Fruits: Vegetables	Food	KTN, MT	Native	111
Morus alba L.	Moraceae	Dessert fruits	Food	HH	Exotic	139
Nelumbo nucifera Gaertn.	Nelumbonaceae	Ornamentals	Environmental use	KTN	Native	160

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Neomarica longifolia (Link & Otto) Sprague	Iridaceae	Ornamentals	Environmental use	KTN	Exotic	217
Nicotiana tabacum L.	Solanaceae	Leaves: Smoking	Social use	HH, KTN,	Exotic	203
Ocimum × *africanum* Lour.	Lamiaceae	Leaves: Herbs	Food additive	HH	Native	150
Ocimum basilicum L.	Lamiaceae	Leaves: Herbs	Food additive	KTN	Exotic	209
Ocimum gratissimum L.	Lamiaceae	Leaves: Herbs	Food additive	HH, MT	Exotic	092
Ocimum tenuiflorum L.	Lamiaceae	Leaves: Herbs	Food additive	HH	Native	166
Opuntia sp.	Cactaceae	Ornamentals	Environmental use	KTN, MT	Native	053
Oroxylum indicum (L.) Kurz	Bignoniaceae	Fruits: Vegetables	Food	MT	Native	144
Oxalis acetosella L.	Oxalidaceae	Leaves: Vegetables	Food	KTN	Exotic	223
Pandanus amaryllifolius Roxb.	Pandanaceae	Leaves: Essences	Food additive	HH, KTN,	Exotic	228

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Pandanus sp.	Pandanaceae	Ornamentals	Environmental use	HH	Native	054
Passiflora edulis Sims	Passifloraceae	Dessert fruits	Food	MT	Exotic	181
Passiflora laurifolia L.	Passifloraceae	Dessert fruits	Food	HH	Exotic	205
Persea americana Mill.	Lauraceae	Dessert fruits	Food	KTN	Exotic	229
Persicaria sp.	Polygonaceae	Leaves: Herbs	Food additive	KTN	Native	055
Phlogacanthus pulcherrimus T. Anderson	Acanthaceae	Leaves: Vegetables	Food	HH	Native	075
Phrynium imbricatum Roxb.	Marantaceae	Containers: Leaves	Material	KTN	Native	129
Phyllanthus acidus (L.) Skeels	Phyllanthaceae	Dessert fruits	Food	MT	Exotic	248
Piper betle L.	Piperaceae	Leaves: Chewing	Social use	HH, KTN	Native	185
Piper samemtosum Roxb.	Piperaceae	Leaves: Vegetables	Food	MT	Native	186
		Leaves: Herbs	Food additive	HH, MT	Native	
Plantago major L.	Plantaginaceae	Leaves: Vegetables	Food	HH	Native	224

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Plectranthus amboinicus (Lour.) Spreng.	Lamiaceae	Leaves: Insect bite	Medicine	MT	Exotic	218
Plectranthus scutellarioides (L.) R. Br.	Lamiaceae	Ornamentals	Environmental use	KTN	Exotic	219
Plumeria obtusa L.	Apocynaceae	Ornamentals	Environmental use	MT	Exotic	123
Plumeria rubra L.	Apocynaceae	Ornamentals	Environmental use	KTN	Exotic	083
Podocarpus neriifolius D. Don	Podocarpaceae	Stems: Body nourishment	Medicine	KTN	Native	056
Polygonum odoratum Lour.	Polygonaceae	Leaves: Herbs	Food additive	HH, KTN,	Native	225
Polyscias guilfoylei (W. Bull) L. H. Bailey	Araliaceae	Ornamentals	Environmental use	KTN	Exotic	057
Portulaca grandiflora Hook.	Portulacaceae	Ornamentals	Environmental use	MT	Exotic	247
Portulaca pilosa L.	Portulacaceae	Ornamentals	Environmental use	KTN	Native	163

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Proiphys amboinensis (L.) Herb.	Amaryllidaceae	Ornamentals	Environmental use	KTN	Exotic	091
Prunus cerasoides Buch.-Ham. ex D. Don	Rosaceae	Ornamentals	Environmental use	MT	Native	058
Prunus persica (L.) Batsch	Rosaceae	Ornamentals	Environmental use	KTN	Exotic	059
		Leaves: Vegetables	Food	KTN	Exotic	
Psidium guajava L.	Myrtaceae	Dessert fruits	Food	HH,KTN, MT	Exotic	221
Remusatia pumila (D. Don) H. Li & A. Hay	Araceae	Ornamentals	Environmental use	KTN	Native	060
Rhinacanthus nasutus (L.) Kurz	Acanthaceae	Leaves: Fever	Medicine	MT	Native	172
Ricinus communis L.	Euphorbiaceae	Ornamentals	Environmental use	KTN	Native	171
Rosa sp.	Rosaceae	Ornamentals	Environmental use	MT	Exotic	226
Rumex crispus L.	Polygonaceae	Leaves: Vegetables	Food	MT	Native	240

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Saccharum officinarum L.	Poaceae	Cane Juice	Food	KTN, MT	Exotic	188
Salix tetrasperma Roxb.	Salicaceae	Ornamentals	Environmental use	HH, KTN	Native	170
Sambucus canadensis L.	Adoxaceae	Ornamentals	Environmental use	HH, MT	Exotic	088
Sambucus javanica Blume	Adoxaceae	Leaves: Body pain	Medicine	KTN	Native	112
		Leaves: Body pain	Medicine	KTN	Native	
Sandoricum koetjape (Burm.f.) Merr.	Meliaceae	Dessert fruits	Food	HH	Native	130
Sansevieria trifasciata Prain	Asparagaceae	Ornamentals	Environmental use	KTN	Exotic	154
Sauropus androgynus (L.) Merr.	Phyllanthaceae	Leaves: Vegetables	Food	HH, KTN	Native	241
Scadoxus multiflorus (Martyn) Raf.	Amaryllidaceae	Ornamentals	Environmental use	KTN	Exotic	119
Schima wallichii Choisy	Theaceae	Ornamentals	Environmental use	MT	Native	244

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Scoparia dulcis L.	Plantaginaceae	Leaves: Vegetables	Food	HH	Native	168
Sechium edule (Jacq.) Sw.	Cucurbitaceae	Fruits: Vegetables	Food	HH, KTN,	Exotic	175
Senna alata (L.) Roxb.	Leguminosae	Leaves: Laxative	Medicine	HH	Exotic	216
Senna occidentalis (L.) Link	Leguminosae	Leaves: Vegetables	Food	HH	Exotic	062
Senna spectabilis (DC.) H. S. Irwin & Barneby	Leguminosae	Ornamentals	Environmental use	HH	Exotic	063
Sesamum indicum L.	Pedaliaceae	Seeds: Essence	Food additive	KTN	Exotic	127
Sisyrinchium palmifolium L.	Iridaceae	Ornamentals	Environmental use	KTN	Native	110
		Leaves: Insect bite	Medicine	HH	Native	
Solanum aethiopicum L.	Solanaceae	Fruits: Vegetables	Food	MT	Native	260
Solanum americanum Mill.	Solanaceae	Leaves: Vegetables	Food	MT	Native	254
Solanum erianthum D. Don	Solanaceae	Leaves: Tools (washing dish)	Material	HH, MT	Native	204

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Solanum incanum L.	Solanaceae	Fruits: Vegetables	Food	HH, KTN,	Native	261
Solanum indicum L.	Solanaceae	Fruits: Vegetables	Food	HH, KTN,	Native	262
Solanum melongena L.	Solanaceae	Fruits: Vegetables	Food	HH, KTN,	Native	236
Solanum spirale Roxb.	Solanaceae	Leaves: Vegetables	Food	HH	Native	065
Solanum torvum Sw.	Solanaceae	Fruits: Vegetables	Food	HH, KTN,	Native	252
Solanum virginianum L.	Solanaceae	Fruits: Vegetables	Food	MT	Native	255
Solanumm lycopesicum L.	Solanaceae	Fruits: Souing agent	Food additive	HH, KTN,	Native	259
		Fruits	Selling	MT	Native	
Sphagneticola trilobata (L.) Pruski	Compositae	Ornamentals	Environmental use	HH	Exotic	067
Spondias pinnata (L. f.) Kurz	Anacardiaceae	Dessert fruits	Food	HH, MT	Native	082

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Sterculia villosa Roxb.	Malvaceae	Containers: Leaves	Material	KTN	Native	068
Syzygium malaccense (L.) Merr. & L. M. Perry	Myrtaceae	Dessert fruits	Food	KTN	Native	157
Syzygium nervosum A. Cunn. ex DC.	Myrtaceae	Dessert fruits	Food	HH	Exotic	158
Tabernaemontana pandacaqui Lam.	Apocynaceae	Ornamentals	Environmental use	HH	Exotic	095
Tagetes erecta L.	Compositae	Ornamentals	Environmental use	KTN	Exotic	174
Tamarindus indica L.	Leguminosae	Dessert fruits	Food	HH,KTN MT	Exotic	146
Thunbergia erecta (Benth.) T. Anderson	Acanthaceae	Ornamentals	Environmental use	HH	Exotic	086
Thysanolaena latifolia (Roxb. ex Hornem.) Honda	Poaceae	Cane: Containers	Material	KTN	Native	189
Toddalia asiatica (L.) Lam.	Rutaceae	Leaves: Vegetables	Food	KTN	Native	099
Trevesia palmata (Roxb. ex Lindl.) Vis.	Araliaceae	Inflorescences: Vegetables	Food	HH	Native	103

Table 4.9 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Tupistra muricata (Gagnep.) N. Tanaka	Asparagaceae	Inflorescences: Vegetables	Food	KTN	Native	070
Turnera ulmifolia L.	Passifloraceae	Ornamentals	Environmental use	KTN	Exotic	257
Vigna unguiculata (L.) Walp.	Leguminosae	Fruits: Vegetables	Food	HH, KTN	Exotic	128
Zanthoxylum rhetsa DC.	Rutaceae	Fruits	Selling	HH	Native	074
Zephyranthes rosea Lindl.	Amaryllidaceae	Ornamentals	Environmental use	KTN	Exotic	138
Zingiber montanum (J. Koenig) Link ex A.Dietr.	Zingiberaceae	Rhizome: Body nourishment	Medicine	HH, KTN,	Native	201
Zingiber officinale Roscoe	Zingiberaceae	Rhizome: Spices	Food additive	KTN	Native	249
Zingiber ottensii Valeton	Zingiberaceae	Rhizomes: Flatulence	Medicine	KTN	Native	234
Zinnia elegans Jacq.	Compositae	Ornamentals	Environmental use	MT	Native	184

Mango (*Mangifera indica* L.) is the most dominant woody species in Huai Hai and Mae Tom. However coffee (*Coffea arabica* L.) is the most dominant woody species in Khun Tuen Noi (Table 4.11) followed by mango. Among these dominant species, four species were presented in all the villages: mango, guava (*Psidium guajava* L.), jackfruit (*Artocarpus heterophyllus* Lam.), and lime *Citrus* × *aurantifolia* (Christm.) Swingle.

Like in the dominance list, mango, lime, and jackfruit were present in all the villages and among the most common species (Table 4.12). There were many species that were not noted as dominant but were still among the most common species including *Acacia pennata* (L.) Willd. subsp. *insuavis* (Lace) I. C. Nielsen, *Dimocarpus longan* Lour., *Oroxylum indicum* (L.) Kurz, *Sambucus canadensis* L., and *Spondias pinnata* (L.f.) Kurz.

Most woody plant individuals in all villages were in the category *food* while the second largest category, when measured as the number of individuals, was *environmental use* (Fig. 4.12). These two groups contributed more than 70% of all the woody plant individuals in all the villages. The trend of number of woody species (Fig. 4.13) was a little bit different from the trend of number of individuals. The largest category in Huai Hia and Mae Tome was *food*. In Khun Tuen Noi, the number of woody species in the *environmental use* category was a bit higher than the number in the *food* category. Moreover, the sum of these two categories contributed more than 70% of all the species found in all villages.

Table 4.10 Diversity indices of woody plants in the the 75 Karen homegardens in northern Thailand presented individually for each village

Dieversity index		Huai Hia	Khun Tuen Noi	Mae Tam
Richness	Median	7.50	10.50	6.00
	Max	17.00	18.00	12.00
	Min	2.00	3.00	3.00
Abundance	Median	13.50	16.00	13.00
	Max	33.00	45.00	48.00
	Min	3.00	3.00	6.00
Shannon	Median	2.00	1.71	2.21
	Max	2.49	2.34	2.63
	Min	1.30	1.01	1.17
Evenness	Median	0.82	0.88	0.78
	Max	1.00	0.96	0.92
	Min	0.66	0.53	0.57

Table 4.11 The most dominant woody species in homegardens in three Karen villages (arranged in order of dominance).

Huai Hia	Khun Thun Noi	Mae Tom
Artocarpus heterophyllus Lam.	*Areca catechu* L.	*Artocarpus heterophyllus* Lam.
Bamboosa sp.	*Artocarpus heterophyllus* Lam.	*Carica papaya* L.
Citrus aurantifolia (Christm.) Swingle	*Citrus aurantifolia* (Christm.) Swingle	*Citrus aurantifolia* (Christm.) Swingle
Citrus hystrix DC.	*Coffea arabica* L.	*Citrus hystrix* DC.
Citrus maxima (Burm.f.) Merr.	*Fraxinus griffithii* C. B. Clarke	*Coffea arabica* L.
Duranta erecta L.	*Mangifera indica* L.	*Jatropha curcas* L.
Mangifera indica L.	*Manihot esculenta* Crantz	*Mangifera indica* L.
Psidium guajava L.	*Psidium guajava* L.	*Psidium guajava* L.

Table 4.12 The most common (total number of homegardens found) woody species in homegardens of three Karen villages, arranged in order of commonness.

Huai Hia	Khun Thun Noi	Mae Tom
Artocarpus heterophyllus Lam.	*Acacia pennata* (L.) Willd. subsp. *insuavis* (Lace) I. C. Nielsen	*Artocarpus heterophyllus* Lam.
Bamboosa sp.	*Artocarpus heterophyllus* Lam.	*Carica papaya* L.
Citrus aurantifolia (Christm.) Swingle	*Citrus aurantifolia* (Christm.) Swingle	*Citrus aurantifolia* (Christm.) Swingle
Citrus maxima (Burm.f.) Merr.	*Coffea arabica* L.	*Citrus hystrix* DC.
Dimocarpus longan Lour.	*Ficus semicordata* J. E. Smith	*Mangifera indica* L.

Table 4.12 (continued)

Huai Hia	Khun Thun Noi	Mae Tom
Mangifera indica L.	*Fraxinus griffithii* C. B. Clarke	*Oroxylum indicum* (L.) Kurz
Psidium guajava L.	*Mangifera indica* L.	*Psidium guajava* L.
Sambucus canadensis L.	*Psidium guajava* L.	*Sambucus canadensis* L.
	Syzygium malaccense (L.) Merr. & L.M.Perry	*Spondias pinnata* (L.f.) Kurz

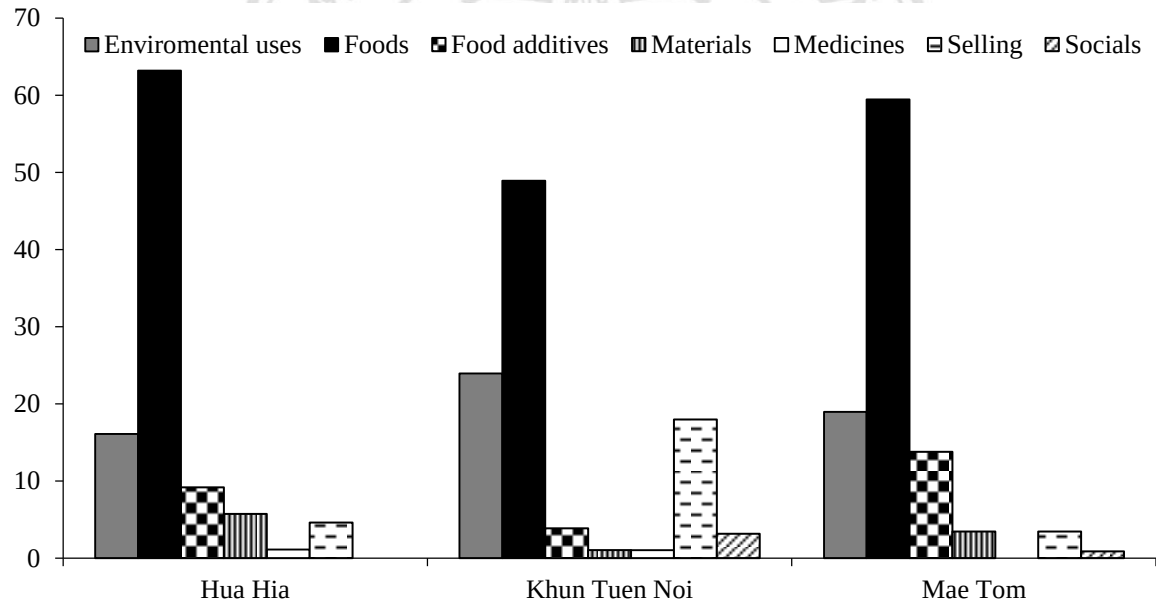

Fig. 4.12 Percentage of woody plant individuals in each use category in homegardens in three Karen villages.

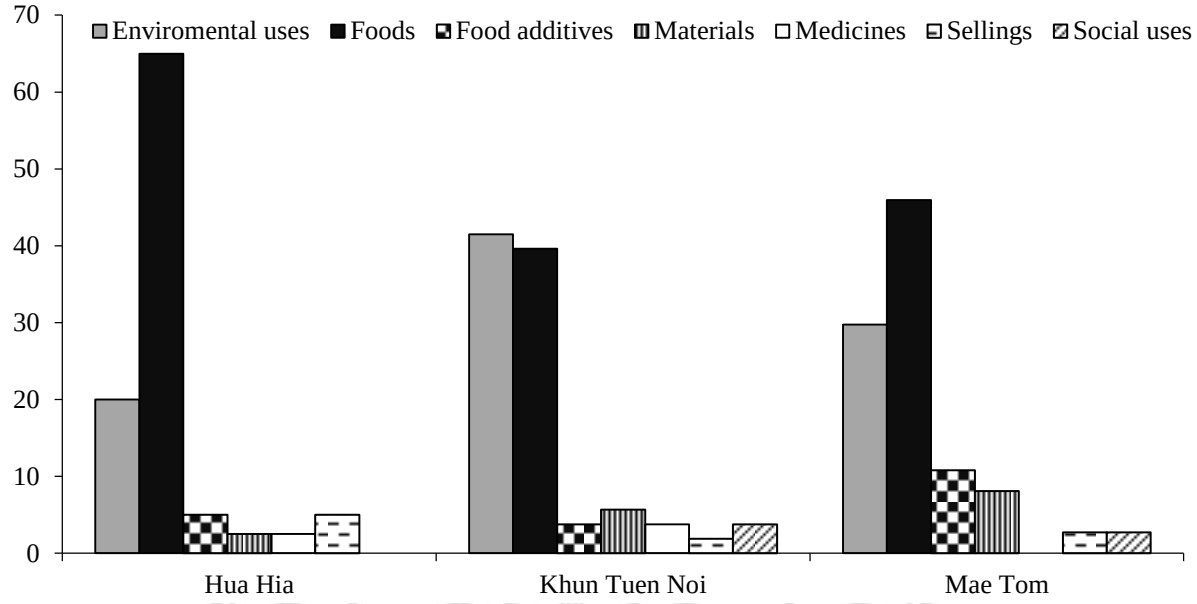

Fig. 4.13 Percentage of woody plant species found in each use category in homegardens in three Karen villages.

Nearly all woody species and individuals were grown in the yards (Y) or in the homegarden borders (HB). Only a few species were planted in pots (P) or fenced plot margins (FPM) (Fig. 4.16 and 4.17). The woody plants in pots (P) included coffee and mango in Khun Tuen Noi, and *Gardenia jasminoides* J. Ellis in Mae Tom. Two species were found in fenced plot margins (FPM) included the coffee and mango in Khun Tuen Noi.

There were a total of 158 species of non-woody plants. Like woody species, most non-woody species belonged to the *food* and *environmental use* categories (Fig. 4.18). These two categories contributed 60–70% of all the non-woody species in each village. Khun Tuen Noi had the lowest proportion of *food* species, compared to the other villages, while Mae Tom had the highest proportion in this category. In all villages the third largest use category was *food additivs* but overall this group fell into the fourth largest, after the category *medicines*. Only tomato (*Solanumm lycopesicum* L.) was noted as a commercial crop in Mae Tome village.

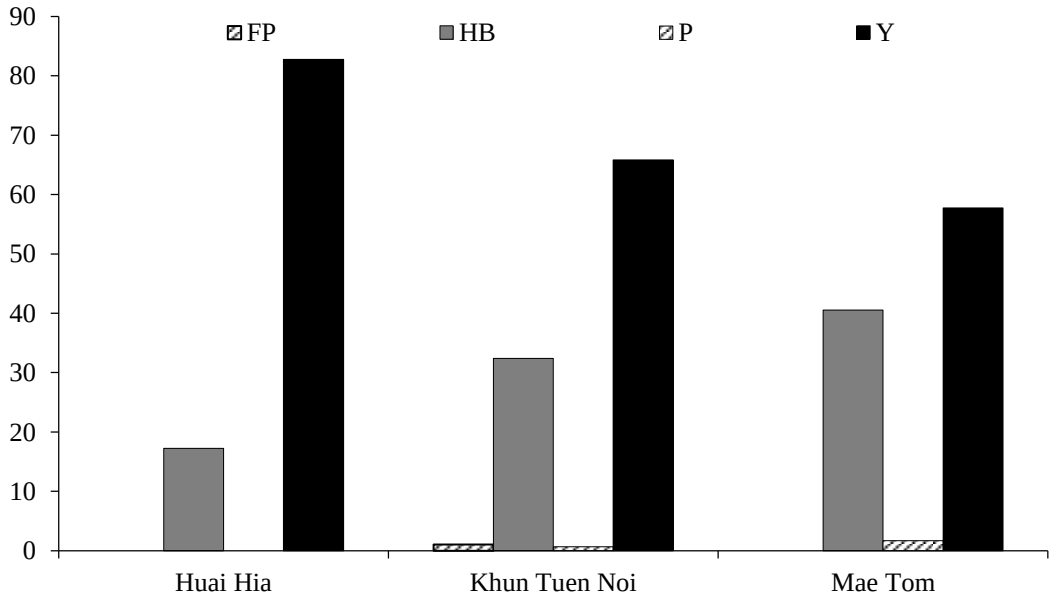

Fig. 4.14 Percentage of woody plant individuals in five horizontal zones (FP = fence plot, HB = homegarden boundary, P = pot, Y = yard) in homegardens of three Karen villages.

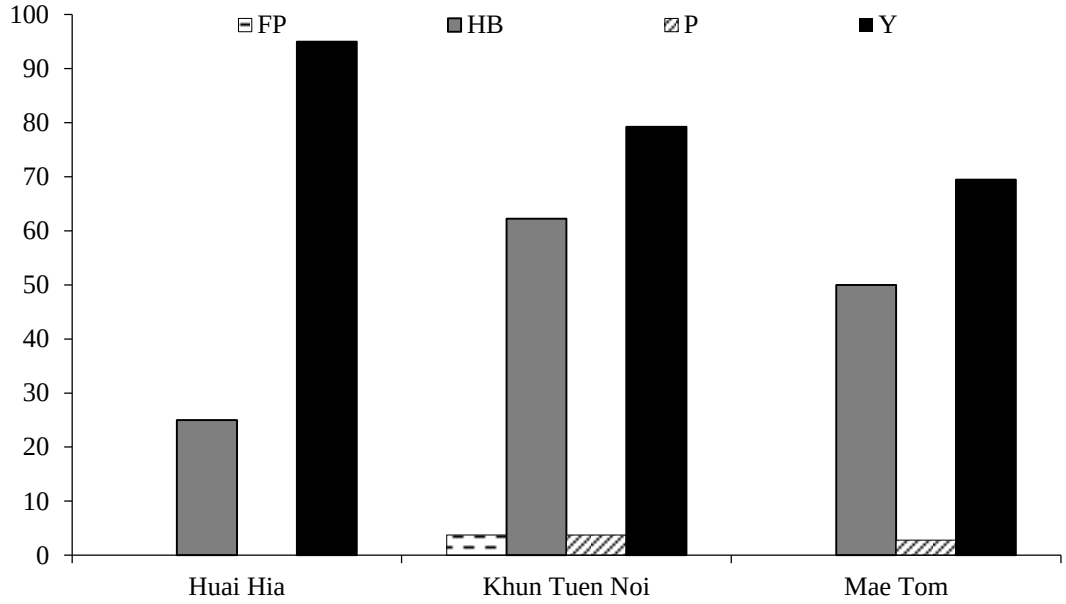

Fig. 4.15 Percentage of woody species in four horizontal zones in homegardens of three Karen villages (FP = fence plot, HB = homegarden boundary, P = pot, Y = yard).

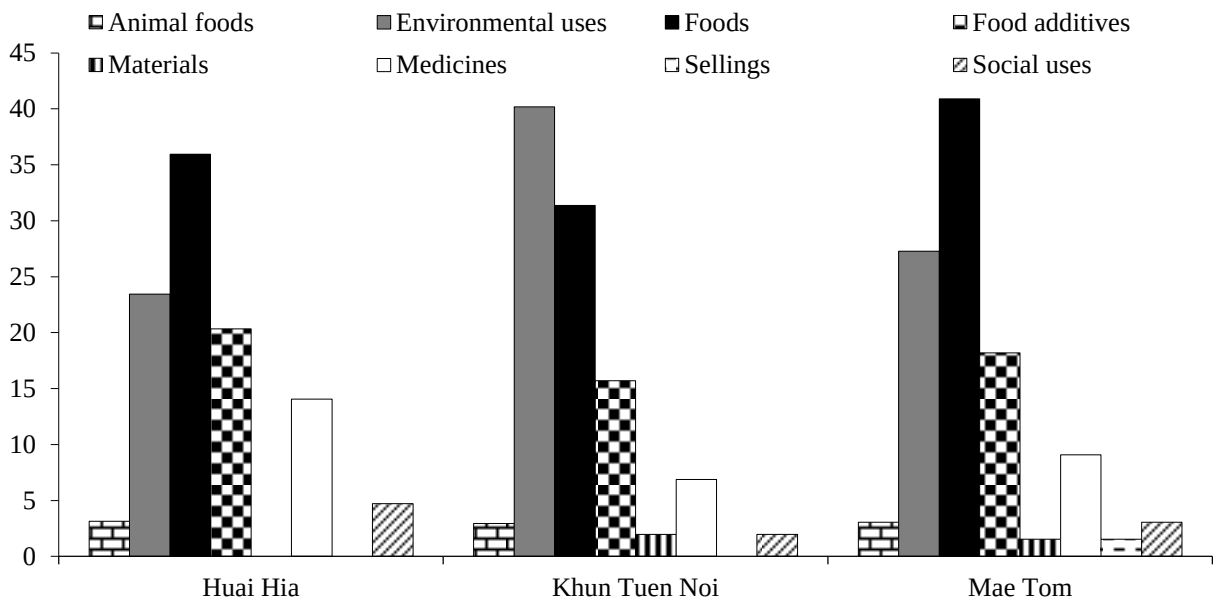

Fig. 4.16 Percentage of non-woody species in eight use categories in homegardens of three Karen villages

Non-woody species: Function, commonness, and horizontal distribution

The list of the most common non-woody species included very different species in each village (Table 4.13). Only *Colocasia esculenta* (L.) Schott, which was used mostly for feeding pigs, was one of the most common species in all villages. Most species were noted as the most common in only one village.

Most species of non-woody plants were located in the homegarden yard (Fig. 4.17). This zone had 75–80% of the all the species in each homegarden. Homegarden boundaries were another important zone with 20–35% of all the non-woody species found in the homegardens. Very few species., such as *Colocasia esculenta* (L.) Schott and lemon grass (*Cymbopogon citratus* Stapf) were found at fenced margin zones.

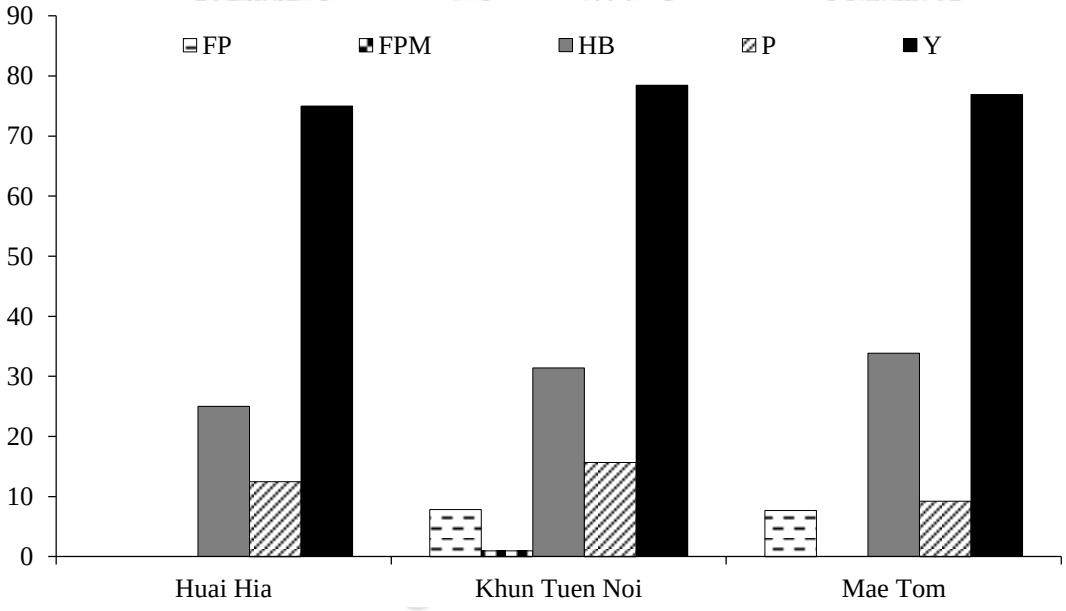

Fig. 4.17 Percentage of non-woody species in five horizontal zones in homegardens in three Karen villages (FP = fenced plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard)

Table 4.13 The most common non-woody species in homegardens of three Karen villages (arranged in order of commoness).

Huai Hia	Khun Tuen Noi	Mae Tom
Capsicum frutescens L.	*Colocasia esculenta* (L.) Schott	*Cymbopogon citratus* Stapf
Curcuma longa L.	*Curcuma longa* L.	*Solanum incanum* L.
Colocasia esculenta (L.) Schott	*Alocasia cucullata* (Lour.) G. Don	*Colocasia esculenta* (L.) Schott
Cymbopogon citratus Stapf	*Solanumm lycopesicum* L.	*Solanumm lycopesicum* L.
Eryngium foetidum L.	*Solanum melongena* L.	*Nicotiana tabacum* L.
Solanum melongena L.	*Allium hookeri* Thwaites	*Acmella oleracea* (L.) R. K. Jansen
Zingiber montanum (J.Koenig) Link ex A.Dietr.	*Nicotiana tabacum* L.	*Allium hookeri* Thwaites
	Haemanthus multiflorus (Tratt.) Martyn	*Canna indica* L.
		Euphorbia pulcherrima Willd. ex Klotzsch

4.3 Lahu Homegarden

General characteristics

Lahu people kept most of their plants within yards and homegarden boundaries. There were plants in these zones in nearly all the studied homegardens. Generally, Lahu homegarden were composed without fences or hedgerows around the house. Fences were usually found only at the front of the homegarden which is connected to the village road. The ground was clear and most plants were kept in the part of the homegardens away from the village road (Fig. 4.18).

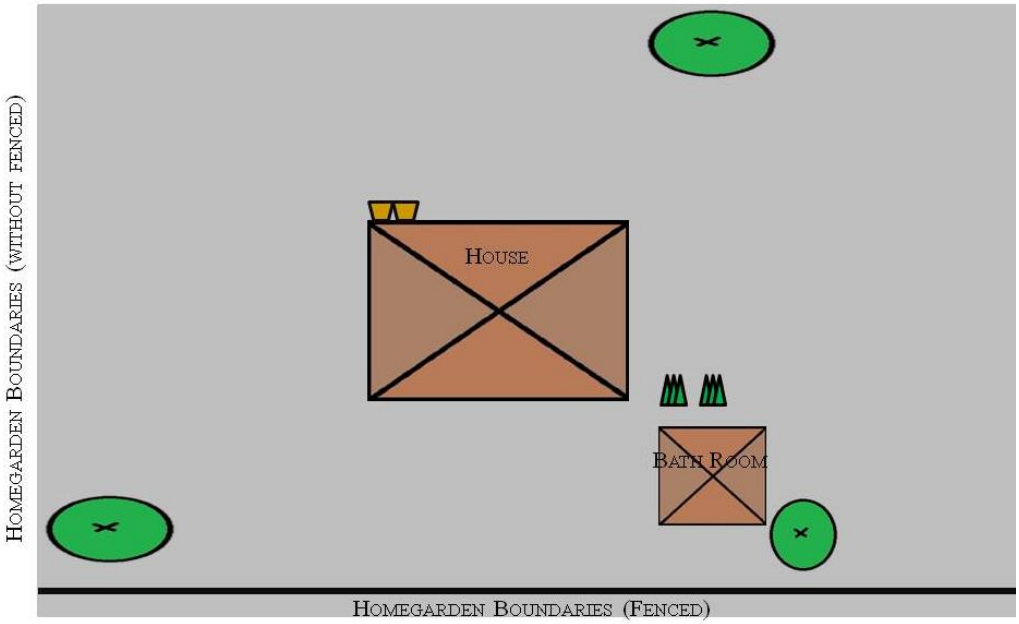

Fig. 4.18 The diagram of Lahu homegarden

Plant species and diversity in Lahu homegardens

A total of 108 species were recorded from two Lahu villages (Table 4.14), 58 and 80 spp. in Muser Pak Tang and Huai Phak Dap, respectively. The average number of species per homegarden in Muser Pak Tang and Huai Phak Dap was 12 and 13, respectively. Most species in all villages represented the categories *food* and

environmental use. These two categories contributed 70% and 80% of the all species found in Muser Pak Tang and Huai Phak Dap, respectively. *Food* was the largest category followed by *environmental use* and *food additives*, the orders were similar in these villages.

Distribution and composition in zones

The yards (Y) and homegarden boundaries (HB) were the most important zones of the homegardens in both Lahu villages (Fig. 4.19). Nearly all yards and homegarden boundaries in Lahu homegardens had plants. The other horizontal zones included fenced plots and pots which were found in 20% of all studied homegardens in both villages.

Table 4.14 Two Lahu villages where the homegardens were examined for plant species diversity, zonification, and use categories

Village	Muser Pak Tang	Huai Phak Dap
Geographic coordinates	N 17°34'09.20" E098°31'26.88"	N19 °13'47.96" E98° 54'38.42"
Elevation (m.a.s.l.)	1306	593
No. of generation since foundation	2	2
No. of studied homegardens (% of total in the village)	60 (20)	40 (50)
Distance from nearest urban center (length of dirt road)		
No. of species (total 108)	58	80
No. of plant families	32	41
Mean of species in each homegarden	12	13

Table 4.14 (continued)

Village	Muser Pak Tang	Huai Phak Dap
No. of environmental use species (%)	7 (12%)	20 (25%)
No. of food species (%)	34 (59%)	49 (61%)
No. of food additive species (%)	8 (13%)	7 (9%)
No. of material species (%)	4 (7%)	2 (2%)
No. of medicinal species (%)	3 (5%)	3 (4%)
No. of selling species (%)	1 (2%)	1 (1%)
No. of social use species (%)	2 (3%)	3 (4%)
Mean of animal food species/homegarden	0	1
Mean of environmental use species /homegarden	1	3
Mean of food species /homegarden	**7**	10
Mean of food additive species /homegarden	1	3
Mean of material species /homegarden	1	1
Mean of medicinal species /homegarden	0.4	2
Mean of social use species /homegarden	1	2

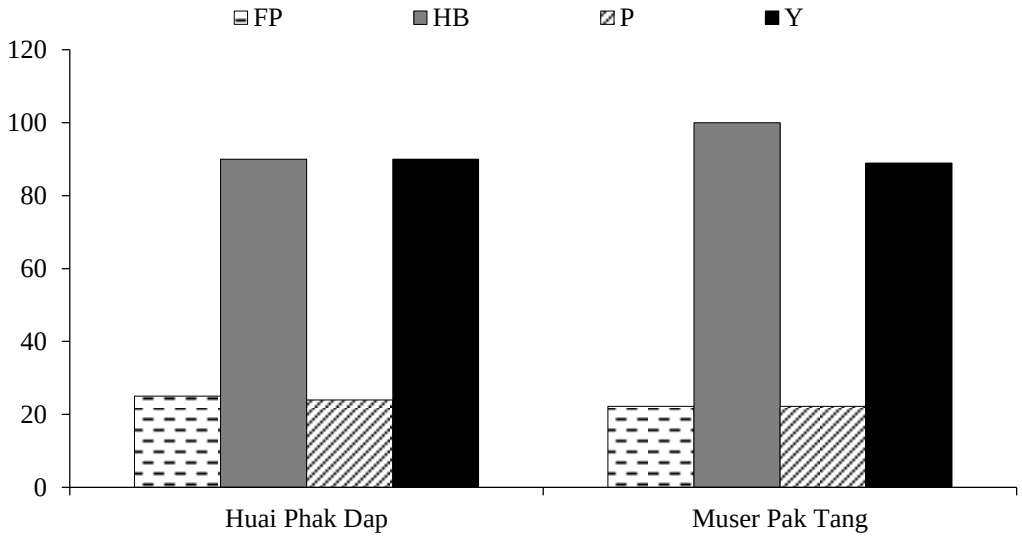

Fig.4.19 Percentage of zonation presented in homegardens of two Lahu villages. (FP = fence plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

Table 4.15 Species found in homegardens in two Lahu villages and their use and use categories with indication of village (HDP: Huai Phak Dap, MPT: Muser Pak Tang)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Abrus precatorius L.	Leguminosae	Leaves: Chewing with betel	Social use	HPD	Native	482
Abutilon theophrasti Medik.	Malvaceae	Stems: Back aches	Medicine	HPD	Native	539
Acacia concinna (Willd.) DC.	Leguminosae	Fruits: Souing agent	Food additive	HPD	Native	488
Acacia pennata subsp. *insuavis* (Lace) I. C. Nielsen	Leguminosae	Leaves: Vegetables	Food	HPD, MPT	Native	476
Acmella oleracea (L.) R. K. Jansen	Compositae	Aerial part: Vegetables	Food	HPD	Native	493
Acorus gramineus Aiton	Acoraceae	Leaves: Cold and Fever	Medicine	HPD	Exotic	495
Ageratina adenophora (Spreng.) R. M. King & H. Rob.	Compositae	Leaves: Bleeding wound	Medicine	MPT	Exotic	506
Allium hookeri Thwaites	Amaryllidaceae	Root: Spices	Food additive	HPD, MPT	Native	497
Aloe vera (L.) Burm.f.	Xanthorrhoeaceae	Leaves: Skin burned	Medicine	HPD	Exotic	540

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Alpinia galanga (L.) Willd.	Zingiberaceae	Rhizome: Spices	Food additive	HPD, MPT	Exotic	545
Alstonia scholaris (L.) R. Br.	Apocynaceae	Shade	Environmental use	HPD, MPT	Native	478
Ananas comosus (L.) Merr.	Bromeliaceae	Dessert fruits	Food	HPD, MPT	Exotic	544
Andrographis paniculata (Burm.f.) Nees	Acanthaceae	Leaves: Fever	Medicine	HPD	Exotic	485
Artemisia lactiflora Wall. ex DC.	Compositae	Leaves: Body nourishment	Medicine	MPT	Exotic	592
Artocarpus heterophyllus Lam.	Moraceae	Dessert fruits	Food	HPD, MPT	Exotic	479
Baccaurea ramiflora Lour.	Phyllanthaceae	Dessert fruits	Food	MPT	Native	583
Baliospermum calycinum Müll. Arg.	Euphorbiaceae	Exudates: Mouth ulcer	Medicine	HPD	Native	520
Bauhinia purpurea L.	Leguminosae	Young leaves: Vegetables	Food	HPD	Exotic	535
Benincasa hispida (Thunb.) Cogn.	Cucurbitaceae	Fruits: Vegetables	Food	HPD	Exotic	502

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Blumea balsamifera (L.) DC.	Compositae	Leaves: Common cold, fever (children)	Medicine	MPT	Native	574
Bouea macrophylla Griff.	Anacardiaceae	Dessert fruits	Food	HPD	Native	549
Brassica rapa L.	Brassicaceae	Leaves: Vegetables	Food	HPD	Exotic	486
Calamus sp.	Arecaceae	Leaves: Vegetables	Food	MPT	Exotic	586
Camellia sinensis (L.) Kuntze	Theaceae	Leaves: Tea	Food	MPT	Native	570
Canna indica L.	Cannaceae	Root: Starch	Food	HPD	Exotic	543
Capsicum annuum L.	Solanaceae	Fruits: Spices	Food additive	HPD, MPT	Exotic	510
Carica papaya L.	Caricaceae	Fruits: Vegetables, Dessert fruits	Food	HPD, MPT	Exotic	500
Catharanthus roseus (L.) G. Don	Apocynaceae	Ornamentals	Environmental use	HPD	Exotic	514
Centella asiatica (L.) Urb.	Apiaceae	Leaves: Vegetables	Food	HPD	Exotic	523

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Citrus aurantiifolia (Christm.) Swingle	Rutaceae	Fruit juice: Souring agents	Food additive	HPD, MPT	Exotic	528
Citrus hystrix DC.	Rutaceae	Fruit juice: Souring agents	Food additive	HPD	Exotic	553
Citrus maxima (Burm.) Merr.	Rutaceae	Dessert fruits	Food	MPT	Exotic	579
Citrus reticulata Blanco	Rutaceae	Dessert fruits	Food	MPT	Exotic	582
Coffea arabica L.	Rubiaceae	Fruits	Selling	MPT	Exotic	572
Colocasia esculenta (L.) Schott	Araceae	Unspecified aerial parts: pigs	Animal food	HPD	Native	522
		Dessert fruits	Food	MPT	Native	575
Cordyline fruticosa (L.) A. Chev.	Asparagaceae	Ornamentals	Environmental use	HPD	Exotic	480
Coriandrum sativum L.	Apiaceae	Fruits: Spices	Food additive	HPD	Exotic	477
Crateva religiosa G. Forst.	Capparaceae	Leaves: Vegetables	Food	HPD	Native	504
Cucurbita moschata Duchesne	Cucurbitaceae	Fruits: Vegetable	Food	HPD	Exotic	548

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Curcuma longa L.	Zingiberaceae	Rhizome: Spices	Food additive	HPD, MPT	Native	557
Cymbopogon citratus (DC.) Stapf	Poaceae	Bulbs: Spices	Food additive	HPD, MPT	Exotic	481
Dimocarpus longan Lour.	Sapindaceae	Dessert fruits	Food	HPD, MPT	Native	532
Dioscorea alata L.	Dioscoreaceae	Root: Starch	Food	HPD	Native	551
Dracaena fragrans (L.) Ker Gawl.	Asparagaceae	Ornamentals	Environmental use	HPD	Exotic	560
Dregea volubilis (L.f.) Benth. ex Hook.f.	Apocynaceae	Leaves: Vegetables	Food	HPD	Native	484
Duranta erecta L.	Verbenaceae	Ornamentals	Environmental use	HPD, MPT	Exotic	562
Elaeagnus latifolia L.	Elaeagnaceae	Dessert fruits	Food	MPT	Native	590
Eleutherococcus trifoliatus (L.) S. Y. Hu	Araliaceae	Leaves: Vegetables	Food	HPD	Native	554
Engelhardtia spicata Lechen ex Blume	Juglandaceae	Wood: Tools	Material	MPT	Native	587

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Eryngium foetidum L.	Apiaceae	Leaves: Herbs	Food additive	HPD	Exotic	529
Euphorbia milii Des Moul.	Euphorbiaceae	Ornamentals	Environmental use	HPD, MPT	Native	563
Ficus virens Aiton	Moraceae	Leaves: Vegetables	Food	HPD	Native	489
Gardenia sp.	Rubiaceae	Ornamentals	Environmental use	MPT	Native	580
Gomphrena globosa L.	Amaranthaceae	Ornamentals	Environmental use	HPD	Exotic	512
		Flowers: Religion uses	Social use	HPD	Exotic	505
Hippeastrum × *johnsonii* Bury	Amaryllidaceae	Ornamentals	Environmental use	HPD	Native	491
Houttuynia cordata Thunb.	Saururaceae	Leaves: Vegetables	Food	HPD	Native	524
Hylocereus undatus (Haw.) Britton & Rose	Cactaceae	Dessert fruits	Food	HPD	Exotic	517
Ixora chinensis Lam.	Rubiaceae	Ornamentals	Environmental use	HPD	Exotic	487

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Ixora lucida R. Br. ex Hook.f.	Rubiaceae	Ornamentals	Environmental use	HPD	Native	501
Jatropha curcas L.	Euphorbiaceae	Ornamentals	Environmental use	HPD, MPT	Exotic	561
Lablab purpureus (L.) Sweet	Leguminosae	Fruits: Vegetables	Food	HPD, MPT	Native	564
Lantana camara L.	Verbenaceae	Ornamentals	Environmental use	HPD	Exotic	483
Litchi chinensis Sonn.	Sapindaceae	Dessert fruits	Food	MPT	Exotic	581
		Fruits	Selling	HPD	Exotic	498
Macadamia integrifolia Maiden & Betche	Proteaceae	Nut	Food	MPT	Exotic	537
Mangifera indica L.	Anacardiaceae	Dessert fruits, Leaves: Vegetables	Food	HPD, MPT	Native	559
Manihot esculenta Crantz	Euphorbiaceae	Roots: Starch	Food	HPD, MPT	Exotic	555
Maranta arundinacea L.	Marantaceae	Roots: Starch	Food	HPD	Exotic	525

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Melia azedarach L.	Meliaceae	Ornamentals	Environmental use	HPD, MPT	Native	556
Mentha longifolia (L.) L.	Lamiaceae	Leaves: Herbs	Food additive	HPD	Native	508
Mentha × *villosa* Huds.	Lamiaceae	Leaves: Herbs	Food additive	MPT	Exotic	519
Mirabilis jalapa L.	Nyctaginaceae	Ornamentals	Environmental use	HPD	Exotic	490
Momordica charantia L.	Cucurbitaceae	Fruits: Vegetables	Food	HPD	Native	494
Morus nigra L.	Moraceae	Dessert fruits	Food	HPD, MPT	Native	552
Mucuna macrocarpa Wall.	Leguminosae	Toys: Seeds	Material	MPT	Native	576
Nicotiana tabacum L.	Solanaceae	Leaves: Smoking	Social use	HPD, MPT	Exotic	565
Ocimum tenuiflorum L.	Lamiaceae	Leaves: Herbs	Food additive	HPD	Native	518
Oroxylum indicum (L.) Kurz	Bignoniaceae	Fruits: Vegetables	Food	HPD	Native	507
Passiflora edulis Sims	Passifloraceae	Dessert fruits	Food	HPD	Exotic	492
Passiflora laurifolia L.	Passifloraceae	Dessert fruits	Food	MPT	Exotic	588

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Persea americana Mill.	Lauraceae	Dessert fruits	Food	MPT	Exotic	571
Phlogacanthus pulcherrimus T. Anderson	Acanthaceae	Leaves: Vegetables	Food	HPD	Native	496
Phrynium imbricatum Roxb.	Marantaceae	Containers: Leaves	Material	HPD	Native	503
Phyllanthus acidus (L.) Skeels	Phyllanthaceae	Dessert fruits	Food	HPD	Exotic	509
Piper betle L.	Piperaceae	Leaves: Chewing	Social use	HPD, MPT	Native	550
Piper rostratum Roxb.	Piperaceae	Leaves: Vegetables	Food	HPD, MPT	Native	547
Prunus sp.	Rosaceae	Dessert fruits	Food	MPT	Native	578
Psidium guajava L.	Myrtaceae	Dessert fruits	Food	HPD, MPT	Exotic	546
Punica granatum L.	Lythraceae	Dessert fruits	Food	HPD	Exotic	511
Pyrus pyrifolia (Burm.f.) Nakai	Rosaceae	Dessert fruits	Food	HPD, MPT	Exotic	558

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Saccharum officinarum L.	Poaceae	Cane Juice	Food	HPD, MPT	Exotic	544
Sambucus canadensis L.	Adoxaceae	Ornamentals	Environmental use	MPT	Exotic	573
Sandoricum koetjape (Burm.f.) Merr.	Meliaceae	Dessert fruits	Food	MPT	Native	577
Sechium edule (Jacq.) Sw.	Cucurbitaceae	Fruits: Vegetables	Food	HPD, MPT	Exotic	542
Sesbania grandiflora (L.) Pers.	Leguminosae	Flower: Vegetables	Food	HPD	Exotic	513
Sida sp.	Malvaceae	Wood: Tools (broom)	Material	HPD	Native	526
Solanum aethiopicum L.	Solanaceae	Fruits: Vegetables	Food	MPT	Native	593
Solanum erianthum D. Don	Solanaceae	Leaves: Tools (washing dish)	Material	MPT	Native	589
Solanum incanum L.	Solanaceae	Fruits: Vegetables	Food	HPD	Native	530
Solanum indicum L.	Solanaceae	Fruits: Vegetables	Food	HPD	Native	531
Solanum lycopersicum L.	Solanaceae	Fruits: Souing agent	Food additive	MPT	Native	585

Table 4.15 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Solanum melongena L.	Solanaceae	Fruits: Vegetables	Food	MPT	Native	591
Solanum spirale Roxb.	Solanaceae	Leaves: Vegetables	Food	HPD	Native	527
Solanum torvum Sw.	Solanaceae	Fruits: Vegetables	Food	HPD, MPT	Native	566
Solanum tuberosum L.	Solanaceae	Fruits: Vegetables	Food	MPT	Exotic	584
Syzygium nervosum A. Cunn. ex DC.	Myrtaceae	Dessert fruits	Food	MPT	Exotic	596
Tamarindus indica L.	Leguminosae	Dessert fruits	Food	HPD, MPT	Exotic	567
Thysanolaena latifolia (Roxb. ex Hornem.) Honda	Poaceae	Cane: Containers	Material	HPD	Native	521
Trevesia palmata (Roxb. ex Lindl.) Vis.	Araliaceae	Inflorescences: Vegetables	Food	HPD, MPT	Native	568
Vigna unguiculata (L.) Walp.	Leguminosae	Fruits: Vegetables	Food	HPD	Exotic	533
Zea mays L.	Poaceae	Grains: Cereal	Food	HPD	Exotic	538
Zingiber officinale Roscoe	Zingiberaceae	Rhizome: Spices	Food additive	HPD	Native	534

Woody species: Diversity, dominance, function, and horizontal distribution

There were 29 woody species in Muser Pak Tang and Huai Phak Dap. Huai Phak Dap had higher median richness and more individuals in homegardens than Muser Pak Tang.

The Shannon scores in Muser Pak Tang and Huai Phak Dap were 1.8 and 1.9, respectively. The median of evenness in Huai Phak Dap was higher than Muser Pak Tang village. By the way both villages had very high evenness (Table 4.16).

There were two species which were noted as the most dominant species in both Lahu villages, both of them were edible fruit species (*Mangifera indica* L. and *Psidium guajava* L.) (Table 4.17). The other most dominant species in Muser Pak Tang included a social use species (*Camellia sinensis* (L.) Kuntze), a food species (*Trevesia palmate* (Roxb. ex Lindl.) Vis.), a material species (*Solanum erianthum* D.Don), and a commercial species (*Coffea arabica* L.). While the other most dominant species in Huai Phak Dap included two *environmental use* species (*Dracaena fragrans* (L.) Ker Gawl., and *Duranta erecta* L.) and two *food* species (*Carica papaya* L., and *Ficus virens* Aiton).

In the list of most common species (Table 4.18), there were four in both villages which included a *food additive* species (*Citrus* × *aurantifolia* (Christm.) Swingle) and other three *food* species (*Artocarpus heterophyllus* Lam., *Citrus* × *aurantifolia* (Christm.) Swingle, *Psidium guajava* L.). The other most common species in Muser Pak Tang included three *food* species (*Trevesia palmate* (Roxb. ex Lindl.) Vis., *Persea americana* Mill., and *Prunus* sp.). In Huai Pak Dap, the most common species included a *food* species (*Carica papaya* L.) and an ornamental species (*Dracaena fragrans* (L.) Ker Gawl.)

Most woody plant individuals and species in both villages were in the categories *food*, followed by *environmental use* (Fig. 4.20 and 4.21). These two categories included about 80% of both individuals and species found in both villages. Most of woody species and individuals in Lahu homegardens were grown in the yard (Y) and homegarden boundaries (HB) (Fig. 4.22 and 4.23)

Table 4.16 Diversity indices of woody plants in two Lahu homegardens

Dieversity index		Muser Pak Tang	Huai Phak Dap
Richness	Median	8	10
	Max	9	19
	Min	1	3
Abundance	Median	13	15
	Max	20	25
	Min	4	7
Shannon	Median	1.8	1.9
	Max	2.2	2.4
	Min	1	1
Evenness	Median	0.9	0.9
	Max	1	1
	Min	0.7	0.8

Table 4.17 The most dominant woody species in homegardens of two Lahu villages (arranged in order of dominance).

Muser Pak Tang	Huai Phak Dap
Psidium guajava L.	*Mangifera indica* L.
Camellia sinensis (L.) Kuntze	*Psidium guajava* L.
Mangifera indica L.	*Dracaena fragrans* (L.) Ker Gawl.
Trevesia palmate (Roxb. ex Lindl.) Vis.	*Carica papaya* L.
Solanum erianthum D.Don	*Duranta erecta* L.
Coffea arabica L.	*Ficus virens* Aiton

Table 4.18 The most common (total number of homegardens found) woody species in homegardens in two Lahu villages (arranged in order of commonness).

Muser Pak Tang	Huai Phak Dap
Mangifera indica L.	*Mangifera indica* L.
Trevesia palmate (Roxb. ex Lindl.) Vis.	*Artocarpus heterophyllus* Lam.
Psidium guajava L.	*Carica papaya* L.
Camellia sinensis (L.) Kuntze	*Citrus* × *aurantifolia* (Christm.) Swingle
Solanum erianthum D. Don	*Dracaena fragrans* (L.) Ker Gawl.
Artocarpus heterophyllus Lam.	*Psidium guajava* L.
Citrus × *aurantifolia* (Christm.) Swingle	
Persea americana Mill.	
Prunus sp.	

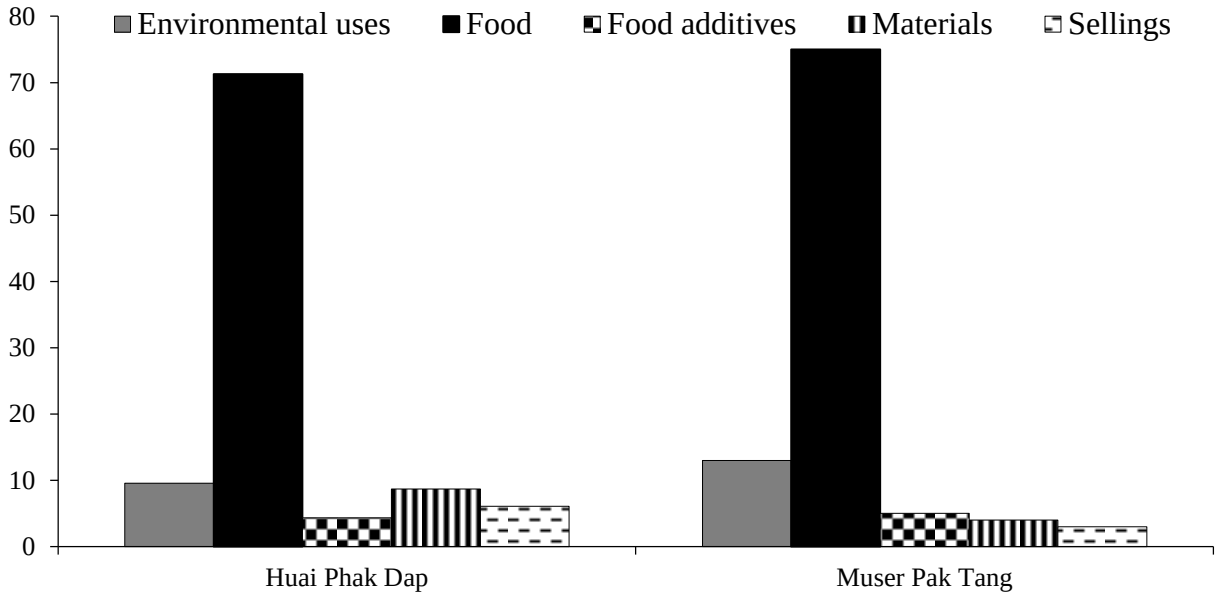

Fig. 4.20 Percentage of woody plant individuals in five use categories of woody species in homegardens of two Lahu villages.

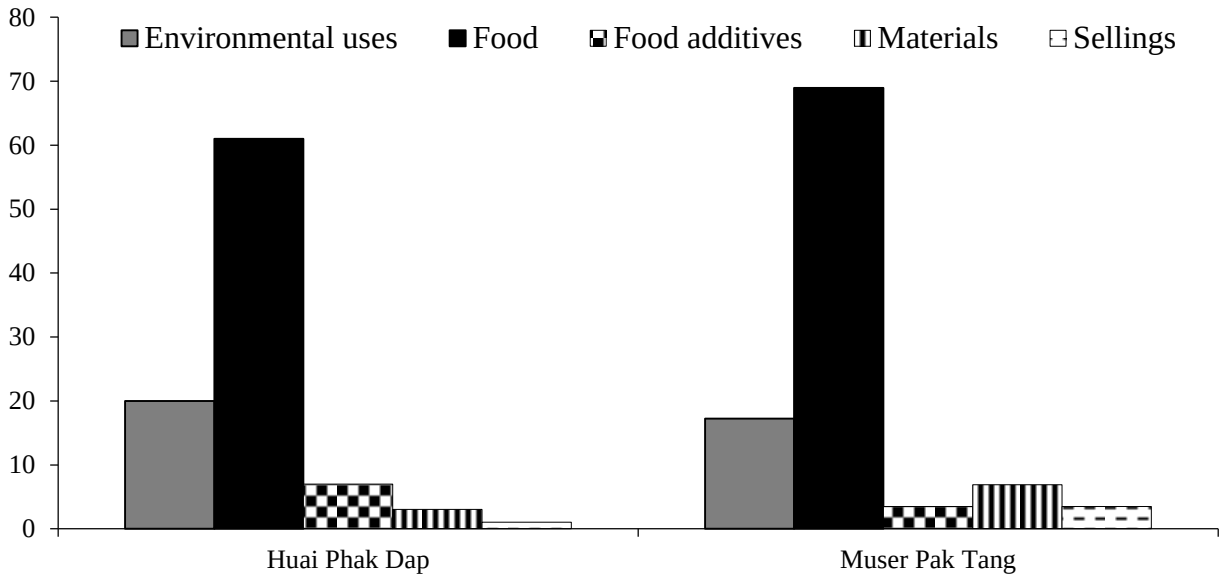

Fig. 4.21 Percentage of species in five use categories of woody species in homegardens in two Lahu villages

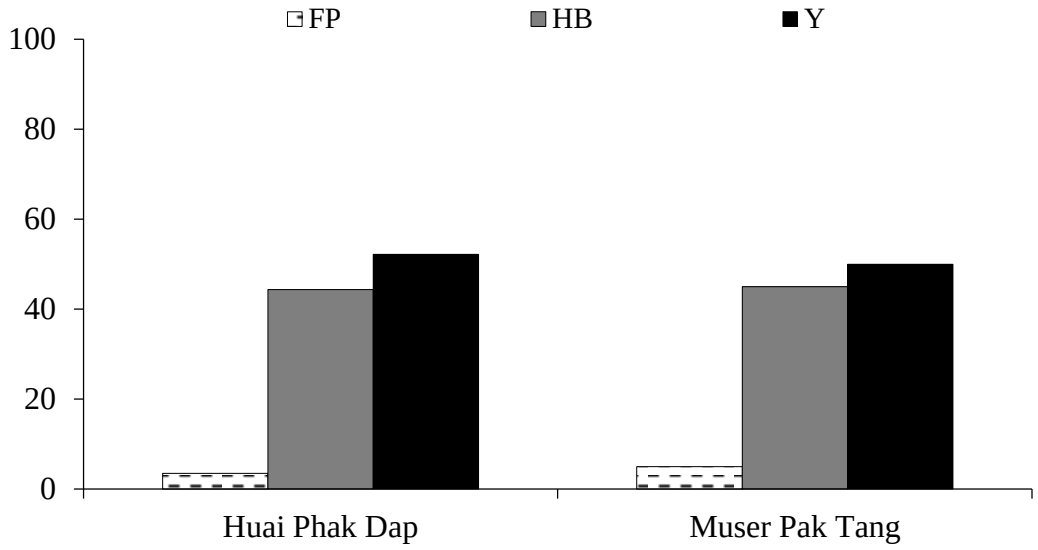

Fig. 4.22 Percentage of woody plant individuals in five horizontal zones in homegardens in two Lahu villages (FP = fence plot, HB = homegarden boundary, P = pot, Y = yard).

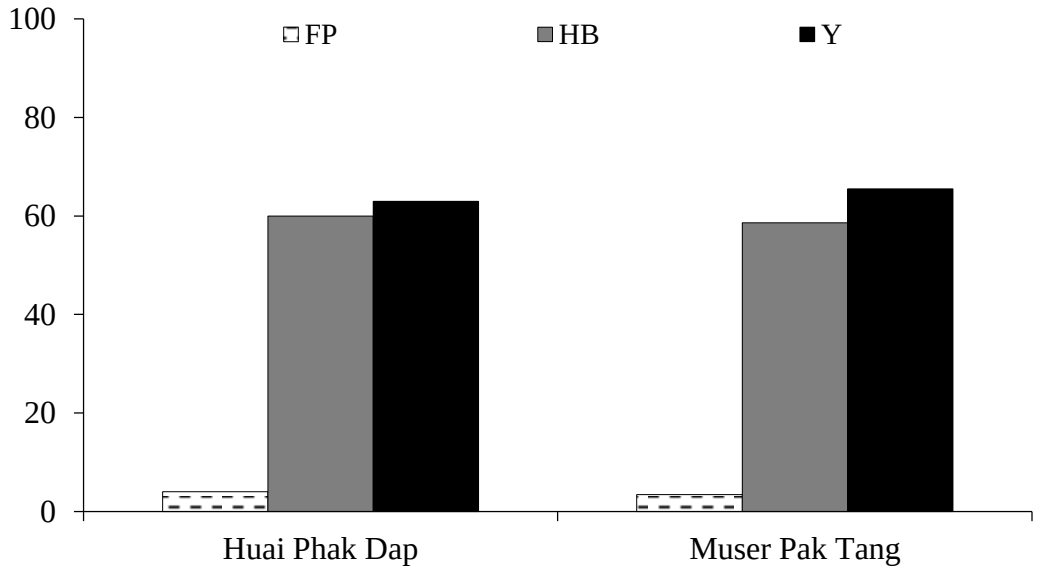

Fig. 4.23 Percentage of woody species in three horizontal zones (FP = fenced plot, HB = homegarden boundary, P = pot, Y = yard) in homegardens of two Lahu villages.

Non-woody species: Function, commonness, and horizontal distribution

There were 50 species of non-woody plants in homegardens of the two Lahu villages. The three largest categories in both villages were *environmental use, food,* and *food additive,* respectively (Fig. 4.24).

The lists of most common species of non-woody species were quite different from each other (Table 4.19). There were only two species which were presented in both common lists included a food species (*Solanum torvum* Sw.) and a food additive species (*Alpinia galanga* (L.) Willd.). The other common species in Muser Pak Tang included two social use species (*Nicotiana tabacum* L., *Piper betle* L.), two food species (*Solanum aethiopicum* L., *Ananas comosus* (L.) Merr.), and a medicinal species (*Blumea balsamifera* (L.) DC.). In Huai Phak Dap, the other common species included three food additive species (*Curcuma longa* L., *Capsicum frutescens* L., *Eryngium foetidum* L.), an animal food species (*Colocasia esculenta* (L.) Schott), and a food species (*Piper samentosum* Roxb.).

Most species of non-woody plants were found in the yard, and homegarden boundaries. There were about 40% and 60% of non-woody species in yard and homegarden boundaries, respectively, in both villages (Fig. 4.25).

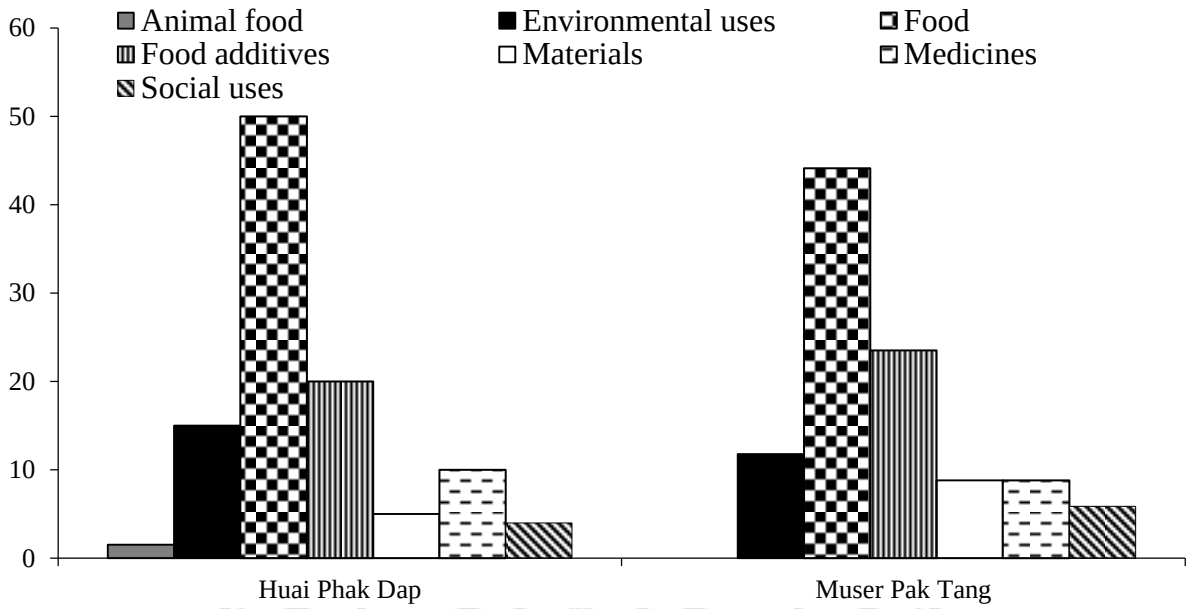

Fig. 4.24 Percentage of non-woody species found in seven use categories in homegardens in two Lahu villages

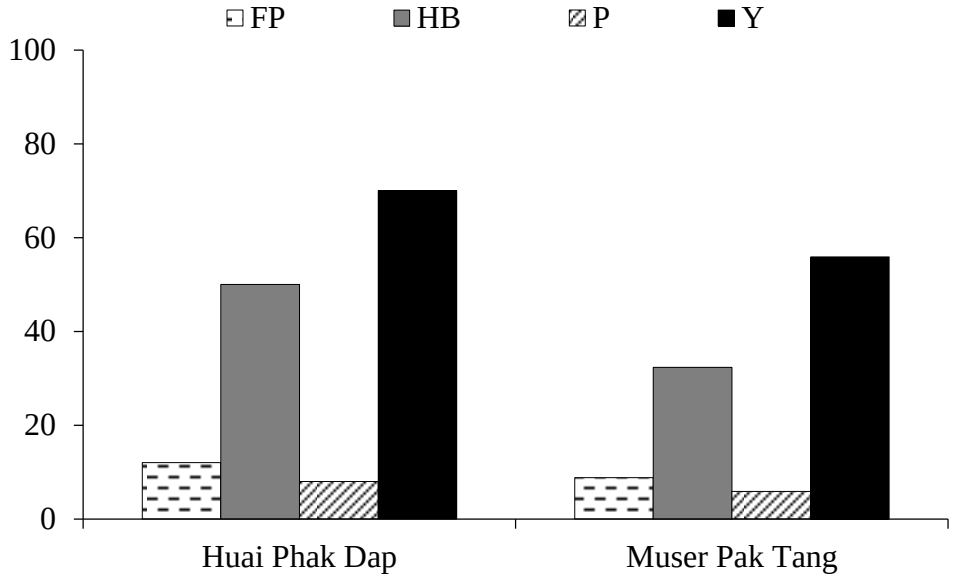

Fig. 4.25 Percentage of non-woody species found in four horizontal zones (FP = fenced plot, HB = homegarden boundary, P = pot, Y = yard) in homegardens in two Lahu villages.

Table 4.19 The most common non-woody species in homegardens of two Lahu villages (arranged in order of commoness).

Muser Pak Tang	Huai Phak Dap
Nicotiana tabacum L.	*Curcuma longa* L.
Piper betle L.	*Colocasia esculenta* (L.) Schott
Solanum aethiopicum L.	*Alpinia galanga* (L.) Willd.
Alpinia galanga (L.) Willd.	*Solanum torvum* Sw.
Ananas comosus (L.) Merr.	*Capsicum frutescens* L.
Blumea balsamifera (L.) DC.	*Piper samentosum* Roxb.
Solanum torvum Sw.	*Eryngium foetidum* L.

4.4 Lawa Homegarden

General characteristics

Like other ethnic groups, Lawa people kept most of their plants within two of the homegarden zones: the yard (Y) and the homegarden boundary (HB). Plants were found in all yards and homegarden boundaries in all the studied homegradens (Fig. 4.26).

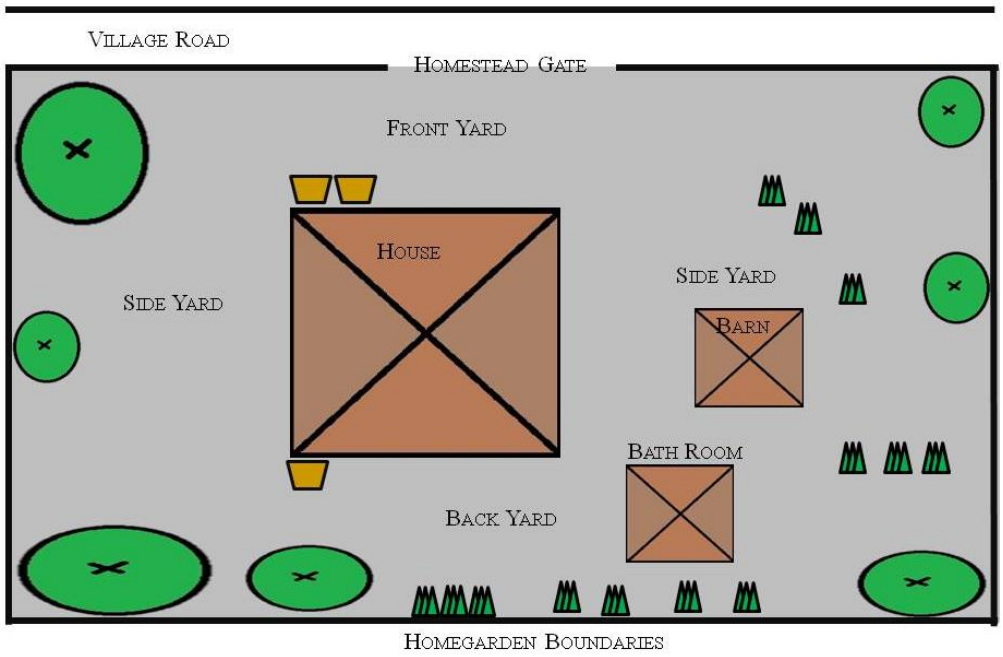

Fig. 4.26 Diagram of a Lawa homegarden

Plant species and diversity in Lawa homegardens

A total of 210 species were recorded from two Lawa villages (Table 4.20), 116 and 156 in Ban Hor and Meuang Ka, respectively. The average number of species per homegarden in Ban Hor and Meuang Ka was 20 and 34, respectively. Most species in all Lawa villages represented the categories *environmental use* and *food*. These two categories contributed 75% and 83% of the all species found in Ban Hor and Meuang Ka, respectively. *Food* is the largest category in Ban Hor while *environmental use* was the largest category in Meuang Ka. *Food additive* is the third largest category in both villages and contributed 14% and 12% in Ban Hor and Meuang Ka, respectively.

Distribution and composition in zones

The yards (Y) and homegarden boundaries (HB) were the most important zones of the homegardens in both Lawa villages (Fig. 4.26). All yards and homegarden boundaries in all homegardens always had plants species. Pots (P) were another important homegarden zone found in more than 50% of the studied homegarden in both Lawa villages.

Table 4.20 Two Lawa villages where the homegardens were examined for plant species diversity, zonification, and use categories

Village	Ban Hor	Meuang Ka
Geographic coordinates	N 18°30'00.78" E098°21'45.89"	N19 °00'32.16" E098° 48'40.51"
Elevation (m.a.s.l.)	532	612
No. of generation since foundation	2	3
No. of studied homegardens (% of total in the village)	50 (31)	40 (46)
Distance from nearest urban center (length of dirt road)		
No. of species (total 210)	116	156
No. of plant families	48	66
Mean of species in each homegarden	20	34
No. of animal food species (%)	1 (1)	2 (1)

Table 4.20 (continued)

Village	Ban Hor	Meuang Ka
No. of food species (%)	45 (39)	70 (45)
No. of food additive species (%)	16 (14)	19 (12)
No. of material species (%)	3 (3)	0 (0)
No. of medicinal species (%)	9 (8)	7 (4)
No. of selling species (%)	2 (2)	2 (1)
No. of social use species (%)	7 (6)	2 (1)
Mean of animal food species/homegarden	1	1
Mean of environmental use species /homegarden	6	11
Mean of food species /homegarden	8	15
Mean of food additive species /homegarden	5	6
Mean of material species /homegarden	0.3	0
Mean of medicinal species /homegarden	1	1
Mean of selling species /homegarden	0.3	0.2
Mean of social use species /homegarden	0.7	0.2

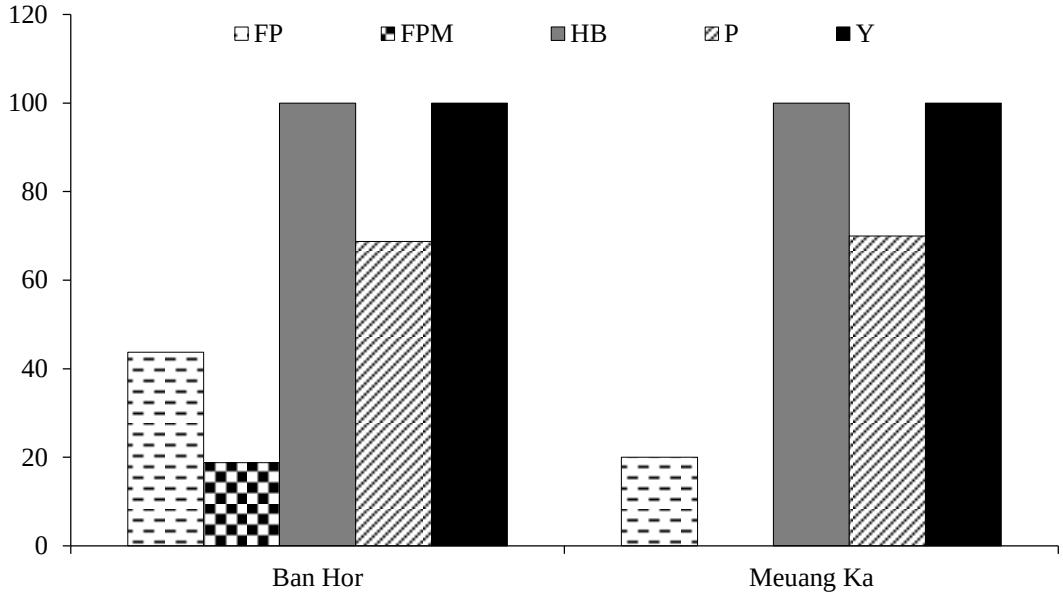

Fig. 4.27 The percentage of zonation present in two Lawa homegardens. (FP = fence plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

Table 4.21 Species found in homegardens in two Lawa villages and their use categories with indication of village (BH: Ban Hor, MK: Mueang Ka)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Abelmoschus esculentus (L.) Moench	Malvaceae	Young fruit: Vegetables	Food	BH	Exotic	792
Acacia pennata subsp. *insuavis* (Lace) I. C. Nielsen	Leguminosae	Leaves: Vegetables	Food	BH	Native	804
Acalypha hispida Burm.f.	Euphorbiaceae	Ornamentals	Environmental use	MK	Exotic	650
Acalypha siamensis Oliv. ex Gage	Euphorbiaceae	Boundaries	Environmental use	BH	Native	814
Aglaomorpha cornucopia (Copel.) M. C. Roos	Polypodiaceae	Ornamentals	Environmental use	MK	Native	686
Aglaonema modestum Schott ex Engl.	Araceae	Ornamentals	Environmental use	MK	Exotic	637
Allium fistulosum L.	Amaryllidaceae	Leaves: Vegetables	Food	BH	Exotic	809
Allium hookeri Thwaites	Amaryllidaceae	Root: Spices	Food additive	BH, MK	Native	785

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Allium schoenoprasum L.	Amaryllidaceae	Leaves: Vegetables	Food	MK	Exotic	692
		Leaves: Herbs	Food additive	MK	Exotic	643
Alocasia cucullata (Lour.) G. Don	Araceae	Ornamentals	Environmental use	MK	Exotic	633
Alocasia macrorrhizos (L.) G. Don	Araceae	Ornamentals	Environmental use	BH	Native	807
		Ornamentals	Environmental use	BH	Native	
		Aerial part: Vegetables	Food	BH	Native	
Aloe vera (L.) Burm.f.	Xanthorrhoeacea e	Leaves: Skin burned	Medicine	BH, MK	Exotic	766
Alpinia galanga (L.) Willd.	Zingiberaceae	Rhizome: Spices	Food additive	BH, MK	Exotic	780
Alpinia malaccensis (Burm.f.) Roscoe	Zingiberaceae	Dessert fruits	Food	MK	Native	604
Alstonia scholaris (L.) R. Br.	Apocynaceae	Shade	Environmental use	BH, MK	Native	788

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Alternanthera ramosissima (Mart.) Chodat & Hassl.	Amaranthaceae	Ornamentals	Environmental use	MK	Exotic	644
Amomum sp.	Zingiberaceae	Inflorescences: Vegetables	Food	BH, MK	Native	757
		Inflorescences	Selling	MK	Native	647
Amorphophallus spp.	Araceae	Inflorescences: Vegetables	Food	MK	Native	640
Ananas comosus (L.) Merr.	Bromeliaceae	Dessert fruits	Food	MK	Exotic	608
Andrographis paniculata (Burm.f.) Nees	Acanthaceae	Leaves: Fever	Medicine	MK	Exotic	645
Annona muricata L.	Annonaceae	Dessert fruits	Food	MK	Exotic	625
Apium graveolens L.	Apiaceae	Leaves: Herbs	Food additive	BH	Exotic	808
Aristolochia ringens Vahl	Aristolochiaceae	Ornamentals	Environmental use	MK	Exotic	620
Artocarpus heterophyllus Lam.	Moraceae	Dessert fruits	Food	BH, MK	Exotic	782

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Azadirachta indica A. Juss.	Meliaceae	Young inflorescense: Vegetables	Food	MK	Exotic	620
Basella alba L.	Basellaceae	Inflorescences: Vegetables	Food	MK	Native	602
Bauhinia purpurea L.	Leguminosae	Young leaves: Vegetables	Food	MK	Exotic	652
Beaumontia multiflora Teijsm. & Binn.	Apocynaceae	Ornamentals	Environmental use	MK	Native	630
Benincasa hispida (Thunb.) Cogn.	Cucurbitaceae	Fruits: Vegetables	Food	MK	Exotic	674
Bougainvillea glabra Choisy	Nyctaginaceae	Ornamentals	Environmental use	BH	Exotic	799
Breynia sp.	Phyllanthaceae	Leaves: Vegetables	Food	MK	Native	684
Brugmansia × *candida* Pers.	Solanaceae	Ornamentals	Environmental use	BH, MK	Native	760
		Ornamentals	Environmental use	MK	Native	600

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Caladium bicolor (Aiton) Vent.	Araceae	Ornamentals	Environmental use	BH, MK	Exotic	781
Cananga odorata (Lam.) Hook.f. & Thomson	Annonaceae	Ornamentals	Environmental use	MK	Exotic	657
Canna indica L.	Cannaceae	Ornamentals	Environmental use	BH, MK	Exotic	679
		Root: Starch	Food	BH	Exotic	
Capsicum annuum L.	Solanaceae	Fruits: Spices	Food additive	BH, MK	Exotic	752
Carica papaya L.	Caricaceae	Fruits: Vegetables, Dessert fruits	Food	BH, MK	Exotic	769
Caryota mitis Lour.	Arecaceae	Ornamentals	Environmental use	MK	Native	651
		Leaves: Vegetables	Food	MK	Native	
Cayratia tenuifolia (Wight & Arn.) Gagnep.	Vitaceae	Leaves: Itching	Medicine	MK	Native	623
Celosia argentea L.	Amaranthaceae	Ornamentals	Environmental use	BH, MK	Exotic	768

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
		Flowers: Religion uses	Social use	MK	Exotic	611
Centratherum punctatum Cass.	Compositae	Ornamentals	Environmental use	MK	Native	662
Cestrum nocturnum L.	Solanaceae	Ornamentals	Environmental use	BH	Exotic	818
Cheilocostus lacerus (Gagnep.) C. D. Specht	Costaceae	Ornamentals	Environmental use	MK	Native	616
Chlorophytum laxum R. Br.	Asparagaceae	Ornamentals	Environmental use	BH, MK	Exotic	811
Chrysophyllum cainito L.	Sapotaceae	Dessert fruits	Food	BH, MK	Exotic	783
Citrus aurantiifolia (Christm.) Swingle	Rutaceae	Fruit juice: Souring agents	Food additive	BH, MK	Exotic	765
Citrus hystrix DC.	Rutaceae	Fruit juice: Souring agents	Food additive	BH, MK	Exotic	785
Citrus maxima (Burm.) Merr.	Rutaceae	Dessert fruits	Food	BH, MK	Exotic	754

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
		Fruit juice: Souring agents	Food additive	BH	Exotic	793
Clausena excavata Burm.f.	Rutaceae	Leaves: Vegetables	Food	MK	Native	642
Clausena sp.	Rutaceae	Leaves: Pain	Medicine	BH	Native	821
Clerodendrum glandulosum Lindl.	Lamiaceae	Leaves: Vegetables	Food	BH	Native	797
Clerodendrum paniculatum L.	Lamiaceae	Ornamentals	Environmental use	MK	Native	601
Clerodendrum thomsoniae Balf.f.	Lamiaceae	Ornamentals	Environmental use	MK	Exotic	614
Coccinia grandis (L.) Voigt	Cucurbitaceae	Leaves: Vegetables	Food	MK	Native	655
Cocos nucifera L.	Arecaceae	Dessert fruits	Food	BH, MK	Exotic	762
Codiaeum variegatum (L.) Rumph. ex A. Juss.	Euphorbiaceae	Ornamentals	Environmental use	MK	Exotic	618
		Leaves: Religion uses	Social use	MK	Exotic	
Coffea arabica L.	Rubiaceae	Fruits	Selling	BH	Exotic	802

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Colocasia esculenta (L.) Schott	Araceae	Unspecified aerial parts: pigs	Animal food	BH, MK	Native	748
Colocasia gigantea (Blume) Hook.f.	Araceae	Aerail parts: Vegetables	Food	MK	Native	659
Cordyline fruticosa (L.) A. Chev.	Asparagaceae	Ornamentals	Environmental use	BH, MK	Exotic	755
		Leaves: Religion uses	Social use	BH	Exotic	813
Crinum asiaticum L.	Amaryllidaceae	Ornamentals	Environmental use	BH	Native	822
		Leaves: Pain	Medicine	BH	Native	
Croton persimilis Müll. Arg.	Euphorbiaceae	Leaves: Body nourishment (nursing mother)	Medicine	MK	Native	365
Cucurbita moschata Duchesne	Cucurbitaceae	Fruits: Vegetable	Food	BH	Exotic	816
Cuphea hyssopifolia Kunth	Lythraceae	Ornamentals	Environmental use	MK	Exotic	612

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Curcuma longa L.	Zingiberaceae	Rhizome: Spices	Food additive	BH, MK	Native	789
Curcuma mangga Valeton & Zijp	Zingiberaceae	Rhizome: Vegetable	Food	BH, MK	Exotic	764
Curcuma sp.	Zingiberaceae	Ornamentals	Environmental use	BH	Native	801
		Rhizomes: Flatulence	Medicine	BH	Native	
Cymbopogon citratus (DC.) Stapf	Poaceae	Bulbs: Spices	Food additive	BH, MK	Exotic	786
Cynodon dactylon (L.) Pers.	Poaceae	Ornamentals	Environmental use	BH	Exotic	825
Dendrocalamus asper (Schult.) Backer	Poaceae	Shoots: Vegetables	Food	BH, MK	Native	759
Dieffenbachia seguine (Jacq.) Schott	Araceae	Ornamentals	Environmental use	BH, MK	Exotic	741
Dimocarpus longan Lour.	Sapindaceae	Dessert fruits	Food	BH, MK	Native	746

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Dioscorea alata L.	Dioscoreaceae	Root: Starch	Food	BH	Native	826
Dioscorea pentaphylla L.	Dioscoreaceae	Root: Starch	Food	MK	Native	708
Dracaena braunii Engl.	Asparagaceae	Ornamentals	Environmental use	MK	Native	717
		Leaves: Religion uses	Social use	BH	Native	828
Dracaena fragrans (L.) Ker Gawl.	Asparagaceae	Ornamentals	Environmental use	BH, MK	Exotic	787
Dregea volubilis (L.f.) Benth. ex Hook.f.	Apocynaceae	Leaves: Vegetables	Food	MK	Native	698
Drimiopsis botryoides Baker	Asparagaceae	Ornamentals	Environmental use	MK	Native	654
Duranta erecta L.	Verbenaceae	Ornamentals	Environmental use	BH, MK	Exotic	761
Dypsis lutescens (H. Wendl.) Beentje & J. Dransf.	Arecaceae	Ornamentals	Environmental use	MK	Exotic	606
Elaeagnus latifolia L.	Elaeagnaceae	Dessert fruits	Food	BH	Native	809

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
		Dessert fruits	Food	MK	Native	689
Elaeocarpus grandiflorus Sm.	Elaeocarpaceae	Ornamentals	Environmental use	MK	Native	677
Eleutherine bulbosa (Mill.) Urb.	Iridaceae	Ornamentals	Environmental use	BH	Exotic	823
Eleutherococcus trifoliatus (L.) S. Y. Hu	Araliaceae	Leaves: Vegetables	Food	MK	Native	704
Elsholtzia communis (Collett & Hemsl.) Diels	Lamiaceae	Bulbs: Spices	Food additive	MK	Native	688
Eryngium foetidum L.	Apiaceae	Leaves: Herbs	Food additive	BH, MK	Exotic	763
Erythropalum scandens Blume	Olacaceae	Leaves: Vegetables	Food	MK	Native	610
Euphorbia milii Des Moul.	Euphorbiaceae	Ornamentals	Environmental use	MK	Native	695
Euphorbia pulcherrima Willd. ex Klotzsch	Euphorbiaceae	Ornamentals	Environmental use	BH	Exotic	806

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Euphorbia sp.	Euphorbiaceae	Ornamentals	Environmental use	BH	Native	795
Ficus virens Aiton	Moraceae	Leaves: Vegetables	Food	BH, MK	Native	750
Gardenia sootepensis Hutch.	Rubiaceae	Ornamentals	Environmental use	BH	Native	819
Gardenia sp.	Apocynaceae	Ornamentals	Environmental use	MK	Exotic	672
Gymnema inodorum (Lour.) Decne.	Apocynaceae	Leaves: Vegetables	Food	MK	Native	724
Heliconia rostrata Ruiz & Pav.	Heliconiaceae	Ornamentals	Environmental use	MK	Native	702
Heteropanax fragrans (Roxb.) Seem.	Araliaceae	Leaves: Vegetables	Food	BH	Native	815
Hibiscus rosa-sinensis L.	Malvaceae	Ornamentals	Environmental use	BH, MK	Exotic	753
Hippeastrum × *johnsonii* Bury	Amaryllidaceae	Ornamentals	Environmental use	MK	Native	603
Hippeastrum vittatum (L'Hér.) Herb.	Amaryllidaceae	Ornamentals	Environmental use	BH	Native	824

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Homalocladium platycladum (F. Muell.) L. H. Bailey	Polygonaceae	Exudate: Centipede bite	Medicine	BH	Native	798
Houttuynia cordata Thunb.	Saururaceae	Leaves: Vegetables	Food	MK	Native	620
Hydrocotyle umbellata L.	Araliaceae	Ornamentals	Environmental use	MK	Exotic	615
Hylocereus undatus (Haw.) Britton & Rose	Cactaceae	Dessert fruits	Food	BH, MK	Exotic	737
Hymenocallis littoralis (Jacq.) Salisb.	Amaryllidaceae	Ornamentals	Environmental use	MK	Exotic	628
Impatiens balsamina L.	Balsaminaceae	Ornamentals	Environmental use	MK	Exotic	712
Indigofera sp.	Leguminosae	Leaves: Beetles	Animal food	MK	Native	676
Ipomoea aquatica Forssk.	Convolvulaceae	Leaves: Vegetables	Food	BH, MK	Native	744
Iresine herbstii Hook.	Amaranthaceae	Ornamentals	Environmental use	BH	Exotic	805

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Iris domestica (L.) Goldblatt & Mabb.	Iridaceae	Ornamentals	Environmental use	BH	Exotic	829
Ixora chinensis Lam.	Rubiaceae	Ornamentals	Environmental use	MK	Exotic	665
Jasminum sambac (L.) Aiton	Oleaceae	Ornamentals	Environmental use	MK	Exotic	639
Jatropha curcas L.	Euphorbiaceae	Ornamentals	Environmental use	BH	Exotic	800
Jatropha podagrica Hook.	Euphorbiaceae	Exudate: bleeding wound	Medicine	BH, MK	Exotic	749
Justicia balansae Lindau	Acanthaceae	Ornamentals	Environmental use	BH	Native	803
Justicia fragilis Wall.	Acanthaceae	Ornamentals	Environmental use	MK	Native	622
Kaempferia elegans (Wall.) Baker	Zingiberaceae	Ornamentals	Environmental use	BH	Native	794
Kaempferia galanga L.	Zingiberaceae	Leaves: Religion uses	Social use	BH	Native	812

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Kalimeris indica (L.) Sch. Bip.	Compositae	Ornamentals	Environmental use	MK	Exotic	663
Leucaena leucocephala (Lam.) de Wit	Leguminosae	Leaves: Vegetables	Food	MK	Exotic	696
Limnocharis flava (L.) Buchenau	Alismataceae	Ornamentals	Environmental use	MK	Exotic	632
Litchi chinensis Sonn.	Sapindaceae	Fruits	Selling	BH, MK	Exotic	756
Luffa cylindrica (L.) M. Roem.	Cucurbitaceae	Fruits: Vegetables	Food	MK	Native	605
Macaranga sp.	Euphorbiaceae	Ornamentals	Environmental use	MK	Native	619
Mangifera indica L.	Anacardiaceae	Dessert fruits, Leaves: Vegetables	Food	BH, MK	Native	730
Manihot esculenta Crantz	Euphorbiaceae	Roots: Starch	Food	MK	Exotic	641
Manilkara zapota (L.) P. Royen	Sapotaceae	Dessert fruits	Food	MK	Exotic	706
Melia azedarach L.	Meliaceae	Ornamentals	Environmental use	MK	Native	621

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Mentha × *villosa* Huds.	Lamiaceae	Leaves: Herbs	Food additive	MK	Exotic	710
Mirabilis jalapa L.	Nyctaginaceae	Ornamentals	Environmental use	MK	Exotic	658
Momordica cochinchinensis (Lour.) Spreng.	Cucurbitaceae	Fruits: Vegetables	Food	BH	Native	820
Moringa oleifera Lam.	Moringaceae	Fuits: Vegetables	Food	MK	Native	646
Morus alba L.	Moraceae	Dessert fruits	Food	MK	Exotic	627
Muntingia calabura L.	Muntingiaceae	Dessert fruits	Food	MK	Exotic	653
Neomarica longifolia (Link & Otto) Sprague	Iridaceae	Ornamentals	Environmental use	MK	Exotic	666
Nicotiana tabacum L.	Solanaceae	Leaves: Smoking	Social use	BH	Exotic	796
Ocimum × *africanum* Lour.	Lamiaceae	Leaves: Herbs	Food additive	MK	Native	670
Ocimum gratissimum L.	Lamiaceae	Leaves: Herbs	Food additive	MK	Exotic	636
Ocimum tenuiflorum L.	Lamiaceae	Leaves: Herbs	Food additive	BH, MK	Native	733

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Oroxylum indicum (L.) Kurz	Bignoniaceae	Fruits: Vegetables	Food	BH, MK	Native	742
Oxalis triangularis A. St.-Hil.	Oxalidaceae	Ornamentals	Environmental use	BH	Native	791
Pachira aquatica Aubl.	Malvaceae	Ornamentals	Environmental use	BH	Exotic	810
Pandanus humilis Lour.	Pandanaceae	Leaves: Essences	Food additive	BH, MK	Native	758
Passiflora laurifolia L.	Passifloraceae	Dessert fruits	Food	BH, MK	Exotic	734
Peliosanthes teta Andrews	Asparagaceae	Inflorescences: Vegetables	Food	MK	Native	668
Peperomia pellucida (L.) Kunth	Piperaceae	Aerail parts: Vegetables	Food	MK	Native	682
Perilla frutescens (L.) Britton	Lamiaceae	Leaves: Vegetables	Food	MK	Exotic	671
Persea americana Mill.	Lauraceae	Dessert fruits	Food	BH, MK	Exotic	740
Philodendron sp.	Araceae	Ornamentals	Environmental use	MK	Exotic	649

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Phlogacanthus pulcherrimus T. Anderson	Acanthaceae	Leaves: Vegetables	Food	BH, MK	Native	767
Phrynium imbricatum Roxb.	Marantaceae	Ornamentals	Environmental use	MK	Native	607
		Containers: Leaves	Material	BH	Native	827
Phyllanthus acidus (L.) Skeels	Phyllanthaceae	Dessert fruits	Food	BH, MK	Exotic	751
Piper nigrum L.	Piperaceae	Fruits: Spices	Food additive	MK	Exotic	700
Piper rostratum Roxb.	Piperaceae	Leaves: Vegetables	Food	BH, MK	Native	739
Platycerium sp.	Polypodiaceae	Ornamentals	Environmental use	MK	Native	624
Plectranthus amboinicus (Lour.) Spreng.	Lamiaceae	Leaves: Vegetables	Food	BH	Exotic	817
Plumeria rubra L.	Apocynaceae	Ornamentals	Environmental use	BH, MK	Exotic	725

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Polygonum odoratum Lour.	Polygonaceae	Leaves: Herbs	Food additive	BH, MK	Native	747
Polyscias fruticosa (L.) Harms	Araliaceae	Leaves: Vegetables	Food	MK	Exotic	631
Psidium guajava L.	Myrtaceae	Dessert fruits	Food	BH, MK	Exotic	736
Psophocarpus tetragonolobus (L.) DC.	Leguminosae	Fruits: Vegetables	Food	MK	Exotic	681
Punica granatum L.	Lythraceae	Dessert fruits	Food	MK	Exotic	626
Rivina humilis L.	Phytolaccaceae	Ornamentals	Environmental use	MK	Exotic	638
Rosa sp.	Rosaceae	Ornamentals	Environmental use	BH, MK	Exotic	727
Saccharum officinarum L.	Poaceae	Cane Juice	Food	BH, MK	Exotic	732
Sambucus canadensis L.	Adoxaceae	Ornamentals	Environmental use	BH	Exotic	790
		Flowers: Religion uses	Social use	BH	Exotic	745

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Sandoricum koetjape (Burm.f.) Merr.	Meliaceae	Dessert fruits	Food	MK	Native	609
Sansevieria cylindrica Bojer ex Hook.	Asparagaceae	Live plant in situ: Magic (Good luck)	Social use	BH	Native	743
Sansevieria trifasciata Prain	Asparagaceae	Ornamentals	Environmental use	BH, MK	Exotic	723
Sauropus androgynus (L.) Merr.	Phyllanthaceae	Leaves: Vegetables	Food	BH, MK	Native	726
Scadoxus multiflorus (Martyn) Raf.	Amaryllidaceae	Ornamentals	Environmental use	BH	Exotic	738
Schinus terebinthifolia Raddi	Rutaceae	Leaves: Vegetables	Food	MK	Exotic	613
Senna × *floribunda* (Cav.) H. S. Irwin & Barneby	Leguminosae	Ornamentals	Environmental use	BH	Native	731
Senna spectabilis (DC.) H. S. Irwin & Barneby	Leguminosae	Ornamentals	Environmental use	MK	Exotic	617
Sesbania grandiflora (L.) Pers.	Leguminosae	Flower: Vegetables	Food	MK	Exotic	629
Sida sp.	Malvaceae	Wood: Tools (broom)	Material	BH	Native	729

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Sisyrinchium palmifolium L.	Iridaceae	Ornamentals	Environmental use	BH	Native	728
Solanum americanum Mill.	Solanaceae	Leaves: Vegetables	Food	MK	Native	656
Solanum erianthum D. Don	Solanaceae	Leaves: Tools (washing dish)	Material	BH	Native	722
Solanum incanum L.	Solanaceae	Fruits: Vegetables	Food	MK	Native	660
Solanum lycopersicum L.	Solanaceae	Fruits: Souing agent	Food additive	BH	Native	721
Solanum melongena L.	Solanaceae	Fruits: Vegetables	Food	BH, MK	Native	693
Solanum spirale Roxb.	Solanaceae	Leaves: Vegetables	Food	BH, MK	Native	719
Solanum torvum Sw.	Solanaceae	Fruits: Vegetables	Food	BH, MK	Native	711
Sphagneticola trilobata (L.) Pruski	Compositae	Ornamentals	Environmental use	MK	Exotic	661
Spondias pinnata (L. f.) Kurz	Anacardiaceae	Dessert fruits	Food	BH, MK	Native	715

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Syzygium jambos (L.) Alston	Myrtaceae	Dessert fruits	Food	BH	Native	718
Syzygium nervosum A. Cunn. ex DC.	Myrtaceae	Dessert fruits	Food	BH, MK	Exotic	690
Tagetes erecta L.	Compositae	Ornamentals	Environmental use	BH	Exotic	716
Tamarindus indica L.	Leguminosae	Ornamentals	Environmental use	MK	Exotic	664
		Dessert fruits	Food	BH, MK	Exotic	714
Tinospora crispa (L.) Hook. f. & Thomson	Menispermaceae	Stems: Body nourishment	Medicine	MK	Native	667
Trevesia palmata (Roxb. ex Lindl.) Vis.	Araliaceae	Inflorescences: Vegetables	Food	BH	Native	709
Tupistra muricata (Gagnep.) N. Tanaka	Asparagaceae	Inflorescences: Vegetables	Food	MK	Native	634
Vigna umbellata (Thunb.) Ohwi & H. Ohashi	Leguminosae	Fruits: Vegetables	Food	MK	Exotic	669

Table 4.21 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Vigna unguiculata (L.) Walp.	Leguminosae	Fruits: Vegetables	Food	BH, MK	Exotic	705
Vitex negundo L.	Lamiaceae	Leaves: body pain	Medicine	BH	Exotic	713
Zamioculcas zamiifolia (Lodd.) Engl.	Araceae	Ornamentals	Environmental use	BH	Native	707
		Live plant in situ: Magic (Good luck)	Social use	BH	Native	
Zephyranthes rosea Lindl.	Amaryllidaceae	Ornamentals	Environmental use	BH, MK	Exotic	703
Zingiber montanum (J. Koenig) Link ex A. Dietr.	Zingiberaceae	Rhizome: Body nourishment	Medicine	BH, MK	Native	701
Zingiber officinale Roscoe	Zingiberaceae	Rhizome: Spices	Food additive	BH, MK	Native	697
Zingiber ottensii Valeton	Zingiberaceae	Rhizomes: Flatulence	Medicine	BH	Native	699
Zinnia violacea Cav.	Compositae	Ornamentals	Environmental use	BH	Exotic	694
Ziziphus jujuba Mill.	Rhamnaceae	Dessert fruits	Food	BH	Exotic	691

Woody species: Diversity, dominance, function, and horizontal distribution

There were 83 woody species in total in the two villages Ban Hor and Meuang Ka. Meuang Ka had higher median richness and individual in homegardens than Meuang Ka.

The Shannon scores in Ban Hor and Meuang Ka were 1.39 and 1.62, respectively. The median of evenness in Ban Hor was a little higher than in Meuang Ka. By the way both villages had very high evenness (Table 4.22).

In the list of dominant species (Table 4.23), three were present in both villages: mango, jackfruit, and papaya. The most dominant species in both villages were small ornamental species: *Dracaena fragrans* (L.) Ker Gawl. in Ban Hor and *Codiaeum variegatum* (L.) Rumph. ex A. Juss. in Meuang Ka. The other dominant species in Ban Hor included two fruit trees: guava and litchi, an ornamental species (*Cordyline fruticosa* (L.) A. Chev.), an *food additive* species (*Citrus* × *aurantifolia* (Christm.) Swingle), and a commercial species (*Coffea arabica* L.). In Meuang Ka the other dominant species included two species with *ornamental use* (*Cordyline fruticosa* (L.) A. Chev. and *Brugmansia* × *candida* Pers.) and a fruit tree, *Phyllanthus acidus* (L.) Skeels.

The lists of the most common species from both villages were very different (Table 4.24), only mango and jackfruit were presented in both villages as the most common species. The other common species in Ban Hor village included three other fruit trees: guava, papaya, and longan, and two common ornamental species: *Dracaena fragrans* (L.) Ker Gawl. In Meuang Ka the other common species included two species with *environmental use*: *Codiaeum variegatum* (L.) Rumph. ex A. Juss. used as ornamental plant and *Brugmansia* × *candida* Pers. which was used for fencing, a fruit tree, *Syzygium nervosum* A. Cunn. ex DC and a *food additive* species, *Citrus x aurantifolia* (Christm.) Swingle.

Most woody plant individuals and species in both villages were in the categories *food* and *environmental use* (Figs. 4.28 and 4.29). These two groups made up more than 80% of both individuals and species found in the two villages. In both villages *food* is the largest

category followed by *environmental use*. Most woody individuals and species were found in the yards and along the homegarden boundaries (Figs. 4.30 and 4.31)

Table 4.22 Diversity indices of woody plants in the Lawa homegardens

Diversity index		Ban Hor	Meuang Ka
Richness	Median	4	5.5
	Max	9	11
	Min	1	3
Abundance	Median	6	7
	Max	17	17
	Min	1	4
Shannon	Median	1.39	1.62
	Max	2.04	2.31
	Min	0	1.04
Evenness	Median	0.95	0.94
	Max	1	1
	Min	0.69	0.89

Table 4.23 Most dominant woody species in the homegardens of two Lawa villages (arranged in order of dominance).

Ban Hor	Meuang Ka
Dracaena fragrans (L.) Ker Gawl.	*Codiaeum variegatum* (L.) Rumph. ex A. Juss.
Mangifera indica L.	*Mangifera indica* L.
Cordyline fruticosa (L.) A. Chev.	*Cordyline fruticosa* (L.) A. Chev.
Artocarpus heterophyllus Lam.	*Brugmansia* × *candida* Pers.
Psidium guajava L.	*Artocarpus heterophyllus* Lam.
Carica papaya L.	*Carica papaya* L.
Citrus x aurantifolia (Christm.) Swingle	*Phyllanthus acidus* (L.) Skeels
Litchi chinensis Sonn.	
Coffea arabica L.	

Table 4.24 The most common (total number of homegardens found) woody species in the homegardens of two Lawa villages (arranged in order of commonness).

Ban Hor	Meuang Ka
Mangifera indica L.	*Mangifera indica* L.
Dracaena fragrans (L.) Ker Gawl.	*Codiaeum variegatum* (L.) Rumph. ex A. Juss.
Psidium guajava L.	*Artocarpus heterophyllus* Lam.
Artocarpus heterophyllus Lam.	*Citrus x aurantifolia* (Christm.) Swingle
Cordyline fruticosa (L.) A. Chev.	*Syzygium nervosum* A. Cunn. ex DC.
Carica papaya L.	*Brugmansia* × *candida* Pers.
Dimocarpus longan Lour.	

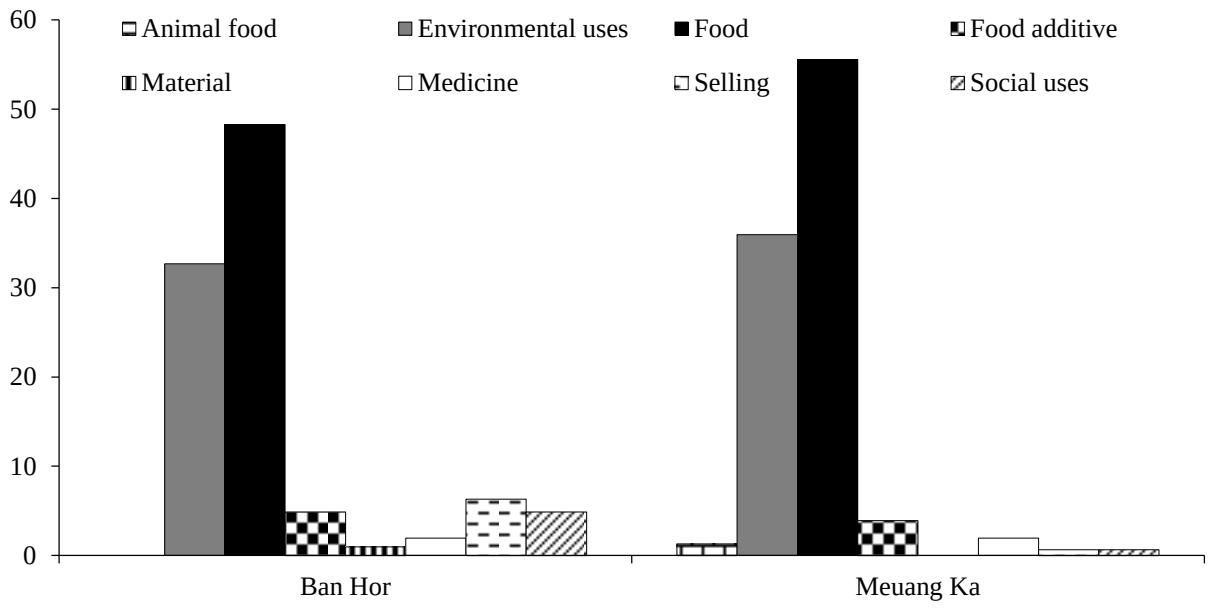

Fig. 4.28 Percentage of woody plant individuals in each use category in homegardens of two Lawa villages.

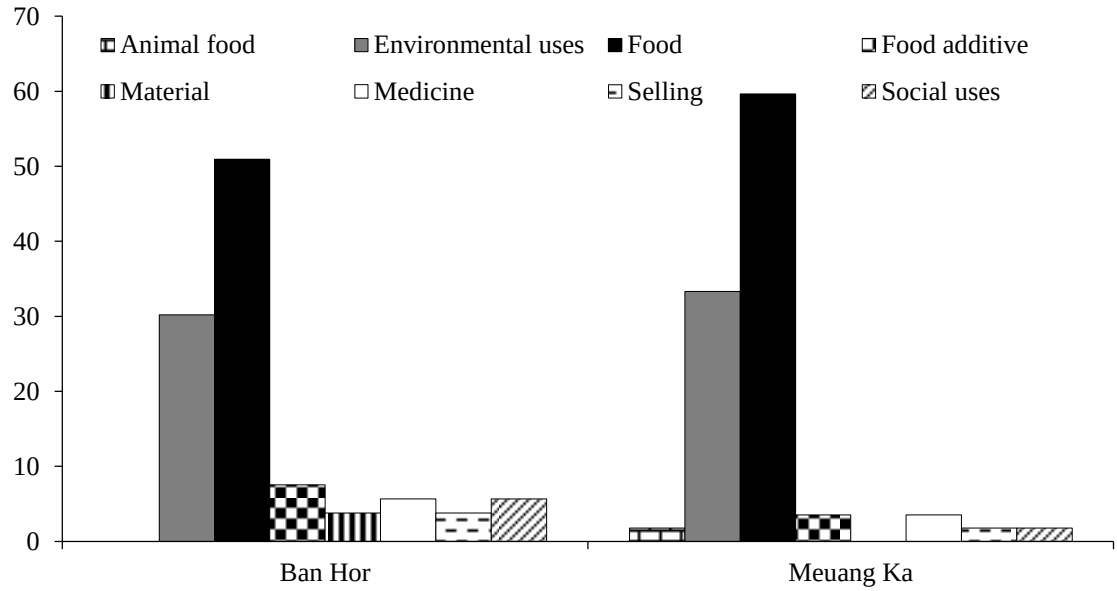

Fig. 4.29 Percentage of species in eight use categories for woody species in homegardens in two Lawa villages.

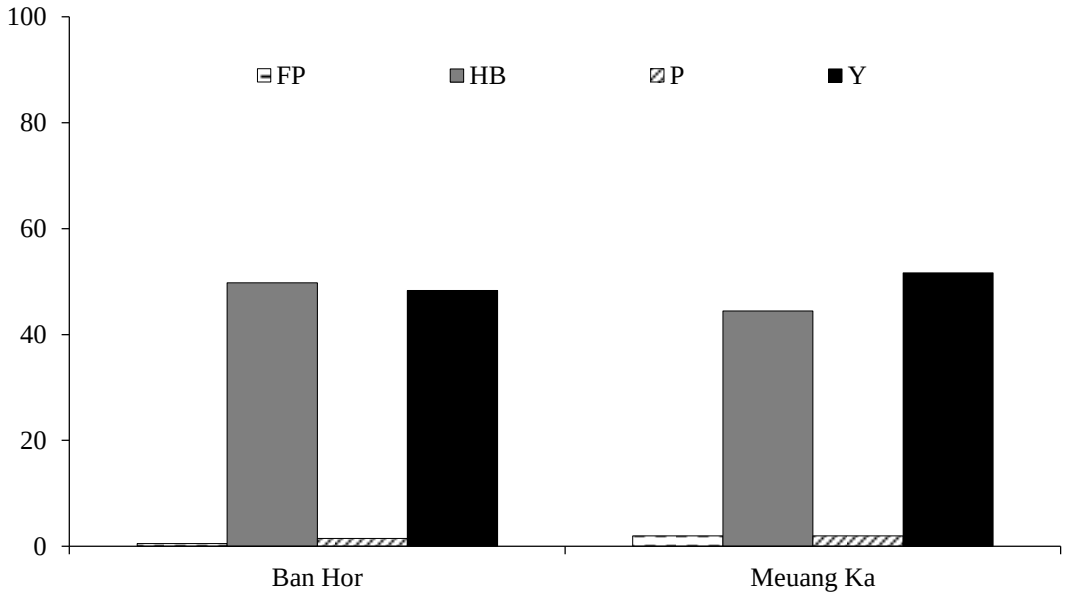

Fig. 4.30 Percentage of woody plant individuals in five horizontal zones in homegardens in two Lawa villages (FP = fence plot, HB = homegarden boundary, P = pot, Y = yard).

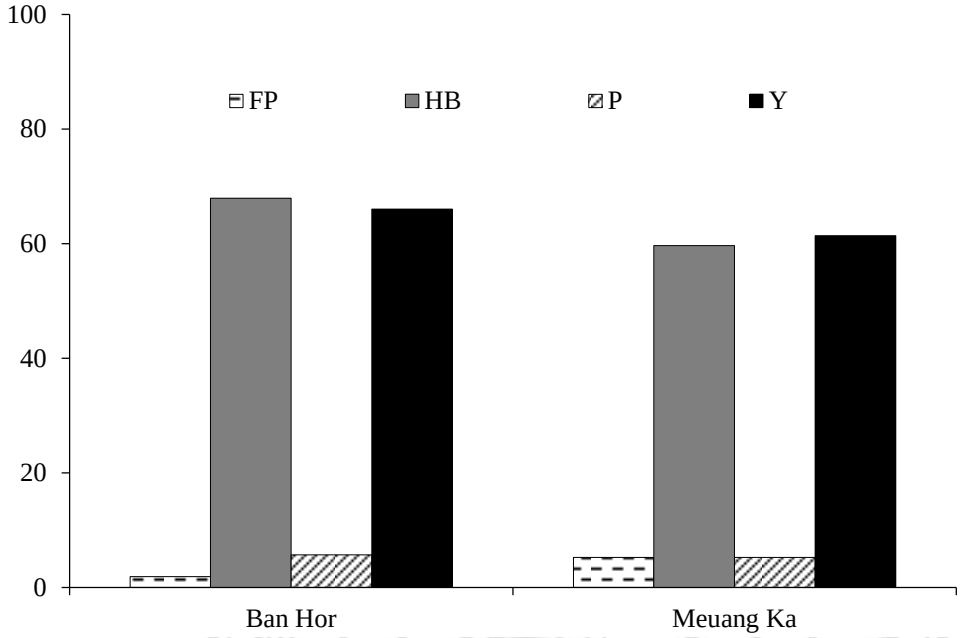

Fig. 4.31 Percentage of woody species in five horizontal zones in homegardens of two Lawa villages (FP = fenced plot, HB = homegarden boundary, P = pot, Y = yard).

Non-woody species: Function, commonness, and horizontal distribution

There were132 species of non-woody plants in the homegardens of the two studied Lawa villages. The three largest use categories in both villages were *environmental use*, *food*, and *food additive*, respectively (Fig. 4.32).

Many species in the list of most common species were found in both villages, *e.g, Alpinia galanga* (L.) Willd., *Colocasia esculenta* (L.) Schott, *Curcuma longa* L., *Cymbopogon citratus* Stapf, and *Piper samentosum* Roxb. (Table 4.25). Most of these belonged the *food additives* category.

Most species of non-woody plants were found in the yard, homegarden boundaries, and pots. There were 60% and 50% of non-woody species in the yard and homegarden boundaries, respectively, in both villages. About 20% of all non-woody species in both villages were found in pots (Fig. 4.33).

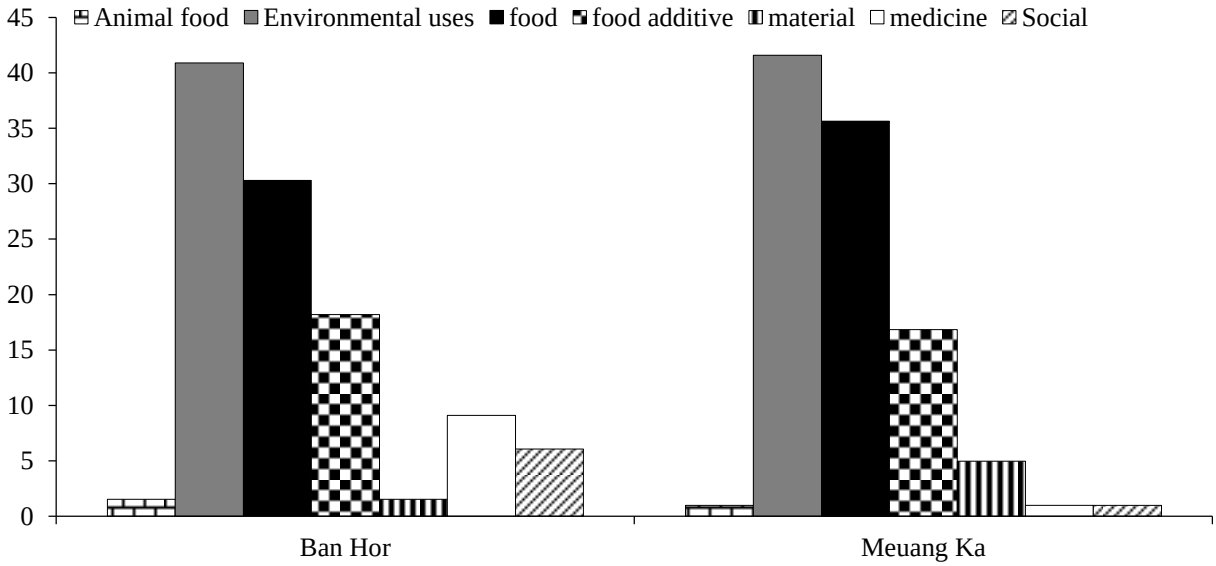

Fig. 4.32 Percentage of non-woody species in seven use categories in homegardens in two Lawa villages.

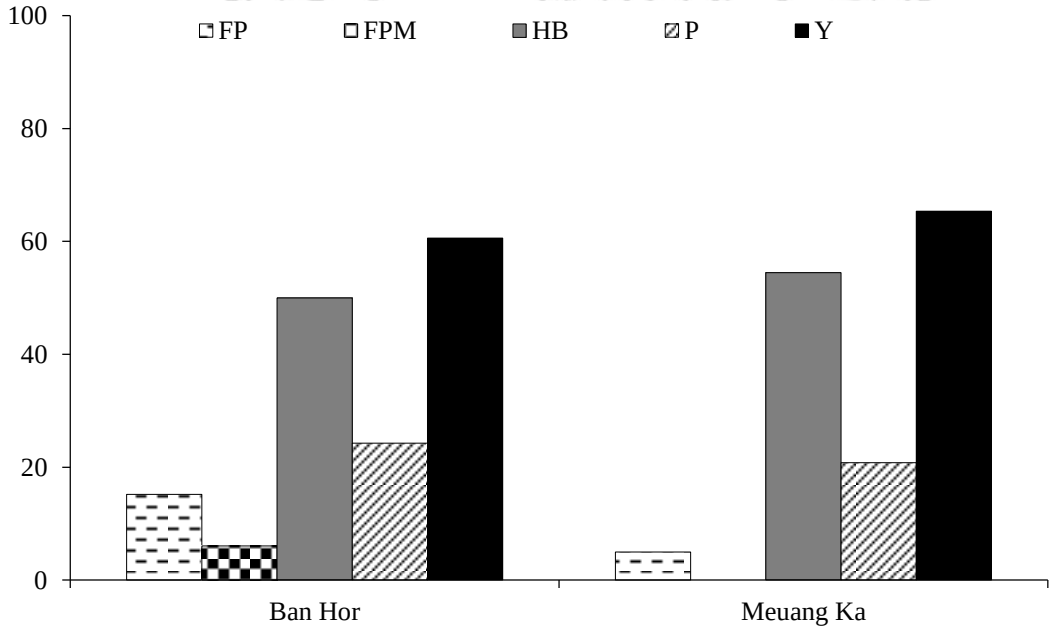

Fig. 4.33 Percentage of non-woody species found in five horizontal zones in homegardens in two Lawa villages (FP = fenced plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

Table 4.25 The most common non-woody species in homegardens of two Lawa villages (arranged in order of commoness).

Ban Hor	Meuang Ka
Curcuma longa L.	*Curcuma mangga* Valeton & Zijp
Colocasia esculenta (L.) Schott	*Curcuma longa* L.
Alpinia galanga (L.) Willd.	*Solanum incanum* L.
Canna indica L.	*Colocasia esculenta* (L.) Schott
Piper samentosum Roxb.	*Alpinia galanga* (L.) Willd.
Cymbopogon citratus Stapf	*Piper samentosum* Roxb.
Amomum sp. 2	*Cymbopogon citratus* Stapf
Crinum asiaticum L.	*Celosia argentea* L.
Cucurbita moschata Duchesne	*Drimiopsis botryoides* Baker
Rosa sp.	
Solanum melongena L.	

4.5 Lisu Homegarden

General characteristics

Lisu people planted most of their plants in three horizontal zones: homgarden boundaries, yards, and pots. Lisu homegardens were generally divided into two areas: the front yard and back yard. Most plants in front yard were environmental species especially ornamental species in pots and fenced species (Fig. 4.33).

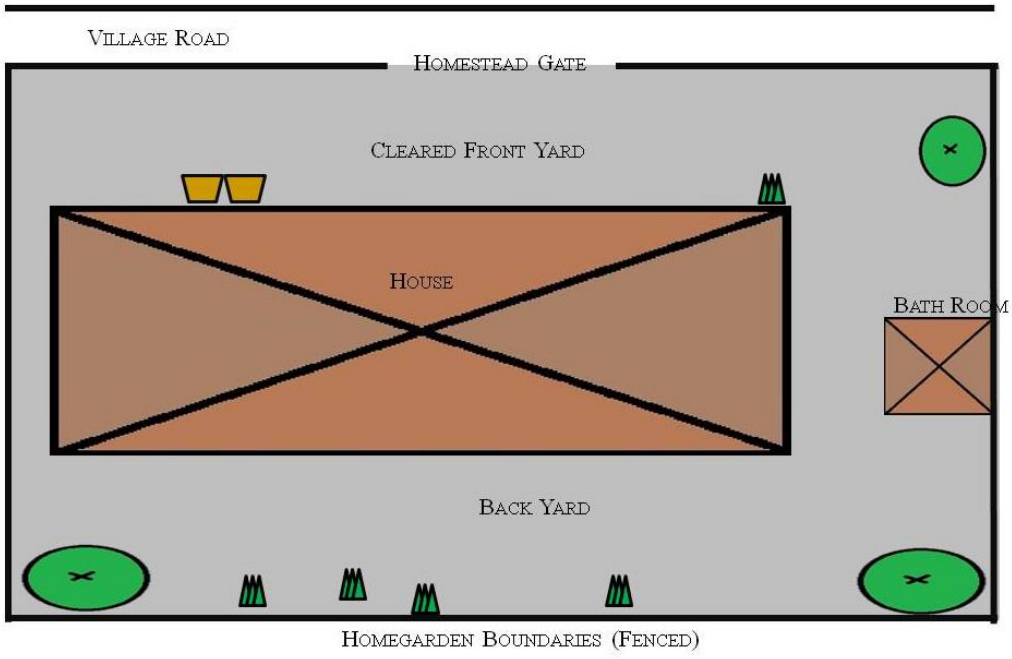

Fig. 4.34 The diagram of Lisu homegarden

Plant species and diversity in Lisu homegardens

A total of 122 species were recorded from two Lisu villages together (Table 4.26), and this incluuded 42 and 107 species in Huai Nam Dang and Khun Jae, respectively. The average number of species per homegarden in Huai Nam Dang and Khun Jae was 7 and 21 spp., respectively. The important plant categories in the Lisu homegardens were *environmental use, food,* and *food additive.* These three categories contributed more

than 80% of all species found in both villages, respectively. *Foods* was the largest category in both villages followed by *environmental use* categories. There were 6 (14%) and 15 (14%) species with medicinal uses in Huai Nam Dang and Khun Jae, respectively.

Distribution and composition in zones

The yards (Y), homegarden boundaries (HB), and pots (P) were the most important zones of homegardens in both Lisu villages (Fig. 4.35). These three zones were found in at least 50% of the surveyed homegardens in both villages. Fence plot was another important zone which was found in more than 20% of the homegardens in both villages.

Woody species: Diversity, dominance, function, and horizontal distribution

There were 40 woody species in total in Huai Nam Dang and Khun Jae. The number of woody species and individuals in Huai Nam Dang was lower than in Khun Jae. All median of diversity indices for Khun Jae were higher than those of Huai Nam Dang, including Shannon and evenness (Table 4.28).

Table 4.26 Information for the Lisu villages where homegardens were studied for plant species diversity, zonification, and use categories

Village	Huai Nam Dang	Khun Jae
Geographic coordinates	N 19°19'01.62" E98°37'28.03"	N 19°19'35.76" E99°19'14.88"
Elevation (m.a.s.l.)	1141	1292
No. of generation since foundation	1	1
No. of studied homegardens (% of total in the village)	50 (20)	52 (21)
Distance from nearest urban center (length of dirt road)		
No. of species (total 122)	42	107
No. of plant families	32	49
Mean of species in each homegarden	7	21
No. of animal food species (%)	1 (2%)	1 (1%)
No. of environmental use species (%)	16 (38%)	34 (32%)
No. of food species (%)	17 (40%)	42 (39%)
No. of food additive species (%)	6 (14%)	15 (14%)
No. of material species (%)	2 (5%)	13 (12%)
No. of medicinal species (%)	0 (0%)	0 (0%)

Table 4.26 (continued)

Village	Huai Nam Dang	Khun Jae
No. of social use species (%)	1 (2%)	2 (2%)
Mean of animal food species/homegarden	0.1	0.2
Mean of environmental use species /homegarden	2.6	5.9
Mean of food species /homegarden	3.1	8.1
Mean of food additive species /homegarden	1.1	3.3
Mean of material species /homegarden	0.2	2.7
Mean of selling species /homegarden	0	0.3
Mean of medicinal species /homegarden	0	0
Mean of social use species /homegarden	0.1	0.2

Only four species in Huai Nam Dang were noted as the most dominant species (Table 4.29), including *Mangifera indica* L., *Artocarpus heterophyllus* Lam., *Citrus reticulata* Blanco, and *Psidium guajava* L. These species, except *C. reticulata* Blanco were also the most dominant species in Khun Jae. Other species included *Diopyros* sp., *Carica papaya* L., *Ceiba pentandra* (L.) Gaertn., and *Gymnanthemum amygdalinum* (Delile) Sch. Bip. ex Walp.

The lists of most common species was similar for the two villages (Table 4.30). The most common species included: *Mangifera indica* L., *Artocarpus heterophyllus* Lam., *Psidium guajava* L., and *Carica papaya* L., all of which were fruit tree species. Another of the most common species in Huai Nam Dang was *Phyllanthus acidus* (L.)

Skeels. Other most common species in Khun Jae were *Ceiba pentandra* (L.) Gaertn., *Diopyros* sp., and *Gymnanthemum amygdalinum* (Delile) Sch. Bip. ex Walp.

Most woody plant individuals and species in both villages were in the categories *food* and *environmental use* (Fig. 4.36 and 4.37). These two categories contributed to more than 80% of both individuals and species in both villages. In both villages *food* was the largest category according to the number of individuals. Althought *foods* was also the largest category according to the number of species in Huai Nam Dang, *environmental use* was the largest category in Khun Jae village.

Homegarden boundaries and yards were the two important zones for planting woody species. More than 90% of woody individuals and species were found within these zones (Fig. 4.38 and 4.39). In Huai Nam Dang most woody plant individuals and species were found in the homegarden boundaries while in Khun Jae most woody individuals and species were found the yards.

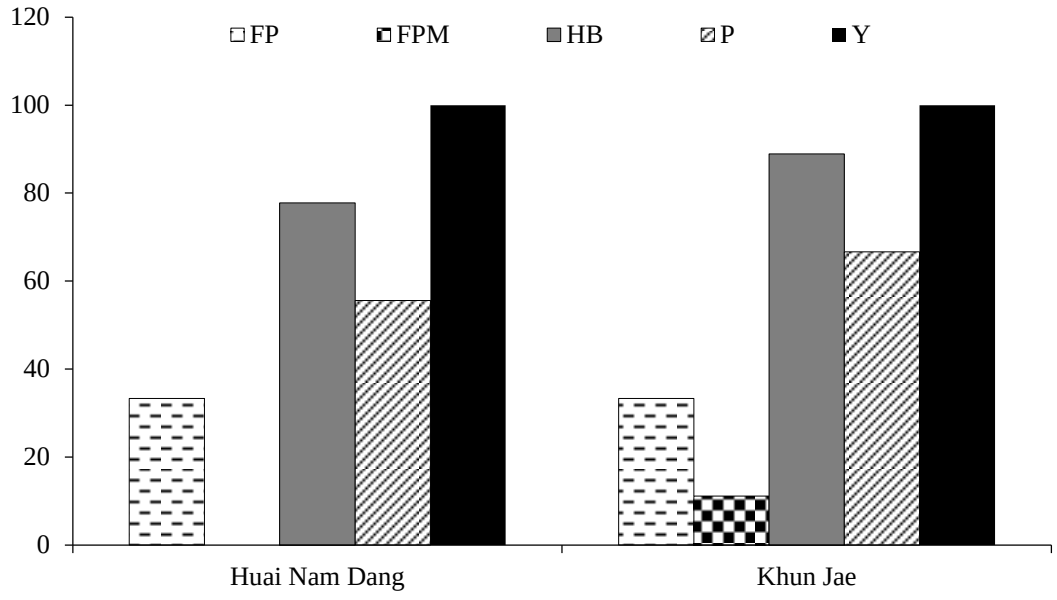

Fig. 4.35 Percentage of zonation presented in two Lisu homegardens. (FP = fence plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

Table 4.27 Species found in homegardens in two Lisu villages and their use categories with indication of village (KJ: Khun Jae, HND: Huai Nam Dang)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Acacia pennata subsp. *insuavis* (Lace) I. C. Nielsen	Leguminosae	Leaves: Vegetables	Food	KJ	Native	848
Agave vivipara L.	Asparagaceae	Ornamentals	Environmental use	KJ	Exotic	861
Allium hookeri Thwaites	Amaryllidaceae	Root: Spices	Food additive	HND, KJ	Native	916
Aloe vera (L.) Burm.f.	Xanthorrhoeaceae	Leaves: Skin burned	Medicine	HND, KJ	Exotic	926
Alpinia galanga (L.) Willd.	Zingiberaceae	Rhizome: Spices	Food additive	KJ	Exotic	836
Artemisia lactiflora Wall. ex DC.	Compositae	Leaves: Body nourishment	Medicine	KJ	Exotic	843
Artemisia sp.	Compositae	Leaves: Common cold and fever in children	Medicine	KJ	Native	852
Artocarpus heterophyllus Lam.	Moraceae	Dessert fruits	Food	HND, KJ	Exotic	937

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Asclepias curassavica L.	Apocynaceae	Exudates: Mouth ulcer	Medicine	KJ	Exotic	868
Blumea balsamifera (L.) DC.	Compositae	Leaves: Common cold, fever (children)	Medicine	KJ	Native	855
Bougainvillea glabra Choisy	Nyctaginaceae	Ornamentals	Environmental use	HND	Exotic	957
Brassica rapa L.	Brassicaceae	Leaves: Vegetables	Food	HND, KJ	Exotic	933
Brugmansia × *candida* Pers.	Solanaceae	Ornamentals	Environmental use	KJ	Native	864
Bryophyllum pinnatum (Lam.) Oken	Crassulaceae	Ornamentals	Environmental use	HND, KJ	Exotic	920
Buddleja asiatica Lour.	Scrophulariaceae	Leaves: Itching	Medicine	KJ	Native	874
Calamus sp.	Arecaceae	Cane: Containers	Material	HND	Native	950
Calamus sp. 2	Arecaceae	Leaves: Vegetables	Food	HND	Native	946
Callisia repens (Jacq.) L.	Commelinaceae	Whole plants: Diabetes	Medicine	KJ	Native	859

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Canna indica L.	Cannaceae	Ornamentals	Environmental use	KJ	Exotic	832
Capsicum annuum L.	Solanaceae	Fruits: Spices	Food additive	HND, KJ	Exotic	924
Carica papaya L.	Caricaceae	Fruits: Vegetables, Dessert fruits	Food	HND, KJ	Exotic	935
Catharanthus roseus (L.) G. Don	Apocynaceae	Ornamentals	Environmental use	HND	Exotic	962
Ceiba pentandra (L.) Gaertn.	Malvaceae	Fibres: Clothes	Material	KJ	Exotic	850
Celosia argentea L.	Amaranthaceae	Ornamentals	Environmental use	HND	Exotic	949
Chlorophytum laxum R. Br.	Asparagaceae	Ornamentals	Environmental use	KJ	Exotic	890
Citrus aurantifolia (Christm.) Swingle	Rutaceae	Fruit juice: Souring agents	Food additive	KJ	Native	885
Citrus maxima (Burm.) Merr.	Rutaceae	Dessert fruits	Food	KJ	Exotic	895
Citrus reticulata Blanco	Rutaceae	Dessert fruits	Food	HND	Exotic	959

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Cleoderndrum sp.	Lamiaceae	Leaves: Vegetables	Food	KJ	Native	857
Codiaeum variegatum (L.) Rumph. ex A. Juss.	Euphorbiaceae	Ornamentals	Environmental use	KJ	Exotic	840
Coffea arabica L.	Rubiaceae	Fruits	Selling	KJ	Exotic	862
Coix lacryma-jobi var. *stenocarpa* Oliv.	Poaceae	Dry Fruits: Decorated clothhes	Material	KJ	Native	838
Cordyline fruticosa (L.) A. Chev.	Asparagaceae	Ornamentals	Environmental use	KJ	Exotic	908
Coriandrum sativum L.	Apiaceae	Fruits: Spices	Food additive	KJ	Exotic	841
Cosmos sulphureus Cav.	Compositae	Ornamentals	Environmental use	KJ	Exotic	870
Cucurbita moschata Duchesne	Cucurbitaceae	Fruits: Vegetable	Food	HND, KJ	Exotic	931
		Fruits: Vegetable	Food	KJ	Exotic	898
Cuphea hyssopifolia Kunth	Lythraceae	Ornamentals	Environmental use	HND, KJ	Exotic	881

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Curcuma longa L.	Zingiberaceae	Rhizome: Spices	Food additive	KJ	Native	830
Cymbopogon citratus (DC.) Stapf	Poaceae	Bulbs: Spices	Food additive	HND, KJ	Exotic	888
Diopyros sp.	Ebenaceae	Ornamentals	Environmental use	KJ	Native	902
Dracaena braunii Engl.	Asparagaceae	Ornamentals	Environmental use	KJ	Native	845
Duranta erecta L.	Verbenaceae	Ornamentals	Environmental use	HND, KJ	Exotic	922
Elaeagnus latifolia L.	Elaeagnaceae	Dessert fruits	Food	KJ	Native	860
Eleutherococcus trifoliatus (L.) S. Y. Hu	Araliaceae	Leaves: Vegetables	Food	HND	Native	965
Eryngium foetidum L.	Apiaceae	Leaves: Herbs	Food additive	HND, KJ	Exotic	938
Erythrina sp.	Leguminosae	Ornamentals	Environmental use	KJ	Native	834

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Euphorbia milii Des Moul.	Euphorbiaceae	Ornamentals	Environmental use	HND, KJ	Native	919
Euphorbia pulcherrima Willd. ex Klotzsch	Euphorbiaceae	Ornamentals	Environmental use	KJ	Exotic	851
Euphorbia sp.	Euphorbiaceae	Ornamentals	Environmental use	KJ	Native	831
Eurya sp.	Pentaphylacaceae	Ornamentals	Environmental use	KJ	Native	866
Ficus auriculata Lour.	Moraceae	Fruits: Vegetable	Food	KJ	Native	847
Ficus geniculata Kurz	Moraceae	Leaves: Vegetables	Food	KJ	Native	835
Foeniculum vulgare Mill.	Apiaceae	Fruits: Spices	Food additive	KJ	Exotic	858
Gomphrena globosa L.	Amaranthaceae	Ornamentals	Environmental use	HND	Exotic	953
Gymnanthemum amygdalinum (Delile) Sch. Bip. ex Walp.	Compositae	Leaves: Diabetes	Medicine	KJ	Native	893
Hibiscus rosa-sinensis L.	Malvaceae	Ornamentals	Environmental use	KJ	Exotic	842

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Hippeastrum × *johnsonii* Bury	Amaryllidaceae	Ornamentals	Environmental use	KJ	Native	833
Houttuynia cordata Thunb.	Saururaceae	Leaves: Vegetables	Food	KJ	Native	872
Hydrangea macrophylla (Thunb.) Ser.	Hydrangeaceae	Ornamentals	Environmental use	HND, KJ	Exotic	929
Hylocereus undatus (Haw.) Britton & Rose	Cactaceae	Dessert fruits	Food	HND, KJ	Exotic	936
Hymenocallis littoralis (Jacq.) Salisb.	Amaryllidaceae	Ornamentals	Environmental use	HND	Exotic	944
Hypoestes phyllostachya Baker	Acanthaceae	Ornamentals	Environmental use	KJ	Native	837
Impatiens balsamina L.	Balsaminaceae	Ornamentals	Environmental use	HND, KJ	Exotic	921
Ipomoea batatas (L.) Lam.	Convolvulaceae	Unspecified aerial parts: pigs	Animal food	HND, KJ	Exotic	928
		Leaves: Vegetables	Food	KJ	Exotic	839
Lablab purpureus (L.) Sweet	Leguminosae	Fruits: Vegetables	Food	KJ	Native	887

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Lantana camara L.	Verbenaceae	Ornamentals	Environmental use	KJ	Exotic	856
Luffa acutangula (L.) Roxb.	Cucurbitaceae	Fruits: Vegetables	Food	KJ	Native	880
Macadamia integrifolia Maiden & Betche	Proteaceae	Nut	Food	KJ	Exotic	899
Mangifera indica L.	Anacardiaceae	Ornamentals	Environmental use	HND	Native	967
		Dessert fruits, Leaves: Vegetables	Food	HND, KJ	Native	932
Maranta arundinacea L.	Marantaceae	Roots: Starch	Food	KJ	Exotic	889
Mentha × *villosa* Huds.	Lamiaceae	Leaves: Herbs	Food additive	KJ	Exotic	863
Mirabilis jalapa L.	Nyctaginaceae	Ornamentals	Environmental use	HND, KJ	Exotic	918
Momordica charantia L.	Cucurbitaceae	Fruits: Vegetables	Food	KJ	Native	853
Nicotiana tabacum L.	Solanaceae	Leaves: Smoking	Social use	KJ	Exotic	844

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Ocimum × *africanum* Lour.	Lamiaceae	Leaves: Herbs	Food additive	HND	Native	963
Ocimum gratissimum L.	Lamiaceae	Leaves: Herbs	Food additive	KJ	Exotic	849
Ocimum tenuiflorum L.	Lamiaceae	Leaves: Herbs	Food additive	KJ	Native	897
Opuntia sp.	Cactaceae	Ornamentals	Environmental use	KJ	Exotic	905
Paris polyphylla Sm.	Melanthiaceae	Rhizomes: Pain	Medicine	KJ	Native	846
Passiflora edulis Sims	Passifloraceae	Dessert fruits	Food	KJ	Exotic	877
Perilla frutescens (L.) Britton	Lamiaceae	Fruits: Essences	Food additive	HND, KJ	Exotic	911
Persea americana Mill.	Lauraceae	Dessert fruits	Food	KJ	Exotic	867
Phyllanthus acidus (L.) Skeels	Phyllanthaceae	Dessert fruits	Food	HND	Exotic	955
Phyllanthus emblica L.	Phyllanthaceae	Dessert fruits	Food	HND, KJ	Native	913
Piper betle L.	Piperaceae	Leaves: Chewing	Social use	HND, KJ	Native	930

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Piper rostratum Roxb.	Piperaceae	Leaves: Vegetables	Food	KJ	Native	882
Pisum sativum L.	Leguminosae	Fruits: Vegetables	Food	KJ	Exotic	865
Pithecellobium dulce (Roxb.) Benth.	Leguminosae	Ornamentals	Environmental use	HND	Exotic	960
Plukenetia corniculata Sm.	Euphorbiaceae	Seeds: snack	Food	KJ	Native	876
Plumeria rubra L.	Apocynaceae	Ornamentals	Environmental use	KJ	Exotic	883
Prunus cerasoides Buch.-Ham. ex D. Don	Rosaceae	Ornamentals	Environmental use	KJ	Native	891
Prunus persica (L.) Batsch	Rosaceae	Dessert fruits	Food	KJ	Exotic	875
Psidium guajava L.	Myrtaceae	Dessert fruits	Food	HND, KJ	Exotic	923
Rosa sp.	Rosaceae	Ornamentals	Environmental use	KJ	Exotic	873
Rubrus sp.	Rosaceae	Dessert fruits	Food	KJ	Native	879

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Saccharum officinarum L.	Poaceae	Cane Juice	Food	HND, KJ	Exotic	917
Salix tetrasperma Roxb.	Salicaceae	Ornamentals	Environmental use	KJ	Native	854
Sauropus androgynus (L.) Merr.	Phyllanthaceae	Leaves: Vegetables	Food	KJ	Native	869
Sechium edule (Jacq.) Sw.	Cucurbitaceae	Fruits: Vegetables	Food	KJ	Exotic	878
Solanum aethiopicum L.	Solanaceae	Fruits: Vegetables	Food	HND	Native	968
Solanum americanum Mill.	Solanaceae	Leaves: Vegetables	Food	HND, KJ	Native	912
Solanum incanum L.	Solanaceae	Fruits: Vegetables	Food	KJ	Native	884
Solanum indicum L.	Solanaceae	Fruits: Vegetables	Food	HND, KJ	Native	927
Solanum lycopersicum L.	Solanaceae	Fruits: Souing agent	Food additive	KJ	Native	886
Solanum melongena L.	Solanaceae	Fruits: Vegetables	Food	KJ	Native	892
Solanum torvum Sw.	Solanaceae	Fruits: Vegetables	Food	KJ	Native	894

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Sphagneticola trilobata (L.) Pruski	Compositae	Ornamentals	Environmental use	KJ	Exotic	896
Sterculia sp.	Malvaceae	Ornamentals	Environmental use	HND	Native	941
Tagetes erecta L.	Compositae	Ornamentals	Environmental use	KJ	Exotic	900
Talinum paniculatum (Jacq.) Gaertn.	Talinaceae	Ornamentals	Environmental use	KJ	Native	904
Tectona grandis L.f.	Lamiaceae	Wood: Buildings	Material	KJ	Native	907
Terminalia ivorensis A. Chev.	Combretaceae	Ornamentals	Environmental use	HND	Exotic	940
Tetrastigma sp.	Vitaceae	Dessert fruits	Food	KJ	Native	901
Tinospora crispa (L.) Hook. f. & Thomson	Menispermaceae	Stems: Body nourishment	Medicine	KJ	Native	903
Vigna umbellata (Thunb.) Ohwi & H. Ohashi	Leguminosae	Fruits: Vegetables	Food	KJ	Exotic	907

Table 4.27 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Vigna unguiculata (L.) Walp.	Leguminosae	Fruits: Vegetables	Food	HND, KJ	Exotic	915
Wendlandia tinctoria (Roxb.) DC.	Rubiaceae	Leaves: Vegetables	Food	KJ	Native	906
Zea mays L.	Poaceae	Grains: Cereal	Food	KJ	Exotic	909
Zingiber officinale Roscoe	Zingiberaceae	Rhizome: Spices	Food additive	KJ	Native	910
Zinnia violacea Cav.	Compositae	Ornamentals	Environmental use	KJ	Exotic	914

Table 4.28 Diversity indices of woody plants in the Lisu homegardens

Diversity index		Huai Nam Dang	Khun Jae
Richness	Median	1	5
	Max	6	16
	Min	1	1
Abundance	Median	2	8
	Max	7	20
	Min	1	1
Shannon	Median	0	1.52
	Max	1.75	2.71
	Min	0	0
Evenness	Median	1	0.95
	Max	1	1
	Min	0.79	0.92

Table 4.29 The most dominant woody species in two Lisu villages (arranged in order of dominance).

Huai Nam Dang	Khun Jae
Mangifera indica L.	*Mangifera indica* L.
Artocarpus heterophyllus Lam.	*Artocarpus heterophyllus* Lam.
Citrus reticulata Blanco	*Psidium guajava* L.
Psidium guajava L.	*Diopyros* sp.
	Carica papaya L.
	Ceiba pentandra (L.) Gaertn.
	Gymnanthemum amygdalinum (Delile) Sch. Bip. ex Walp.

Table 4.30 The most common (total number of homegardens found) woody species in two Lisu villages (arranged in order of commonness).

Huai Nam Dang	Khun Jae
Mangifera indica L.	*Mangifera indica* L.
Artocarpus heterophyllus Lam.	*Psidium guajava* L.
Psidium guajava L.	*Artocarpus heterophyllus* Lam.
Carica papaya L.	*Carica papaya* L.
Phyllanthus acidus (L.) Skeels	*Ceiba pentandra* (L.) Gaertn.
	Diopyros sp.
	Gymnanthemum amygdalinum (Delile) Sch. Bip. ex Walp.

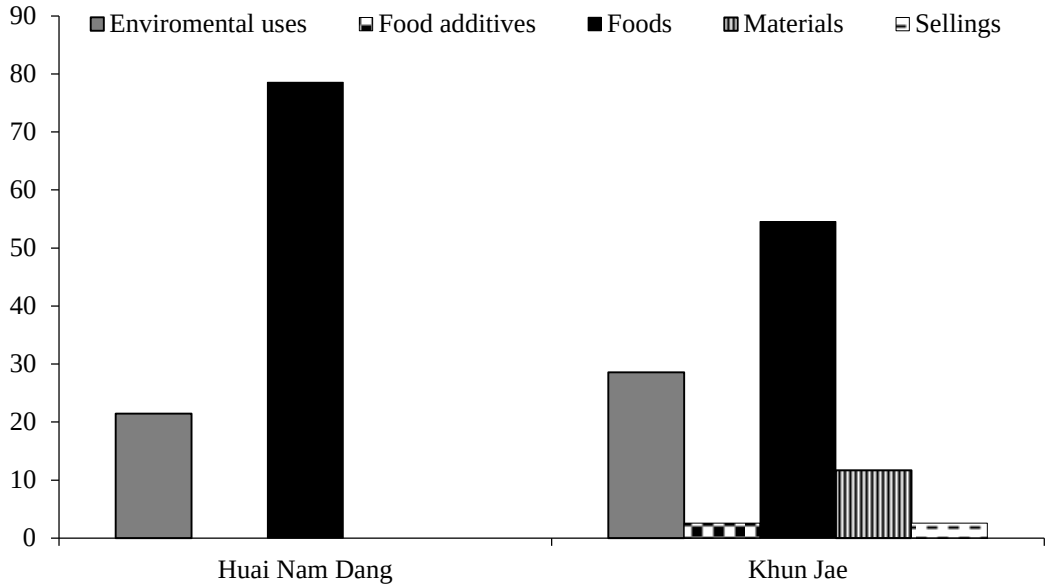

Fig. 4.36 Percentage of woody plant individuals in five use category of woody species in homegardens of two Lisu villages.

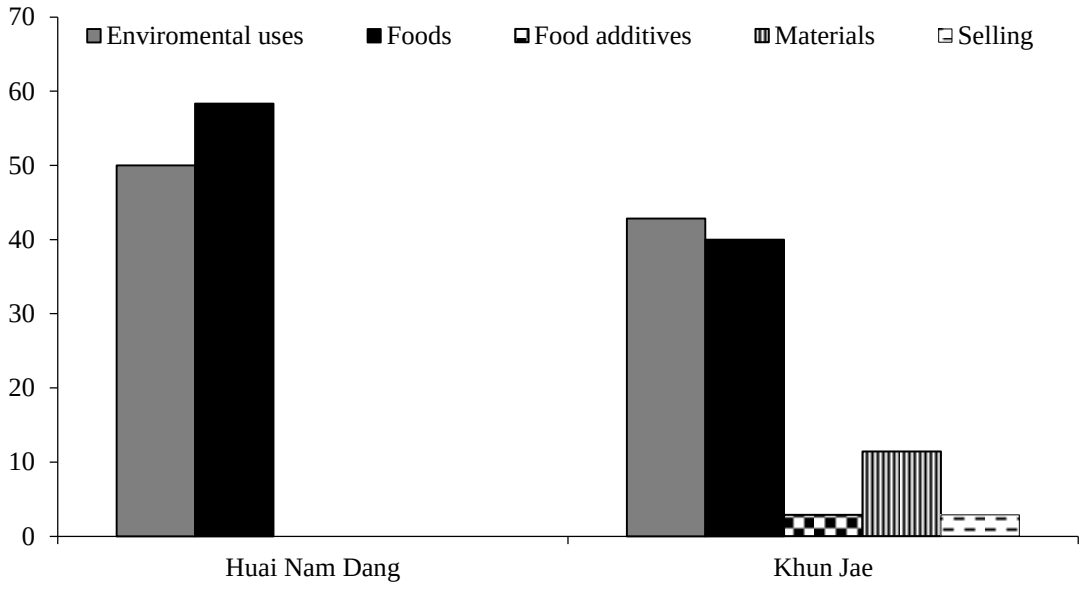

Fig. 4.37 Percentage of species in five use category of woody species in homegardens in two Lisu villages.

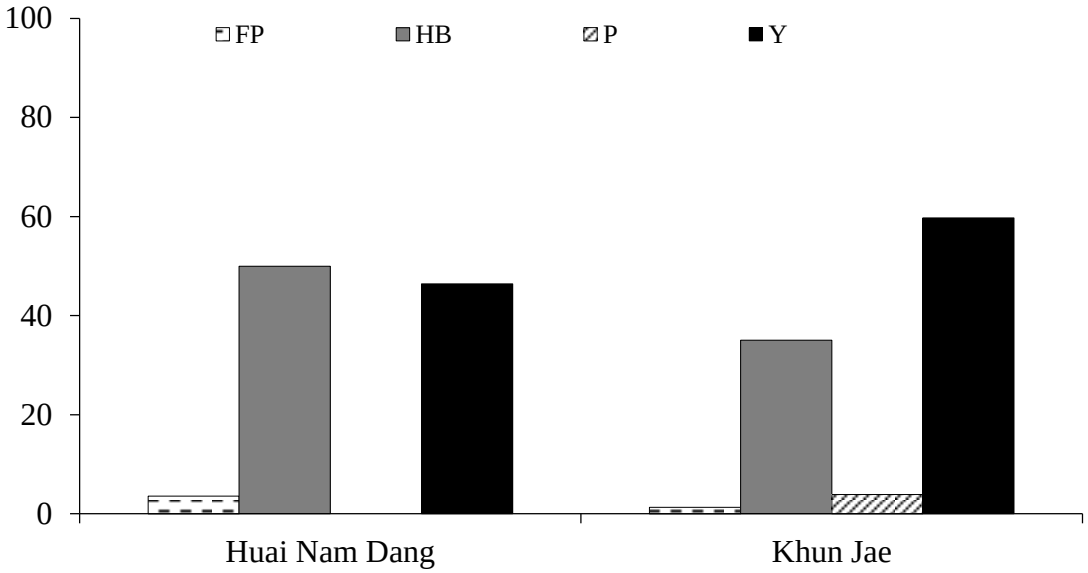

Fig. 4.38 Percentage of woody plant individuals in four horizontal zones (FP = fence plot, HB = homegarden boundary, P = pot, Y = yard) in homegardens in two Lisu villages.

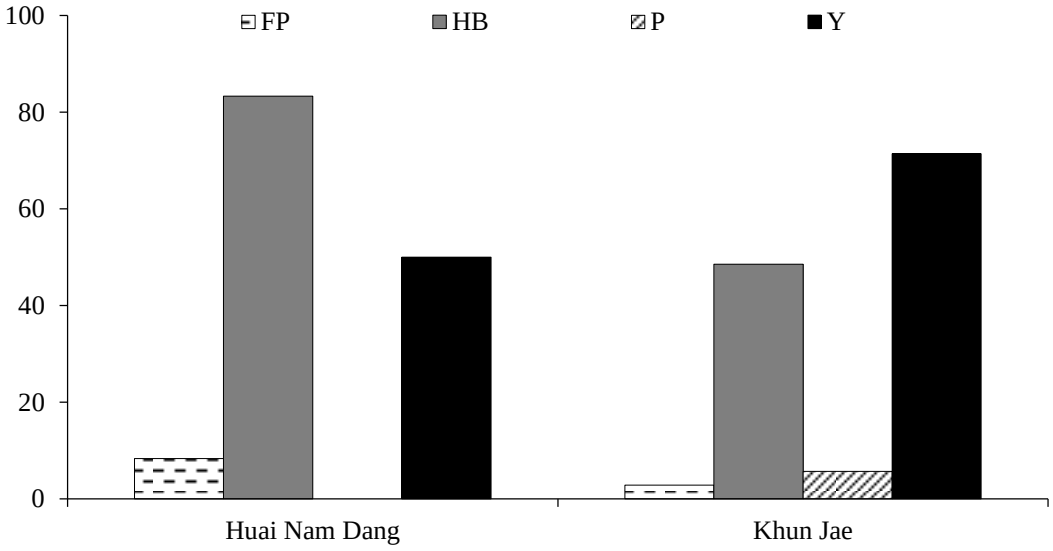

Fig. 4.39 Percentage of woody species in four horizontal zones (FP = fenced plot, HB = homegarden boundary, P = pot, Y = yard) in homegardens of two Lisu villages.

Non-woody species: Function, commonness, and horizontal distribution

There were a total of 86 species of non-woody species in the two studied Lisu villages. The three largest categories in both villages were *environmental use, foods,* and *food additives* (Fig. 4.40). Most species were found in homegarden boundaries in Huai Nam Dang while in Khun Jae most species were found in the yards. The other important zones in Huai Nam Dang were fenced plots, and yards (Fig. 4.41). The other important zones in Khun Jae were fenced plots and homegarden boundaries.

The common species in Huai Nam Dang and Khun Jae were very different (Table 4.31). Only *Capsicum frutescens* L. was recorded as the most common species in both villages. Other common species in Huai Nam Dang included *Euphorbia milii* Des Moul., *Perilla frutescens* (L.) Britton, *Solanum aethiopicum* L., *Bryophyllum pinnatum* (Lam.) Oken, *Cucurbita moschata* Duchesne, and *Hymenocallis littoralis* (Jacq.) Salisb. The common species in Khun Jae included *Eryngium foetidum* L., *Solanum melongena* L., *Alpinia galanga* (L.) Willd., *Duranta erecta* L., *Aloe vera* (L.) Burm.f., *Cuphea hyssopifolia* Kunth, *Ipomoea batatas* (L.) Lam., *Artemisia* sp., *Cosmos sulphureus* Cav., *Solanum lycopersicum* L., and *Tagetes erecta* L.

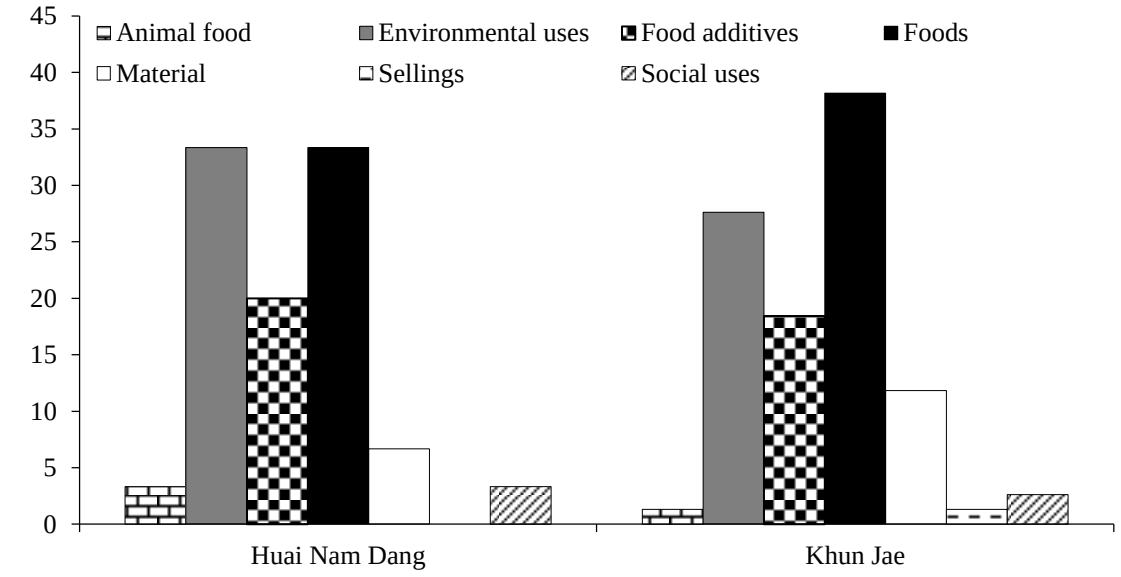

Fig. 4.40 Percentage of non-woody species found in seven use categories in homegardens in two Lisu village

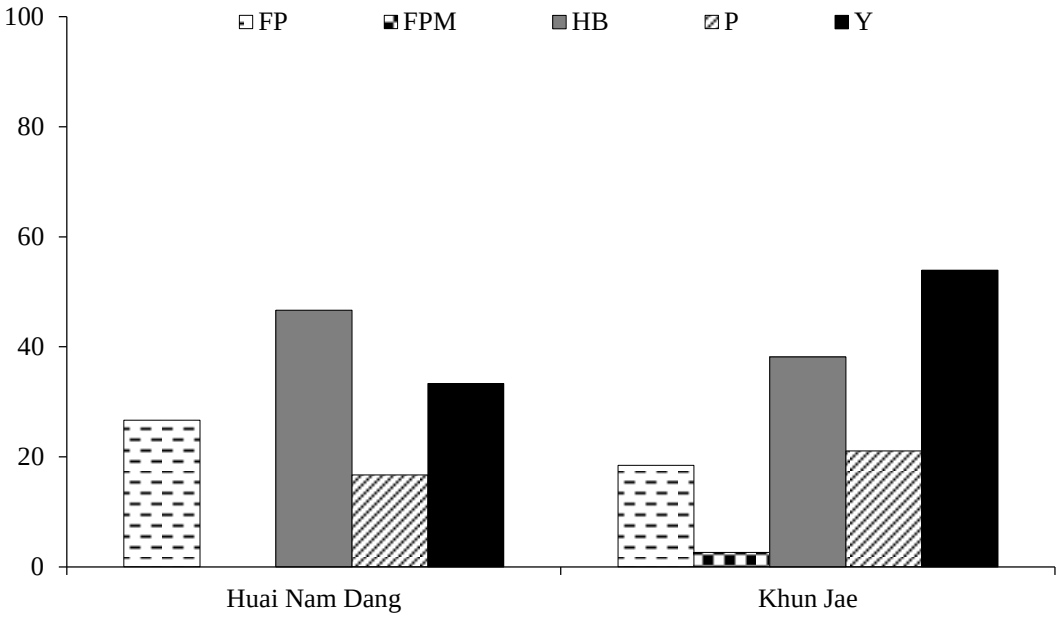

Fig. 4.41 Percentage of non-woody species found in five horizontal zones (FP = fenced plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard) in homegardens of two Lisu villages.

Table 4.31 The most common non-woody species in homegardens of two Lisu villages (arranged in order of commoness).

Huai Nam Dang	Khun Jae
Euphorbia milii Des Moul.	*Eryngium foetidum* L.
Perilla frutescens (L.) Britton	*Solanum melongena* L.
Solanum aethiopicum L.	*Capsicum frutescens* L.
Bryophyllum pinnatum (Lam.) Oken	*Alpinia galanga* (L.) Willd.
Capsicum frutescens L.	*Duranta erecta* L.
Cucurbita moschata Duchesne	*Aloe vera* (L.) Burm.f.
Hymenocallis littoralis (Jacq.) Salisb.	*Cuphea hyssopifolia* Kunth
	Ipomoea batatas (L.) Lam.
	Artemisia sp.
	Cosmos sulphureus Cav.
	Solanum lycopersicum L.
	Tagetes erecta L.

4.6 Thai Yuan Homegarden

General characteristics

The Thai Yuan kept most of their plants within two horizontal zones: the yard and the homegarden boundaries. Yards and homegarden boundaries were found in all the studied homegardens. Fences or hedgerows were commonly found as part of the homegardens. Most of Thai Yuan homegardens included three large yards and a small one. Most plants in the front yards were ornamentals (*environmental use*). Most of the edible species were found in the other yards (Fig. 4.42). Pigs and cattle were rarely found in Thai Yuan homegardens. When present, they were raised in roofed pens in the back yards. Most chicken roamed freely in the homegardens.

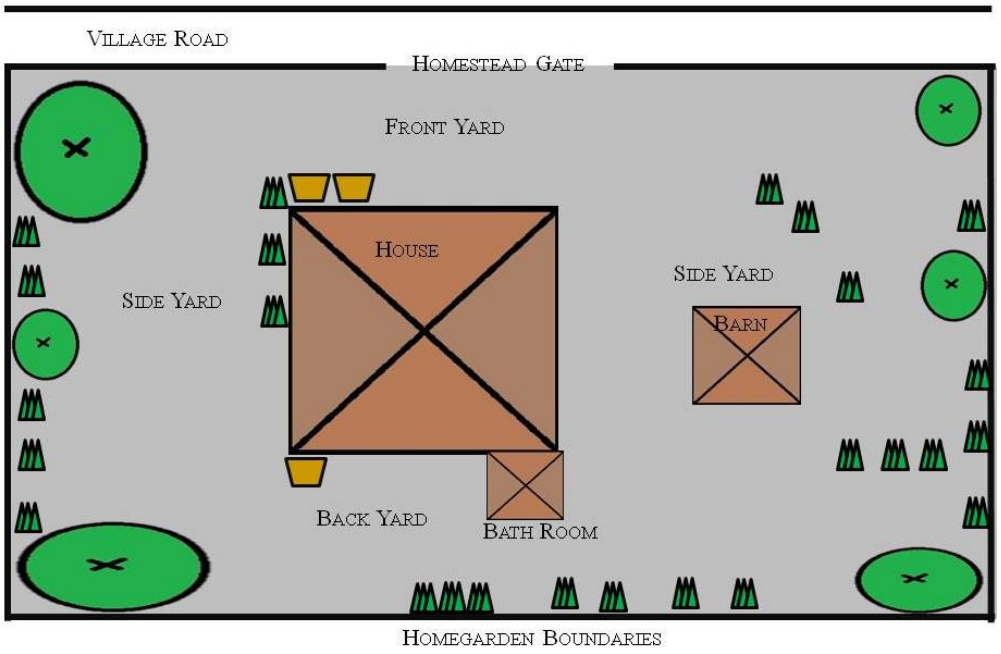

Fig. 4.42 The diagram of Thai Yuan homegarden

Plant species and diversity in Thai Yuan homegardens

A total of 378 species were recorded from two Thai Yuan villages (Table 4.32), with 300 and 211 spp. in Ta Krai and Tong Phai, respectively. The average number of species per homegarden in Ta Krai and Tong Phai was 32 and 37, respectively. Most species in both villages belonged to the categories *environmental use* and *food*. These two categories contributed to 82% and 77% of the species found in Ta Krai and Tong Phai village, respectively. The third largest category in both villages was *food additive* which contributed 10% and 12% of the species found in Ta Krai and Tong Phai, respectively.

Distribution and composition in zones

The yards (Y) and homegarden boundaries (HB) were the most important zones of homegardens in both studied Thai Yuan villages (Fig. 4.43). There were plants in all yards and homegarden boundaries in the studied Thai Yuan villages. Pots were another zone that was found in both villages, and they were found in nearly 90% of the homegardens in both villages.

Woody species: Diversity, dominance, function, and horizontal distribution

There were 124 woody species in total in Ta Krai and Tong Phai. Tong Phai had higher median and mean of richness and individuals in homegardens than Ta Krai (Table 4.34).

Table 4.32 Two Thai Yuan villages where the homegardens were examined for plant species diversity, zonification, and use categories

Village	Ta Krai	Thong Phai
Geographic coordinates	N 18°54'25" E098°56'49"	N18 °29'24" E098° 21'56"
Elevation (m.a.s.l.)	320	512
No. of generation since foundation	3	3
No. of studied homegardens (% of total in the village)	50 (20)	62 (37)
Distance from nearest urban center (length of dirt road)	15 km. (0)	10 km. (0)
No. of species (total 378)	300	211
No. of plant families	87	69
Mean of species in each homegarden	32	36
No. of animal food species (%)	0 (0)	3 (1)
No. of environmental use species (%)	133 (44)	84 (40)
No. of food species (%)	109 (36)	78 (37)
No. of food additive species (%)	30 (10)	26 (12)
No. of material species (%)	5 (2)	3 (1)
No. of medicinal species (%)	21 (7)	22 (10)
No. of social use species (%)	10 (3)	5 (2)
Mean of animal food species/homegarden	0	1.25
Mean of environmental use species /homegarden	9.8	13.0

Table 4.32 (continued)

Village	Ta Krai	Thong Phai
Mean of food additive species /homegarden	6.2	5.8
Mean of material species /homegarden	0.2	0.2
Mean of medicinal species /homegarden	1.6	1.8
Mean of social use species /homegarden	1.2	0.4

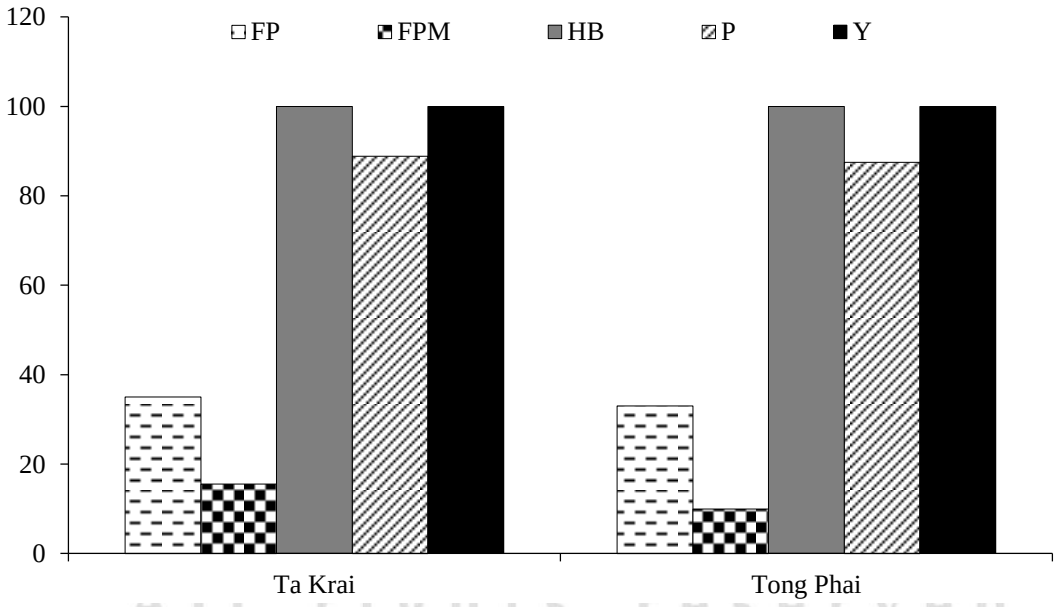

Fig. 4.43 Percentage of zonation in homegardens of two Thai Yuan villages (FP = fence plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

Table 4.33 Species found in homegardens in two Thai Yuan villages and their use categories with indication of village (TK: Ta Krai, TP: Tong Phai)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Abelmoschus esculentus (L.) Moench	Malvaceae	Young fruit: Vegetables	Food	TK, TP	Exotic	1237
Abutilon theophrasti Medik.	Malvaceae	Stems: Apppetizing	Medicine	TK	Native	1118
Acacia concinna (Willd.) DC.	Leguminosae	Fruits: Souing agent	Food additive	TK, TP	Native	1354
		Fruits: Religion uses	Social use	TK	Native	1120
Acacia pennata subsp. *insuavis* (Lace) I. C. Nielsen	Leguminosae	Leaves: Vegetables	Food	TK, TP	Native	1353
Acalypha siamensis Oliv. ex Gage	Euphorbiaceae	Boundaries	Environmental use	TK, TP	Native	1352
Acalypha wilkesiana Müll. Arg.	Euphorbiaceae	Ornamentals	Environmental use	TK	Exotic	1236

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Acmella oleracea (L.) R. K. Jansen	Compositae	Aerial part: Vegetables	Food	TK	Native	1119
Acorus calamus L.	Acoraceae	Ornamentals	Environmental use	TK	Native	1121
		Leaves: Cold and Fever	Medicine	TK	Native	
Acorus gramineus Aiton	Acoraceae	Leaves: Cold and Fever	Medicine	TK	Exotic	1122
Adenium obesum (Forssk.) Roem. & Schult.	Apocynaceae	Ornamentals	Environmental use	TK, TP	Exotic	1355
Aegle marmelos (L.) Corrêa	Rutaceae	Dessert fruits	Food	TK	Native	1235
Aglaonema modestum Schott ex Engl.	Araceae	Ornamentals	Environmental use	TK, TP	Exotic	1238
Allium ascalonicum L.	Amaryllidaceae	Bulbs: Spices	Food additive	TP	Exotic	1408
Allium hookeri Thwaites	Amaryllidaceae	Root: Spices	Food additive	TP	Native	1409
Allium sativum L.	Amaryllidaceae	Bulbs: Spices	Food additive	TK	Exotic	1234

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Allium schoenoprasum L.	Amaryllidaceae	Leaves: Herbs	Food additive	TK	Exotic	1123
Alocasia cucullata (Lour.) G. Don	Araceae	Unspecified aerial parts: pigs	Animal food	TP	Exotic	1356
		Ornamentals	Environmental use	TK	Exotic	1116
Aloe vera (L.) Burm.f.	Xanthorrhoeaceae	Leaves: Skin burned	Medicine	TK, TP	Exotic	1349
Alpinia galanga (L.) Willd.	Zingiberaceae	Rhizome: Spices	Food additive	TK, TP	Exotic	1239
Alstonia scholaris (L.) R. Br.	Apocynaceae	Shade	Environmental use	TK	Native	1117
Alternanthera bettzickiana (Regel) G. Nicholson	Amaranthaceae	Ornamentals	Environmental use	TK	Exotic	1124
Alternanthera ramosissima (Mart.) Chodat & Hassl.	Amaranthaceae	Ornamentals	Environmental use	TK, TP	Exotic	1350
Amaranthus blitum subsp. *oleraceus* (L.) Costea	Amaranthaceae	Aerial part: Vegetables	Food	TK, TP	Native	1348

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Amomum sp. 1	Zingiberaceae	Inflorescences: Vegetables	Food	TK, TP	Native	1351
Amomum sp. 2	Zingiberaceae	Inflorescences: Vegetables	Food	TP	Native	1357
Amorphophallus spp.	Araceae	Inflorescences: Vegetables	Food	TP	Native	1407
Ananas comosus (L.) Merr.	Bromeliaceae	Dessert fruits	Food	TK, TP	Exotic	1242
Andrographis paniculata (Burm.f.) Nees	Acanthaceae	Leaves: Fever	Medicine	TK, TP	Exotic	1347
Annona squamosa L.	Annonaceae	Dessert fruits	Food	TK, TP	Exotic	1241
		Dessert fruits	Food	TP	Exotic	
Apium graveolens L.	Apiaceae	Leaves: Herbs	Food additive	TK, TP	Exotic	1406
Arachis hypogaea L.	Leguminosae	Pulses	Food	TK	Exotic	1233
Areca catechu L.	Arecaceae	Ornamentals	Environmental use	TK, TP	Native	1240

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
		Fruits: Chewing with betel	Social use	TK	Native	
Arenga sp.	Arecaceae	Ornamentals	Environmental use	TP	Native	P.Pratee1358
		Young fruit: Vegetables	Food	TP	Native	
Artemisia lactiflora Wall. ex DC.	Compositae	Ornamentals	Environmental use	TP	Exotic	P.Pratee1359
		Leafy branches: Ritual uses	Social use	TK	Exotic	1125
Artocarpus heterophyllus Lam.	Moraceae	Dessert fruits	Food	TK, TP	Exotic	1346
Asparagus officinalis L.	Asparagaceae	Shoots: Vegetables	Food	TP	Exotic	1410
Asparagus setaceus (Kunth) Jessop	Asparagaceae	Ornamentals	Environmental use	TK	Exotic	1232
Asplenium nidus L.	Aspleniaceae	Ornamentals	Environmental use	TK	Exotic	1231

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Asystasia gangetica (L.) T. Anderson	Acanthaceae	Ornamentals	Environmental use	TK	Exotic	1126
Averrhoa carambola L.	Oxalidaceae	Dessert fruits	Food	TK, TP	Exotic	1243
Azadirachta indica A. Juss.	Meliaceae	Young inflorescense:	Food	TK	Exotic	P.Pratee 1360
Baccaurea ramiflora Lour.	Phyllanthaceae	Dessert fruits	Food	TK	Native	1131
Baliospermum calycinum Müll. Arg.	Euphorbiaceae	Leaves: Vegetables	Food	TK	Native	1127
		Exudates: Mouth ulcer	Medicine	TP	Native	1411
Bambusa sp.	Poaceae	Cane: Containers	Material	TK	Native	1128
Barleria lupulina Lindl.	Acanthaceae	Leaves: Vegetables	Food	TK	Native	1230
Basella alba L.	Basellaceae	Inflorescences: Vegetables	Food	TK, TP	Native	1244
Bauhinia purpurea L.	Leguminosae	Young leaves: Vegetables	Food	TK, TP	Exotic	1345

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Bauhinia racemosa Lam.	Leguminosae	Young leaves: Vegetables	Food	TK	Native	1130
Beaumontia grandiflora Wall.	Apocynaceae	Ornamentals	Environmental use	TK	Exotic	1405
Begonia sp.	Begoniaceae	Ornamentals	Environmental use	TK	Exotic	
Benincasa hispida (Thunb.) Cogn.	Cucurbitaceae	Fruits: Vegetables	Food	TK	Exotic	1129
Blumea balsamifera (L.) DC.	Compositae	Leaves: Ritual uses	Social use	TK, TP	Native	1245
Boesenbergia rotunda (L.) Mansf.	Zingiberaceae	Root: Spices	Food additive	TK, TP	Native	1344
Bouea macrophylla Griff.	Anacardiaceae	Dessert fruits	Food	TK, TP	Native	1342
Bougainvillea glabra Choisy	Nyctaginaceae	Ornamentals	Environmental use	TK	Exotic	1229
Brassica oleracea L.	Brassicaceae	Leaves: Vegetables	Food	TK	Exotic	1132
Brassica rapa L.	Brassicaceae	Leaves: Vegetables	Food	TK	Exotic	P.Pratee 1361

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Breynia sp.	Phyllanthaceae	Leaves: Vegetables	Food	TK	Native	1115
Broussonetia papyrifera (L.) L'Hér. ex Vent.	Moraceae	Shade	Environmental use	TK	Native	1114
Brunfelsia uniflora (Pohl) D. Don	Solanaceae	Ornamentals	Environmental use	TP	Exotic	1404
Bryophyllum pinnatum (Lam.) Oken	Crassulaceae	Ornamentals	Environmental use	TK, TP	Exotic	1246
Caladium bicolor (Aiton) Vent.	Araceae	Ornamentals	Environmental use	TK, TP	Exotic	1340
Calathea lutea (Aubl.) E. Mey. ex Schult.	Marantaceae	Ornamentals	Environmental use	TK	Native	1362
Calathea majestica (Linden) H. A. Kenn.	Marantaceae	Ornamentals	Environmental use	TK	Native	1133
Cananga odorata (Lam.) Hook.f. & Thomson	Annonaceae	Ornamentals	Environmental use	TK, TP	Exotic	1247
Canna indica L.	Cannaceae	Ornamentals	Environmental use	TK, TP	Exotic	1341

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Capsicum annuum L.	Solanaceae	Fruits: Spices	Food additive	TK, TP	Exotic	1343
Carica papaya L.	Caricaceae	Fruits: Vegetables,	Food	TK, TP	Exotic	1339
Caryota maxima Blume ex Mart.	Arecaceae	Ornamentals	Environmental use	TP	Native	1363
Caryota mitis Lour.	Arecaceae	Ornamentals	Environmental use	TK, TP	Native	1248
		Leaves: Vegetables	Food	TK	Native	
Cascabela thevetia (L.) Lippold	Apocynaceae	Ornamentals	Environmental use	TK	Exotic	1134
Cassia fistula L.	Leguminosae	Ornamentals	Environmental use	TP	Native	1364
Catharanthus roseus (L.) G. Don	Apocynaceae	Ornamentals	Environmental use	TK	Exotic	1135
Celosia argentea L.	Amaranthaceae	Unspecified aerial parts: pigs	Animal food	TP	Exotic	1338

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
		Ornamentals	Environmental use	TK, TP	Exotic	
Centella asiatica (L.) Urb.	Apiaceae	Leaves: Vegetables	Food	TK	Exotic	1403
Centratherum punctatum Cass.	Compositae	Ornamentals	Environmental use	TP	Native	1412
Cestrum aurantiacum Lindl.	Solanaceae	Ornamentals	Environmental use	TP	Exotic	1413
Cestrum diurnum L.	Solanaceae	Ornamentals	Environmental use	TK	Exotic	1136
Cheilocostus lacerus (Gagnep.) C. D. Specht	Costaceae	Ornamentals	Environmental use	TP	Native	1414
Chlorophytum chinense Bureau & Franch.	Asparagaceae	Ornamentals	Environmental use	TK	Native	1140
Chlorophytum comosum (Thunb.) Jacques	Asparagaceae	Ornamentals	Environmental use	TK	Native	1137
Chrysophyllum cainito L.	Sapotaceae	Dessert fruits	Food	TP	Exotic	1402

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Cissus hastata Miq.	Vitaceae	Leaves: Souring agents	Food additive	TK	Native	1415
Cissus quadrangularis L.	Vitaceae	Stems:Haemorrhoides	Medicine	TK	Native	1228
Citrullus lanatus (Thunb.) Matsum. & Nakai	Cucurbitaceae	Dessert fruits	Food	TP	Exotic	1416
Citrus hystrix DC.	Rutaceae	Fruit juice: Souring agents	Food additive	TK, TP	Exotic	1337
		Fruits juice: Souring agent	Food additive	TP	Exotic	1370
Citrus maxima (Burm.) Merr.	Rutaceae	Dessert fruits	Food	TK, TP	Exotic	1249
Clerodendrum paniculatum L.	Lamiaceae	Ornamentals	Environmental use	TP	Native	1365
Clerodendrum thomsoniae Balf.f.	Lamiaceae	Ornamentals	Environmental use	TK	Exotic	1138
Clinacanthus nutans (Burm.f.) Lindau	Acanthaceae	Leaves: Vegetables	Food	TP	Native	1401

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
		Leaves: Common cold, fever	Medicine	TK	Native	1139
Clitoria ternatea L.	Leguminosae	Flower: Colourings (deep	Food additive	TK	Exotic	1227
Coccinia grandis (L.) Voigt	Cucurbitaceae	Leaves: Vegetables	Food	TK, TP	Native	1250
Cocos nucifera L.	Arecaceae	Dessert fruits	Food	TK, TP	Exotic	1336
Codiaeum variegatum (L.) Rumph. ex A. Juss.	Euphorbiaceae	Ornamentals	Environmental use	TK, TP	Exotic	1335
		Leaves: Religion uses	Social use	TK	Exotic	1141
Coffea arabica L.	Rubiaceae	Ornamentals	Environmental use	TP	Exotic	1366
Colocasia esculenta (L.) Schott	Araceae	Unspecified aerial parts: pigs	Animal food	TP	Native	1400
		Dessert fruits	Food	TK	Native	1113

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Colocasia gigantea (Blume) Hook.f.	Araceae	Aerail parts: Vegetables	Food	TK	Native	1369
Colubrina asiatica (L.) Brongn.	Rhamnaceae	Leaves: Vegetables	Food	TK, TP	Native	1334
Cordyline fruticosa (L.) A. Chev.	Asparagaceae	Ornamentals	Environmental use	TK, TP	Exotic	1333
		Ornamentals	Environmental use	TP	Exotic	1367
Coriandrum sativum L.	Apiaceae	Ornamentals	Environmental use	TP	Exotic	1251
		Fruits: Spices	Food additive	TK, TP	Exotic	
Costus barbatus Suess.	Costaceae	Ornamentals	Environmental use	TK	Native	1143
Costus sp.	Costaceae	Ornamentals	Environmental use	TK	Exotic	1142
Costus woodsonii Maas	Costaceae	Ornamentals	Environmental use	TK	Native	1141

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Crateva religiosa G. Forst.	Capparaceae	Leaves: Vegetables	Food	TK	Native	1226
Cratoxylum cochinchinense (Lour.) Blume	Hypericaceae	Leaves: Vegetables	Food	TK	Native	1225
Crinum asiaticum L.	Amaryllidaceae	Ornamentals	Environmental use	TK, TP	Native	1252
Crossandra infundibuliformis (L.) Nees	Acanthaceae	Ornamentals	Environmental use	TK, TP	Exotic	1332
Croton persimilis Müll.Arg.	Euphorbiaceae	Leaves: Body nourishment	Medicine	TP	Native	1368
Croton stellatopilosus H. Ohba	Euphorbiaceae	Leaves: Body nourishment	Medicine	TK	Native	1112
Ctenanthe oppenheimiana (E.Morren) K. Schum.	Marantaceae	Ornamentals	Environmental use	TK	Native	1399
Cucumis sativus L.	Cucurbitaceae	Fruits: Vegetable	Food	TK	Exotic	
Cucurbita moschata Duchesne	Cucurbitaceae	Fruits: Vegetable	Food	TK, TP	Exotic	1331

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Cuphea hyssopifolia Kunth	Lythraceae	Ornamentals	Environmental use	TK	Exotic	1142
Curcuma comosa Roxb.	Zingiberaceae	Ornamentals	Environmental use	TP	Native	1417
		Rhizomes: Flatulence	Medicine	TP	Native	1418
Curcuma longa L.	Zingiberaceae	Rhizome: Spices	Food additive	TK, TP	Native	1523
Curcuma mangga Valeton & Zijp	Zingiberaceae	Rhizome: Vegetable	Food	TP	Exotic	1419
		Rhizome: Spices	Food additive	TK	Exotic	1143
Curcuma sp. 1	Zingiberaceae	Rhizomes: Flatulence	Medicine	TP	Native	1398
Curcuma sp. 2	Zingiberaceae	Rhizomes: Flatulence	Medicine	TP	Native	1420
Curcuma sp. *3*	Zingiberaceae	Rhizomes: Bleeding wound	Medicine	TP	Native	1421

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Curcuma zanthorrhiza Roxb.	Zingiberaceae	Rhizomes: Flatulence	Medicine	TK	Exotic	1224
Cymbopogon citratus (DC.) Stapf	Poaceae	Bulbs: Spices	Food additive	TK, TP	Exotic	1330
Cymbopogon nardus (L.) Rendle	Poaceae	Bulbs: Spices	Food additive	TK	Exotic	1144
Cyperus papyrus L.	Cyperaceae	Ornamentals	Environmental use	TK, TP	Exotic	1422
		Dry Fruits: Decorated	Material	TK	Exotic	1110
Dendrocalamus membranaceus Munro	Poaceae	Cane: Containers	Material	TK, TP	Native	1254
Dieffenbachia seguine (Jacq.) Schott	Araceae	Ornamentals	Environmental use	TK, TP	Exotic	1329
Dillenia philippinensis Rolfe	Dilleniaceae	Ornamentals	Environmental use	TK	Native	1111
Dimocarpus longan Lour.	Sapindaceae	Dessert fruits	Food	TK, TP	Native	1243
Dioscorea alata L.	Dioscoreaceae	Root: Starch	Food	TK	Native	1145

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Dioscorea pentaphylla L.	Dioscoreaceae	Root: Starch	Food	TK, TP	Native	1255
Diplazium esculentum (Retz.) Sw.	Athyriaceae	Ornamentals	Environmental use	TK	Native	1109
Dischidia imbricata (Blume) Steud.	Apocynaceae	Ornamentals	Environmental use	TK	Native	1146
Dracaena braunii Engl.	Asparagaceae	Ornamentals	Environmental use	TK	Native	1223
		Leaves: Religion uses	Social use	TK	Native	
Dracaena fragrans (L.) Ker Gawl.	Asparagaceae	Ornamentals	Environmental use	TK, TP	Exotic	1256
Dracaena reflexa Lam.	Asparagaceae	Ornamentals	Environmental use	TK	Exotic	1220
		Ornamentals	Environmental use	TP	Exotic	1424
Dracaena sp.	Asparagaceae	Ornamentals	Environmental use	TK, TP	Exotic	1257

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Dracaena surculosa Lindl.	Asparagaceae	Ornamentals	Environmental use	TK	Native	1221
Dregea volubilis (L.f.) Benth. ex Hook.f.	Apocynaceae	Leaves: Vegetables	Food	TK	Native	1425
Drimiopsis maculata Lindl. & Paxton	Asparagaceae	Ornamentals	Environmental use	TK	Native	1222
Duranta erecta L.	Verbenaceae	Ornamentals	Environmental use	TK, TP	Exotic	1328
Echinodorus cordifolius (L.) Griseb.	Alismataceae	Ornamentals	Environmental use	TK	Exotic	1108
Ehretia microphylla Lam.	Boraginaceae	Ornamentals	Environmental use	TK	Exotic	1426
Elaeagnus latifolia L.	Elaeagnaceae	Dessert fruits	Food	TK	Native	1219
Elaeocarpus grandiflorus Sm.	Elaeocarpaceae	Ornamentals	Environmental use	TK, TP	Native	1258
		Flowers: Religion uses	Social use	TK	Native	

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Elaeocarpus hygrophilus Kurz	Elaeocarpaceae	Dessert fruits	Food	TK	Native	1147
Eleutherine bulbosa (Mill.) Urb.	Iridaceae	Ornamentals	Environmental use	TP	Exotic	1371
		Bulbs: Insect sting	Medicine	TP	Exotic	
Eleutherococcus trifoliatus (L.) S. Y. Hu	Araliaceae	Leaves: Vegetables	Food	TP	Native	1397
Elsholtzia communis (Collett & Hemsl.) Diels	Lamiaceae	Bulbs: Spices	Food additive	TP	Native	1427
Epiphyllum oxypetalum (DC.) Haw.	Cactaceae	Ornamentals	Environmental use	TK	Exotic	1428
Eryngium foetidum L.	Apiaceae	Leaves: Herbs	Food additive	TK, TP	Exotic	1259
Erythrina sp.	Leguminosae	Ornamentals	Environmental use	TP	Native	1428
Etlingera elatior (Jack) R. M. Sm.	Zingiberaceae	Ornamentals	Environmental use	TK	Exotic	1148

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Eucharis grandiflora Planch. & Linden	Amaryllidaceae	Ornamentals	Environmental use	TP	Exotic	1396
Eucrosia bicolor Ker Gawl.	Amaryllidaceae	Ornamentals	Environmental use	TK	Native	1107
Eupatorium capillifolium (Lam.) Small ex Porter & Britton	Compositae	Shoots: Vegetalbes	Food	TK	Exotic	1218
Eupatorium fortunei Turcz.	Compositae	Shoots: Vegetalbes	Food	TK, TP	Exotic	1327
Euphorbia cotinifolia L.	Euphorbiaceae	Ornamentals	Environmental use	TK	Exotic	1217
Euphorbia leucocephala Lotsy	Euphorbiaceae	Ornamentals	Environmental use	TK	Exotic	1149
Euphorbia milii Des Moul.	Euphorbiaceae	Ornamentals	Environmental use	TK, TP	Native	1260
Euphorbia tithymaloides L.	Euphorbiaceae	Ornamentals	Environmental use	TK, TP	Exotic	1261
Euphorbia viguieri Denis	Euphorbiaceae	Ornamentals	Environmental use	TK	Native	1150

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Ficus altissima Blume	Moraceae	Shade	Environmental use	TP	Native	1394
Ficus hispida L.f.	Moraceae	Shade	Environmental use	TP	Native	1372
Ficus pumila L.	Moraceae	Ornamentals	Environmental use	TK	Exotic	1216
Ficus virens Aiton	Moraceae	Leaves: Vegetables	Food	TK, TP	Native	1262
Galphimia gracilis Bartl.	Malpighiaceae	Ornamentals	Environmental use	TK, TP	Native	1395
Garcinia cowa Roxb. ex Choisy	Clusiaceae	Leaves: Vegetables	Food	TK	Native	1151
Garcinia × *mangostana* L.	Clusiaceae	Dessert fruits	Food	TK	Exotic	1215
Gardenia jasminoides J. Ellis	Rubiaceae	Ornamentals	Environmental use	TK, TP	Exotic	1393
Gerbera jamesonii Bolus ex Hook.f.	Compositae	Ornamentals	Environmental use	TK	Exotic	1152

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Gigantochloa sp.	Poaceae	Cane: Containers	Material	TK	Native	1214
Globba schomburgkii Hook.f.	Zingiberaceae	Ornamentals	Environmental use	TP	Native	1430
Glycosmis pentaphylla (Retz.) DC.	Rutaceae	Leaves: Body refreshment	Medicine	TP	Native	1373
Gomphrena globosa L.	Amaranthaceae	Ornamentals	Environmental use	TK, TP	Exotic	1263
		Flowers: Religion uses	Social use	TK	Exotic	1153
Gymnema inodorum (Lour.) Decne.	Apocynaceae	Leaves: Vegetables	Food	TK, TP	Native	1326
Hedychium coronarium J. Koenig	Zingiberaceae	Ornamentals	Environmental use	TK	Native	1154
Hedychium villosum Wall.	Zingiberaceae	Ornamentals	Environmental use	TP	Native	1392
Heliconia bihai (L.) L.	Heliconiaceae	Ornamentals	Environmental use	TK	Native	1213
Helicteres isora L.	Malvaceae	Fruts: Diabetes	Medicine	TK	Native	1155

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Hibiscus rosa-sinensis L.	Malvaceae	Ornamentals	Environmental use	TK	Exotic	
Homalocladium platycladum (F. Muell.) L. H. Bailey	Polygonaceae	Exudate: Centipede bite	Medicine	TK, TP	Native	1325
Homalomena lindenii (Rodigas) Ridl.	Araceae	Ornamentals	Environmental use	TK	Exotic	1156
Homalomena rubescens (Roxb.) Kunth	Araceae	Ornamentals	Environmental use	TK, TP	Native	1431
Houttuynia cordata Thunb.	Saururaceae	Leaves: Vegetables	Food	TK, TP	Native	1264
Hydragea sp.	Hydrangeaceae	Ornamentals	Environmental use	TK	Exotic	1157
Hydrangea macrophylla (Thunb.) Ser.	Hydrangeaceae	Ornamentals	Environmental use	TP	Exotic	1432
Hydrocotyle umbellata L.	Araliaceae	Leaves: Vegetables	Food	TK	Exotic	1212
Hylocereus undatus (Haw.) Britton & Rose	Cactaceae	Dessert fruits	Food	TK, TP	Exotic	1324

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Hymenocallis littoralis (Jacq.) Salisb.	Amaryllidaceae	Ornamentals	Environmental use	TK, TP	Exotic	1323
Impatiens balsamina L.	Balsaminaceae	Ornamentals	Environmental use	TK, TP	Exotic	1322
Indigofera tinctoria L.	Leguminosae	Dyestuffs	Material	TP	Exotic	1433
Ipomoea aquatica Forssk.	Convolvulaceae	Leaves: Vegetables	Food	TK, TP	Native	1265
Ipomoea batatas (L.) Lam.	Convolvulaceae	Leaves: Vegetables	Food	TK, TP	Exotic	1391
Ipomoea hederifolia L.	Convolvulaceae	Ornamentals	Environmental use	TK	Exotic	1211
Iris domestica (L.) Goldblatt & Mabb.	Iridaceae	Ornamentals	Environmental use	TP	Exotic	1434
Ixora chinensis Lam.	Rubiaceae	Ornamentals	Environmental use	TP	Exotic	1435
Ixora coccinea L.	Rubiaceae	Ornamentals	Environmental use	TK	Exotic	1210

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Ixora lucida R. Br. ex Hook.f.	Rubiaceae	Ornamentals	Environmental use	TK, TP	Native	1266
Jasminum adenophyllum Wall. ex C. B. Clarke	Oleaceae	Leaves: Vegetables	Food	TP	Native	1436
Jasminum multiflorum (Burm.f.) Andrews	Oleaceae	Ornamentals	Environmental use	TP	Native	1374
Jasminum sambac (L.) Aiton	Oleaceae	Ornamentals	Environmental use	TK, TP	Exotic	1321
Jatropha integerrima Jacq.	Euphorbiaceae	Ornamentals	Environmental use	TK	Exotic	1106
Jatropha multifida L.	Euphorbiaceae	Exudate: bleeding wound	Medicine	TK, TP	Exotic	1267
Jatropha podagrica Hook.	Euphorbiaceae	Exudate: bleeding wound	Medicine	TK, TP	Exotic	1268
Justicia adhatoda L.	Acanthaceae	Ornamentals	Environmental use	TP	Native	1390
Justicia fragilis Wall.	Acanthaceae	Ornamentals	Environmental use	TP	Native	1437

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Kaempferia elegans (Wall.) Baker	Zingiberaceae	Ornamentals	Environmental use	TK, TP	Native	1319
		Rhizomes: Body pain	Medicine	TP	Native	
Kaempferia galanga L.	Zingiberaceae	Rhizomes: Flatulence	Medicine	TP	Native	1438
Kaempferia parviflora Wall. ex Baker	Zingiberaceae	Rhizomes: Body nourishment	Medicine	TK, TP	Native	1320
Kaempferia sp.	Zingiberaceae	Rhizomes: Body pain	Medicine	TP	Native	1439
Kalimeris indica (L.) Sch. Bip.	Compositae	Ornamentals	Environmental use	TK, TP	Exotic	1269
Lablab purpureus (L.) Sweet	Leguminosae	Fruits: Vegetables	Food	TK	Native	1158
Lasia spinosa (L.) Thwaites	Araceae	Inflorescences: Vegetables	Food	TK, TP	Native	1389
Leea sp.	Vitaceae	Leaves: Pain	Medicine	TP	Native	1440

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Leucaena leucocephala (Lam.) de Wit	Leguminosae	Ornamentals	Environmental use	TP	Exotic	1441
		Leaves: Vegetables	Food	TK, TP	Exotic	1271
Litchi chinensis Sonn.	Sapindaceae	Dessert fruits	Food	TK, TP	Exotic	1270
Luffa acutangula (L.) Roxb.	Cucurbitaceae	Fruits: Vegetables	Food	TP	Native	1388
Magnolia champaca (L.) Baill. ex Pierre	Magnoliaceae	Ornamentals	Environmental use	TK	Native	1209
Magnolia coco (Lour.) DC.	Magnoliaceae	Ornamentals	Environmental use	TK	Exotic	1208
Mammea siamensis T. Anderson	Calophyllaceae	Flowers: Religion uses	Social use	TP	Native	1442
Mangifera indica L.	Anacardiaceae	Dessert fruits, Leaves:	Food	TK, TP	Native	1375
Manihot esculenta Crantz	Euphorbiaceae	Roots: Starch	Food	TK, TP	Exotic	1272
Manilkara zapota (L.) P. Royen	Sapotaceae	Dessert fruits	Food	TK	Exotic	1207

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Mansoa alliacea (Lam.) A. H. Gentry	Bignoniaceae	Ornamentals	Environmental use	TK	Exotic	1206
Maranta arundinacea L.	Marantaceae	Roots: Starch	Food	TP	Exotic	1443
Markhamia stipulata (Wall.) Seem.	Bignoniaceae	Fruits: Vegetables	Food	TK	Native	1159
Melia azedarach L.	Meliaceae	Ornamentals	Environmental use	TK	Native	1205
Mentha × *villosa* Huds.	Lamiaceae	Leaves: Herbs	Food additive	TK, TP	Exotic	1318
Millingtonia hortensis L.f.	Bignoniaceae	Ornamentals	Environmental use	TK, TP	Native	1317
Mirabilis jalapa L.	Nyctaginaceae	Ornamentals	Environmental use	TK	Exotic	1204
Momordica charantia L.	Cucurbitaceae	Fruits: Vegetables	Food	TK, TP	Native	1273
Momordica cochinchinensis (Lour.) Spreng.	Cucurbitaceae	Fruits: Vegetables	Food	TK	Native	1198
Morinda citrifolia L.	Rubiaceae	Leaves: Vegetables	Food	TK	Native	1203

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Moringa oleifera Lam.	Moringaceae	Fuits: Vegetables	Food	TK, TP	Native	1315
Morus alba L.	Moraceae	Dessert fruits	Food	TP	Exotic	1387
Morus macroura Miq.	Moraceae	Dessert fruits	Food	TK	Native	1202
Muntingia calabura L.	Muntingiaceae	Dessert fruits	Food	TK, TP	Exotic	1316
Murdannia loriformis (Hassk.) R. S. Rao & Kammathy	Commelinaceae	Leaves: Cancer	Medicine	TK, TP	Native	1376
Murraya paniculata (L.) Jack	Rutaceae	Ornamentals	Environmental use	TK	Native	1201
Musa ornata Roxb.	Musaceae	Ornamentals	Environmental use	TK	Native	1199
Mussaenda philippica A. Rich.	Rubiaceae	Ornamentals	Environmental use	TK	Exotic	1200
Nelumbo nucifera Gaertn.	Nelumbonaceae	Ornamentals	Environmental use	TK	Native	1197
Neomarica longifolia (Link & Otto) Sprague	Iridaceae	Ornamentals	Environmental use	TK	Exotic	1196

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Ocimum × *africanum* Lour.	Lamiaceae	Leaves: Herbs	Food additive	TP	Native	1386
Ocimum americanum L.	Lamiaceae	Leaves: Herbs	Food additive	TK	Native	1105
Ocimum basilicum L.	Lamiaceae	Leaves: Herbs	Food additive	TP	Exotic	
Ocimum gratissimum L.	Lamiaceae	Leaves: Herbs	Food additive	TK	Exotic	1195
Ocimum tenuiflorum L.	Lamiaceae	Leaves: Herbs	Food additive	TK, TP	Native	1312
Oroxylum indicum (L.) Kurz	Bignoniaceae	Fruits: Vegetables	Food	TK, TP	Native	1313
Paederia sp.	Rubiaceae	Leaves: Vegetables	Food	TK	Native	1160
Pandanus amaryllifolius Roxb.	Pandanaceae	Leaves: Essences	Food additive	TK	Exotic	1444
Pandanus humilis Lour.	Pandanaceae	Leaves: Essences	Food additive	TK, TP	Native	1314
Passiflora foetida L.	Passifloraceae	Leaves: Vegetables	Food	TK	Native	1161
Passiflora laurifolia L.	Passifloraceae	Dessert fruits	Food	TK, TP	Exotic	1274

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Peliosanthes teta Andrews	Asparagaceae	Ornamentals	Environmental use	TK	Native	1194
		Inflorescences: Vegetables	Food	TK, TP	Native	1311
Phaseolus lunatus L.	Leguminosae	Fruits: Vegetables	Food	TK	Exotic	1445
Philodendron sp.	Araceae	Ornamentals	Environmental use	TK, TP	Exotic	1385
Phlogacanthus pulcherrimus T. Anderson	Acanthaceae	Leaves: Vegetables	Food	TP	Native	1446
Phyllanthus acidus (L.) Skeels	Phyllanthaceae	Dessert fruits	Food	TK, TP	Exotic	1275
Phyllanthus pulcher Wall. ex Müll. Arg.	Phyllanthaceae	Ornamentals	Environmental use	TK	Native	1162
Piper betle L.	Piperaceae	Leaves: Chewing	Social use	TK, TP	Native	
Piper retrofractum Vahl	Piperaceae	Fruits: Spices	Food additive	TK	Native	1193
Piper rostratum Roxb.	Piperaceae	Leaves: Vegetables	Food	TK, TP	Native	1310

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Piper wallichii (Miq.) Hand.-Mazz.	Piperaceae	Stems: Spices	Food additive	TK	Native	1192
Pistia stratiotes L.	Araceae	Ornamentals	Environmental use	TK	Exotic	1191
Plantago major L.	Plantaginaceae	Leaves: Pain	Medicine	TK, TP	Native	1276
Plectranthus amboinicus (Lour.) Spreng.	Lamiaceae	Leaves: Vegetables	Food	TK, TP	Exotic	1277
Plectranthus scutellarioides (L.) R. Br.	Lamiaceae	Ornamentals	Environmental use	TK	Exotic	1104
Plumeria pudica Jacq.	Apocynaceae	Ornamentals	Environmental use	TK	Exotic	1190
Podranea ricasoliana (Tanfani) Sprague	Bignoniaceae	Ornamentals	Environmental use	TK	Exotic	1189
Polygonum odoratum Lour.	Polygonaceae	Leaves: Herbs	Food additive	TK, TP	Native	1308
Polyscias fruticosa (L.) Harms	Araliaceae	Ornamentals	Environmental use	TK, TP	Exotic	1309
Polyscias scutellaria (Burm.f.) Fosberg	Araliaceae	Ornamentals	Environmental use	TK, TP	Exotic	1307

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Portulaca grandiflora Hook.	Portulacaceae	Ornamentals	Environmental use	TP	Exotic	1447
Portulaca pilosa L.	Portulacaceae	Ornamentals	Environmental use	TK	Native	1188
Proiphys amboinensis (L.) Herb.	Amaryllidaceae	Ornamentals	Environmental use	TK, TP	Exotic	1306
Pseuderanthemum carruthersii (Seem.) Guillaumin	Acanthaceae	Ornamentals	Environmental use	TK, TP	Exotic	1278
		Flowers: Religion uses	Social use	TP	Exotic	1378
Pseuderanthemum latifolium B. Hansen	Acanthaceae	Leaves: Fever	Medicine	TK	Native	1187
Psidium guajava L.	Myrtaceae	Dessert fruits	Food	TK, TP	Exotic	1448
Psophocarpus tetragonolobus (L.) DC.	Leguminosae	Fruits: Vegetables	Food	TK	Exotic	1186
Punica granatum L.	Lythraceae	Dessert fruits	Food	TK, TP	Exotic	1304
Pyrostegia venusta (Ker Gawl.) Miers	Bignoniaceae	Ornamentals	Environmental use	TK	Exotic	1103

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Ravenala madagascariensis Sonn.	Strelitziaceae	Ornamentals	Environmental use	TK	Exotic	1185
Rhapis excelsa (Thunb.) Henry	Arecaceae	Ornamentals	Environmental use	TK	Exotic	1184
Rivina humilis L.	Phytolaccaceae	Ornamentals	Environmental use	TK	Exotic	1163
Rosa sp.	Rosaceae	Ornamentals	Environmental use	TK, TP	Exotic	1279
Ruellia squarrosa (Fenzl) Cufod.	Acanthaceae	Ornamentals	Environmental use	TK	Native	1183
Saccharum officinarum L.	Poaceae	Cane Juice	Food	TK, TP	Exotic	1305
Sanchezia speciosa Leonard	Acanthaceae	Ornamentals	Environmental use	TK	Exotic	1182
Sandoricum koetjape (Burm.f.) Merr.	Meliaceae	Dessert fruits	Food	TP	Native	1449
Sansevieria trifasciata Prain	Asparagaceae	Ornamentals	Environmental use	TK, TP	Exotic	1303

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Saraca indica L.	Leguminosae	Leaves: Vegetables	Food	TK	Native	1102
Sarcandra glabra (Thunb.) Nakai	Chloranthaceae	Ornamentals	Environmental use	TP	Native	1377
Sauropus androgynus (L.) Merr.	Phyllanthaceae	Leaves: Vegetables	Food	TK, TP	Native	1281
Scadoxus multiflorus (Martyn) Raf.	Amaryllidaceae	Ornamentals	Environmental use	TK, TP	Exotic	1280
Schleichera oleosa (Lour.) Merr.	Sapindaceae	Live plant in situ: Magic (Good	Social use	TK	Native	1181
Sechium edule (Jacq.) Sw.	Cucurbitaceae	Fruits: Vegetables	Food	TP	Exotic	1450
Senna siamea (Lam.) H. S. Irwin & Barneby	Leguminosae	Leaves: Vegetables	Food	TK	Native	1180
Sesamum indicum L.	Pedaliaceae	Fruits: Essences	Food additive	TP	Exotic	1451
Sesbania grandiflora (L.) Pers.	Leguminosae	Flower: Vegetables	Food	TK, TP	Exotic	1302

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Smilax ovalifolia Roxb. ex D.Don	Smilacaceae	Leaves: Vegetables	Food	TP	Native	1384
Solanum americanum Mill.	Solanaceae	Leaves: Vegetables	Food	TK	Native	1179
Solanum erianthum D. Don	Solanaceae	Ornamentals	Environmental use	TK	Native	1101
Solanum incanum L.	Solanaceae	Fruits: Vegetables	Food	TK, TP	Native	1282
Solanum indicum L.	Solanaceae	Fruits: Vegetables	Food	TK	Native	1164
Solanum lycopersicum L.	Solanaceae	Fruits: Souing agent	Food additive	TP	Native	1452
Solanum melongena L.	Solanaceae	Fruits: Vegetables	Food	TK, TP	Native	1300
Solanum stramoniifolium Jacq.	Solanaceae	Fruits: Vegetables	Food	TK	Exotic	1301
Solanum torvum Sw.	Solanaceae	Fruits: Vegetables	Food	TK, TP	Native	1283
Solanumm lycopesicum L.	Solanaceae	Fruits: Vegetables	Food	TK	Native	1100

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Spathiphyllum cannifolium (Dryand. ex Sims) Schott	Araceae	Ornamentals	Environmental use	TK, TP	Exotic	1299
Spathiphyllum floribundum (Linden & André) N. E. Br.	Araceae	Ornamentals	Environmental use	TP	Exotic	1453
Spathodea campanulata P. Beauv.	Bignoniaceae	Ornamentals	Environmental use	TK	Exotic	1178
Sphagneticola trilobata (L.) Pruski	Compositae	Ornamentals	Environmental use	TK	Exotic	1177
Spondias pinnata (L.f.) Kurz	Anacardiaceae	Dessert fruits	Food	TK, TP	Native	1454
Sterculia sp.	Malvaceae	Ornamentals	Environmental use	TK	Native	1176
Strobilanthes cusia (Nees) Kuntze	Acanthaceae	Dyestuffs	Material	TP	Native	1383
Syzygium antisepticum (Blume) Merr. & L. M. Perry	Myrtaceae	Dessert fruits	Food	TK	Native	1455
Syzygium jambos (L.) Alston	Myrtaceae	Dessert fruits	Food	TK	Native	1174
Syzygium malaccense (L.) Merr. & L. M. Perry	Myrtaceae	Dessert fruits	Food	TK	Native	1175

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Syzygium nervosum A. Cunn. ex DC.	Myrtaceae	Dessert fruits	Food	TK, TP	Exotic	1284
Tagetes erecta L.	Compositae	Ornamentals	Environmental use	TK, TP	Exotic	1297
Talinum paniculatum (Jacq.) Gaertn.	Talinaceae	Ornamentals	Environmental use	TP	Native	1379
Tamarindus indica L.	Leguminosae	Dessert fruits	Food	TK, TP	Exotic	1295
Tectona grandis L.f.	Lamiaceae	Ornamentals	Environmental use	TK, TP	Native	1296
Telosma cordata (Burm. f.) Merr.	Apocynaceae	Flowers: Vegetables	Food	TK, TP	Native	1298
Terminalia catappa L.	Combretaceae	Ornamentals	Environmental use	TK	Exotic	1098
Terminalia ivorensis A. Chev.	Combretaceae	Ornamentals	Environmental use	TK	Exotic	1099
Thunbergia erecta (Benth.) T. Anderson	Acanthaceae	Ornamentals	Environmental use	TK, TP	Exotic	1285
Thyrsostachys siamensis Gamble	Poaceae	Cane: Containers	Material	TK	Native	1165

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Tiliacora triandra Diels	Menispermaceae	Leaves: Intoxicants	Social use	TK, TP	Native	1294
Tillandsia sp.	Bromeliaceae	Ornamentals	Environmental use	TK	Exotic	1172
Tinospora crispa (L.) Hook. f. & Thomson	Menispermaceae	Stems: Body nourishment	Medicine	TK, TP	Native	1293
Toddalia asiatica (L.) Lam.	Rutaceae	Leaves: Vegetables	Food	TK, TP	Native	1292
Toxocarpus villosus (Blume) Decne.	Apocynaceae	Exudates: Pimple	Medicine	TK	Native	1173
Trevesia palmata (Roxb. ex Lindl.) Vis.	Araliaceae	Inflorescences: Vegetables	Food	TK	Native	1171
Tupistra muricata (Gagnep.) N. Tanaka	Asparagaceae	Inflorescences: Vegetables	Food	TK, TP	Native	1286
Vigna unguiculata subsp. *sesquipedalis* (L.) Verdc.	Leguminosae	Fruits: Vegetables	Food	TK	Exotic	1170
Vigna unguiculata (L.) Walp.	Leguminosae	Fruits: Vegetables	Food	TK, TP	Exotic	1291
Vitex negundo L.	Lamiaceae	Ornamentals	Environmental use	TP	Exotic	1456

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Wrightia religiosa (Teijsm. & Binn.) Benth. ex Kurz	Apocynaceae	Ornamentals	Environmental use	TK	Native	1097
Xanthosoma sagittifolium (L.) Schott	Araceae	Ornamentals	Environmental use	TK	Exotic	1169
Xiphidium caeruleum Aubl.	Haemodoraceae	Ornamentals	Environmental use	TK	Native	1168
Zamioculcas zamiifolia (Lodd.) Engl.	Araceae	Ornamentals	Environmental use	TK, TP	Native	1290
Zea mays L.	Poaceae	Grains: Cereal	Food	TP	Exotic	1382
Zephyranthes carinata Herb.	Amaryllidaceae	Ornamentals	Environmental use	TK	Exotic	1166
Zephyranthes rosea Lindl.	Amaryllidaceae	Ornamentals	Environmental use	TK, TP	Exotic	1457
Zingiber kerrii Craib	Zingiberaceae	Leaves: Herbs	Food additive	TK	Native	1167
Zingiber montanum (J.Koenig) Link ex A. Dietr.	Zingiberaceae	Pseudostem: Vegetable	Food	TK, TP	Native	1287

Table 4.33 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
		Rhizome: Vegetable	Food	TP	Native	
		Rhizome: Body nourishment	Medicine	TK	Native	
Zingiber officinale Roscoe	Zingiberaceae	Rhizome: Spices	Food additive	TP	Native	1381
Zingiber ottensii Valeton	Zingiberaceae	Pseudostem: Vegetable	Food	TP	Native	1380
		Rhizomes: Flatulence	Medicine	TK, TP	Native	1288
Zinnia violacea Cav.	Compositae	Ornamentals	Environmental use	TK, TP	Exotic	1289
Ziziphus jujuba Mill.	Rhamnaceae	Dessert fruits	Food	TK	Exotic	1096

The Shannon scores in Ta Krai and Tong Phai were 2.02 and 2.21, respectively. The medians of the evenness were high in both villages (Table 4.34).

Table 4.34 Diversity indices of woody plants in the Thai Yuan homegardens

Dieversity index		Ta Krai	Tong Phai
Richness	Median	8.0	16
	Max	34	29
	Min	1	2
Abundance	Median	8	22
	Max	79	40
	Min	1	6
Shannon	Median	1.97	2.59
	Max	3.13	3.31
	Min	0	0.45
Evenness	Median	0.92	0.88
	Max	1.00	0.96
	Min	0.65	0.71

The dominant species in these two villages were very different from each other (Table 4.35). Only mango and papaya were present as most dominant species in both villages. In Ta Krai, the most dominant species was *Ficus virens* Aiton, followed by other food and food additive species, including: *Annona squamosa* L., *Cocos nucifera* L., *Artocarpus heterophyllus* Lam., *Citrus hystrix* DC., *Dimocarpus longan* Lour.,

Carica papaya L., and *Acacia pennata* (L.) Willd. In Tong Phai, the most dominant species were ornamental species: *Cadiaeum variegatum* (L.) Rumph. ex A. Juss and *Cordyline fruticosa* (L.) A. Chev., followed by other food and ornamental species like *Mangifera indica* L., *Citrus* × *aurantifolia* (Christm.) Swingle, *Dracaena fragrans* (L.) Ker Gawl., *Phyllanthus acidus* (L.) Skeels, and *Carica papaya* L.

Mango was the most common species in Ta Krai, followed by some other food species, e.g., *Annona squamosa* L., *Artocarpus heterophyllus* Lam., *Dimocarpus longan* Lour., and *Ficus virens* Aiton (Table 4.36). In Tong Phai, *Cordyline fruticosa* (L.) A.Chev. was the most common species. This species was primarily used as ornamental but also reported as a food and having social uses in the secondary use reports. The second most common species in this village was mango followed by other ornamental species, *e.g., Cadiaeum variegatum* (L.) Rumph. ex A. Juss., *Galphimia gracilis* Bartl., *Cananga odorata* (Lam.) Hook.f. & Thomson, and *Pseuderanthemum carruthersii* (Seem.) Guillaumin.

Most woody plant individuals in both Thai Yuan villages were in the categories *food* and *environmental use* (Fig. 4.44). These two groups contributed more than 80% of all woody plant individuals in both villages. The trend for number of species (Fig 4.44) was the same as the trend for number of individuals, and these two categories contributed to more than 80% in both villages. *Food* was the largest category in Ta Krai according both numbers of individuals and species. However, *environmental use* was the largest category in Tong Phai. Most species and individuals were found in homegarden boundaries and yards (Fig. 4.46 and 4.47).

Table 4.35 The most dominant woody species in two Thai Yuan villages (arranged in order of dominance).

Ta Krai	Tong Phai
Ficus virens Aiton (55)	*Cadiaeum variegatum* (L.) Rumph. ex A. Juss (41)
Mangifera indica L. (53)	*Cordyline fruticosa* (L.) A. Chev. (38)
Annona squamosa L. (28)	*Mangifera indica* L. (38)
Cocos nucifera L. var. *nucifera* (28)	*Citrus* × *aurantifolia* (Christm.) Swingle (21)
Artocarpus heterophyllus Lam. (26)	*Dracaena fragrans* (L.) Ker Gawl. (16)
Citrus hystrix DC. (23)	*Phyllanthus acidus* (L.) Skeels (13)
Dimocarpus longan Lour. (22)	*Carica papaya* L. (13)
Carica papaya L. (22)	
Acacia pennata (L.) Willd. subsp. *insuavis* (Lace) I. C. Nielsen (21)	

Table 4.36 The most common (total number of homegardens found) woody species in two Thai Yuan villages (arranged in order of commonness).

Ta Krai	Tong Phai
Mangifera indica L.	*Cordyline fruticosa* (L.) A. Chev.
Annona squamosa L.	*Mangifera indica* L.
Artocarpus heterophyllus Lam.	*Citrus* × *aurantifolia* (Christm.) Swingle
Ficus virens Aiton	*Phyllanthus acidus* (L.) Skeels
Citrus hystrix DC.	*Cadiaeum variegatum* (L.) Rumph. ex A. Juss
Dimocarpus longan Lour.	*Galphimia gracilis* Bartl.
Cocos nucifera L. var. *nucifera*	*Cananga odorata* (Lam.) Hook.f. & Thomson
Carica papaya L.	*Pseuderanthemum carruthersii* (Seem.) Guillaumin

Non-woody species: Function, commonness, and horizontal distribution

There were a total of 280 species of non-woody plants. Most of them belonged to the *environmental use* and *food* categories (Fig. 4.48). These two categories contributed about 80% of all species found in both villages. *Environmental use* was the largest category followed by *food*, in both villages. The third largest category in both villages was *food additives.*

The list of most common non-woody species present in both villaged included *Alpinia galangal* (L.) Wild., *Curcuma longa* L., *Ocimum tenuiflorum* L., and *Piper sarmentosum* Roxb (Table 4.37). The three first of these belonged to *food additive.*

Most species of non-woody plants were located in the homegarden yard (Fig. 4.49). This zone included 65-71% of all the species in each village. Homegarden boundaries and pots were another important zone with 33–50% of all the non-woody species found in the homegardens. The less common zonaition was FPM which less than 5% of total species were found in this zone.

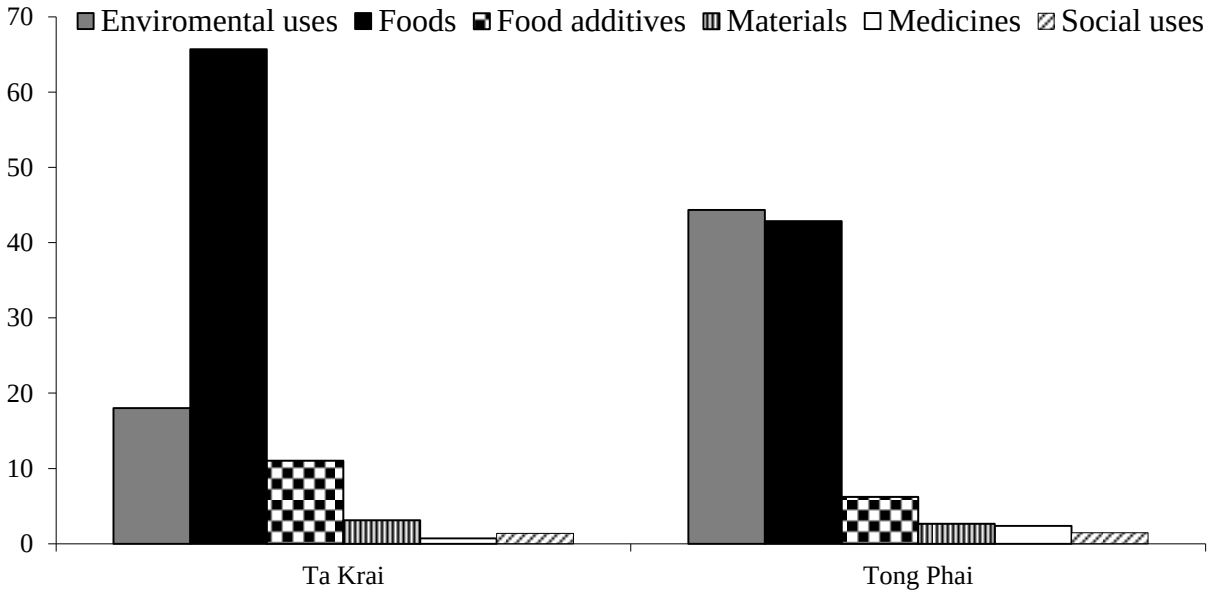

Fig. 4.44 The percentage of woody plant individuals in Thai Yuan homegardens.

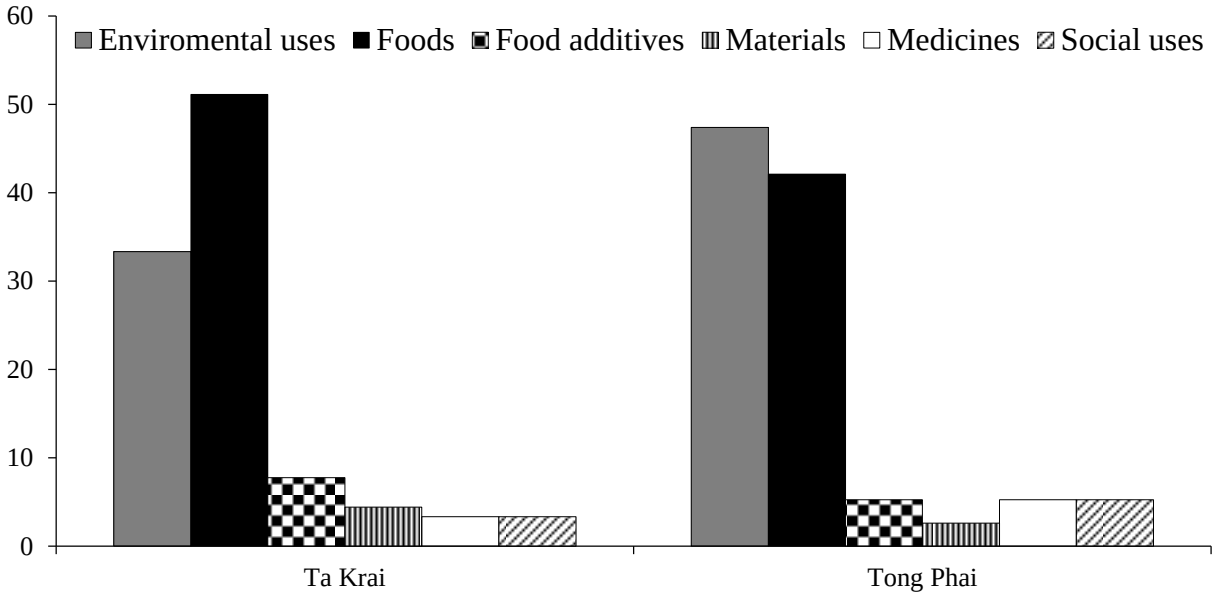

Fig. 4.45 The percentage of species in each use category of woody species in Thai Yuan homegardens in northern Thailand that were studied for species richness, zonification and use categories

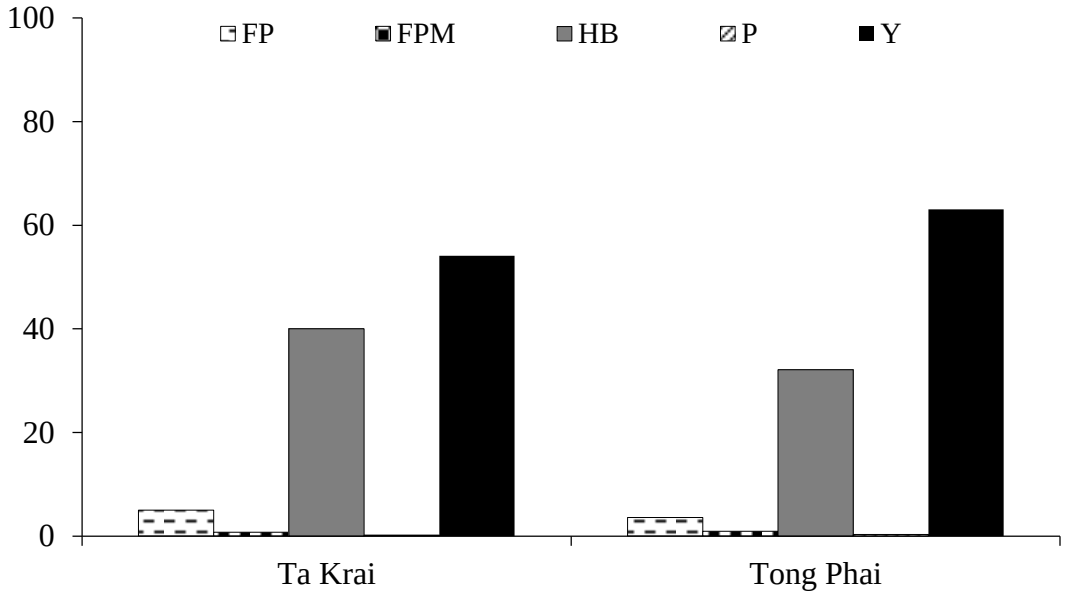

Fig. 4.46 Percentage of woody plant individuals in five horizontal zones in homegardens of two Thai Yuan villages. (FP = fence plot, HB = homegarden boundary, P = pot, Y = yard)

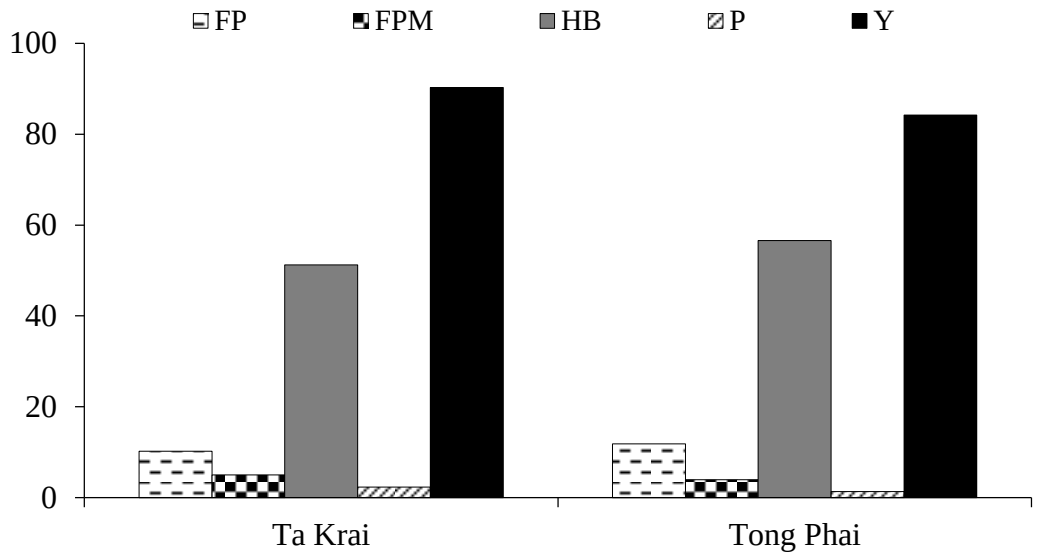

Fig. 4.47 Percentage of woody species in five horizontal zones in homegardens of two Thai Yuan villages (FP = fenced plot, FPM= fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

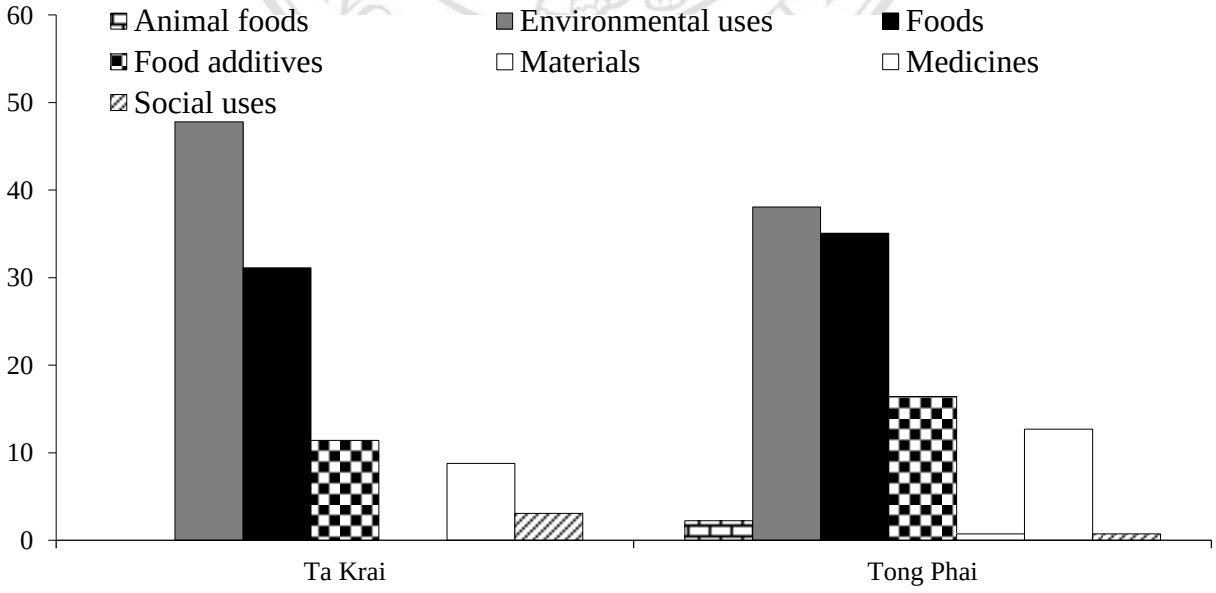

Fig. 4.48 Percentage of non-woody species found in seven use categories in homegardens in two Thai Yuan villages.

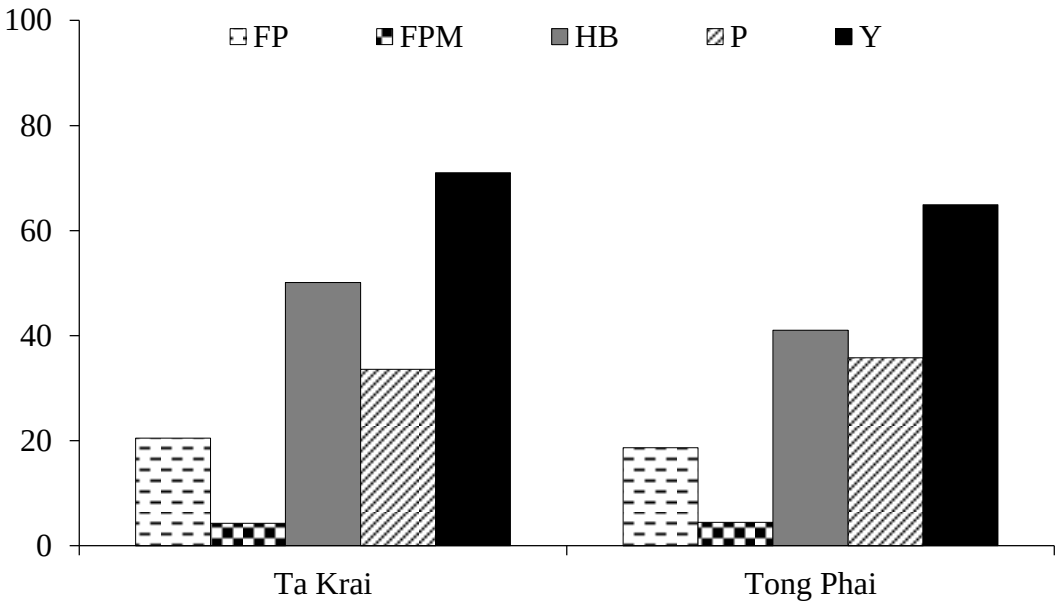

Fig. 4.49 Percentage of non-woody species found in five horizontal zones in homegardens of two Thai Yuan villages (FP = fenced plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard) .

Table 4.37 The most common non-woody species in homegardens of two Thai Yuan villages (arranged in order of commoness).

Ta Krai	Tong Phai
Alpinia galanga (L.) Willd. (60)	*Alpinia galanga* (L.) Willd. (69)
Capsicum frutescens L. (44)	*Capsicum frutescens* L. (63)
Coccinia grandis (L.) Voigt (44)	*Coccinia grandis* (L.) Voigt (63)
Dracaena braunii Engl. (44)	*Dracaena braunii* Engl. (56)
Cymbopogon citratus Stapf (42)	*Cymbopogon citratus* Stapf (56)
Curcuma longa L. (40)	*Curcuma longa* L. (50)
Piper sarmentosum Roxb. (37)	*Piper sarmentosum* Roxb. (50)
Houttuynia cordata Thunb. (33)	*Houttuynia cordata* Thunb. (44)
Ocimum tenuiflorum L. (33)	*Ocimum tenuiflorum* L. (44)

4.7 **Yunnan Chinese Homegarden**

General characteristics

Yunnan Chinese people kept most of their plants in pots. The yards were divided into front yards and back yards with clear and permanent fences around the homestead (Fig. 4.50). The front yards were large and clear and they were used for drying farm products. The back yards were small and sometimes they did not have space left for any plants.

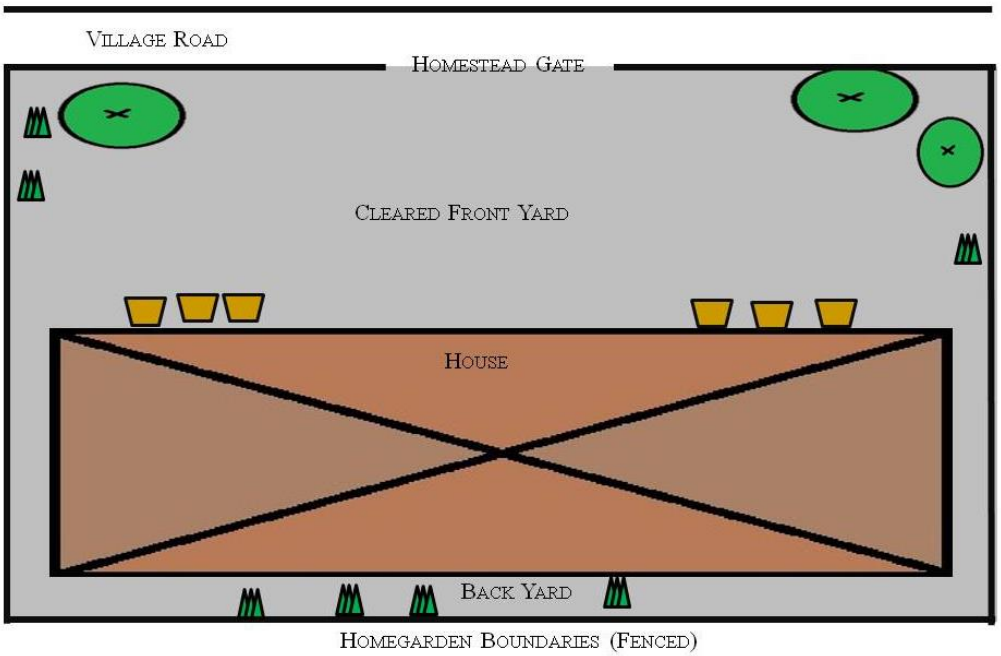

Fig. 4.50 The diagram of Yunnan Chinese homegarden

A total of 113 species were recorded from the two studied Yunnan Chinese villages (Table 4.38) with 83 and 75 in Arunothai and Suk Ruethai, respectively. The average number of species per homegarden in Arunothai and Suk Ruethai was 14 and 10, respectively. The largest use categories in Yunnan Chinese homegardens were

environmental use and *food*. These two categories contributed more than 80% of all species found in both villages. *Foods* was the largest category in both villages followed by *environmental use*. Other important categories, according the number of species, were *food additives* and *medicinals*. These two categories contributed to about 20% and 30% of total species in Arunothai and Suk Ruethai, respecitively.

Distribution and composition in zones

Four horizontal zones were recorded in the two Yunnan Chineses villages: fenced plots, homegarden boundaries, pots, and yards. In Arunothai, homegarden boundaries were the most common zones followed by pots, yards, and fenced plot, respectively. In Suk Ruethai, the most common zone was pots followed by homegarden boundaries, yards, and fenced plots, respectively (Fig. 4.51).

Woody species: Diversity, dominance, function, and horizontal distribution

There were a total of 17 woody species in Arunothai and Suk Ruethai. The number of woody species and individuals in Suk Ruethai was lower than in Arunothai. All medians of diversity indices in Suk Ruethai were higher than in Arunothai, including Shannon and evenness (Table 4.40).

The list of dominant species in Arunothai and Suk Ruethai were quite similar (Table 4.41). The shared list included three food species: *Artocarpus heterophyllus* Lam., *Carica papaya* L., *Mangifera indica* L., and another environmental species: *Dracaena fragrans* (L.) Ker Gawl. The other dominant species in Arunothai inclused two food species: *Ficus virens* Aiton and *Punica granatum* L. var. *granatum*, and an ornamental *Terminalia ivorensis* A. Chev. The other dominant species in Suk Ruethai were *Psidium guajava* L. and *Sauropus androgynus* (L.) Merr., both of which were food species.

Table 4.38 Two Yunnan Chinese villages where homegardens were examined for plant species diversity, zonification, and use categories

Village	Arunothai	Suk Ruethai
Geographic coordinates	N 20°06'00.94" E99°31'56.89"	N19°44'16.85" E98°57'43.36"
Elevation (m.a.s.l.)	583	755
No. of generation since foundation	85 (5%)	51 (40)
No. of studied homegardens (% of total in the village)		
Distance from nearest urban center (length of dirt road)		
No. of species (total 113)	83	75
No. of plant families	42	36
Mean of species in each homegarden	14	10
No. of animal food species (%)	1 (1.2%)	1 (1.3%)
No. of environmental use species (%)	26 (31%)	25 (33%)
No. of food species (%)	31 (37%)	30 (40%)
No. of food additive species (%)	10 (12%)	10 (33%)
No. of medicinal species (%)	18 (22%)	10 (33%)
No. of selling species (%)	2 (2%)	0 (%)
Mean of animal food species/homegarden	0.2	0.1
Mean of environmental use species /homegarden	4.7	4.3

Table 4.37 (continued)

Village	Arunothai	Suk Ruethai
Mean of food additive species /homegarden	2.1	2.0
Mean of medicinal species /homegarden	2.3	2.2
Mean of selling species /homegarden	0.2	0

The woody species, which were noted as the most common species in both villages, were *Carica papaya* L. and *Mangifera indica* L. Both of them were in the *food* category (Table 4.42). The remaining common species in Arunothai included *Terminalia ivorensis* A. Chev., *Ficus virens* Aiton, *Artocarpus heterophyllus* Lam., and *Punica granatum* L. var. *granatum*, all of which were food species. In Suk Ruethai, the other most common species included two ornamental species: *Dracaena fragrans* (L.) Ker Gawl. and *Cadiaeum variegatum* (L.) Rumph. ex A. Juss, a food additive species: *Citrus aurantifolia* (Christm.) Swingle; and a food species, *Psidium guajava* L.

Only two use categories, *environmental use* and *foods*, were recorded for woody species in the two Yunnan Chinese villages. In both villages *foods* was a larger category and contributed about 60% and 70% of total woody individual and species in Arunothai and Suk Ruethai, respectively (Fig. 4.52 and 4.53).

Most of woody species, both individuals and species, were found in homeagarden boundaries, followed by yards in both villages. More than 80% of the woody individuals and species were found within these zones in both villages (Fig. 4.54 and 4.55).

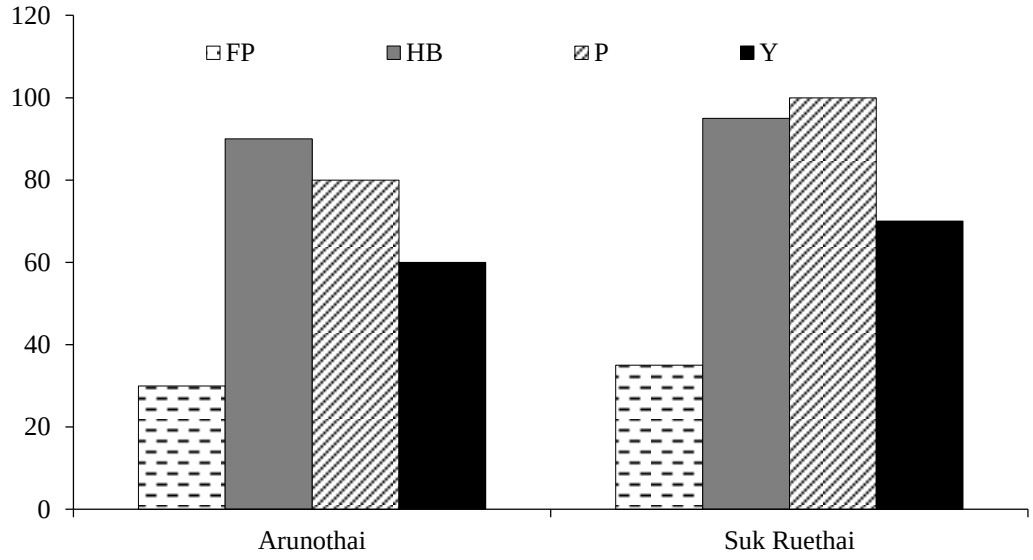

Fig. 4.51 Percentage of zonation present in homegardens of two Yunnan.\Chinese villages (FP = fence plot, FPM = fenced plot margin, HB = homegarden boundary, P = pot, Y = yard).

Table 4.39 Species found in homegardens in two Yunnan Chinese villages and their use categories with indication of village (AT: Arunothai, ST: Suk Ruethai)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Abelmoschus esculentus (L.) Moench	Malvaceae	Young fruit: Vegetables	Food	AT	Exotic	982
Abutilon theophrasti Medik.	Malvaceae	Stems: Back aches	Medicine	ST	Native	1074
Acacia pennata subsp. *insuavis* (Lace) I. C. Nielsen	Leguminosae	Leaves: Vegetables	Food	ST	Native	1075
Acorus calamus L.	Acoraceae	Leaves: Cold and Fever	Medicine	AT	Native	1017
Adenium obesum (Forssk.) Roem. & Schult.	Apocynaceae	Ornamentals	Environmental use	AT	Exotic	997
Adonidia merrillii (Becc.) Becc.	Arecaceae	Ornamentals	Environmental use	AT	Exotic	1003
Aglaonema modestum Schott ex Engl.	Araceae	Ornamentals	Environmental use	AT, ST	Exotic	1018
Allium ascalonicum L.	Amaryllidaceae	Bulbs: Spices	Food additive	AT	Exotic	1004

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Allium hookeri Thwaites	Amaryllidaceae	Root: Spices	Food additive	AT	Native	1076
Allium schoenoprasum L.	Amaryllidaceae	Leaves: Vegetables	Food	AT	Exotic	1005
		Leaves: Herbs	Food additive	AT	Exotic	998
Aloe vera (L.) Burm.f.	Xanthorrhoeaceae	Leaves: Skin burned	Medicine	AT, ST	Exotic	1019
Alpinia galanga (L.) Willd.	Zingiberaceae	Rhizome: Spices	Food additive	ST	Exotic	1077
Alstonia scholaris (L.) R. Br.	Apocynaceae	Shade	Environmental use	ST	Native	1078
Alternanthera brasiliana (L.) Kuntze	Amaranthaceae	Ornamentals	Environmental use	AT	Native	1020
Amaranthus blitum subsp. *oleraceus* (L.) Costea	Amaranthaceae	Aerial part: Vegetables	Food	AT	Native	980
Amomum sp.	Zingiberaceae	Inflorescences: Vegetables	Food	ST	Native	1079
Amorphophallus spp.	Araceae	Inflorescences: Vegetables	Food	AT	Native	990

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Ananas comosus (L.) Merr.	Bromeliaceae	Dessert fruits	Food	ST	Exotic	1080
Andrographis paniculata (Burm.f.) Nees	Acanthaceae	Leaves: Fever	Medicine	AT	Exotic	981
Annona squamosa L.	Annonaceae	Dessert fruits	Food	AT, ST	Exotic	1021
Artemisia lactiflora Wall. ex DC.	Compositae	Leaves: Body nourishment	Medicine	AT, ST	Exotic	1023
Artocarpus heterophyllus Lam.	Moraceae	Dessert fruits	Food	AT, ST	Exotic	1024
Bauhinia purpurea L.	Leguminosae	Young leaves: Vegetables	Food	ST	Exotic	1081
Benincasa hispida (Thunb.) Cogn.	Cucurbitaceae	Fruits: Vegetables	Food	AT	Exotic	1006
Blumea balsamifera (L.) DC.	Compositae	Leaves: Common cold, fever (children)	Medicine	AT, ST	Native	1025
Brassica rapa L.	Brassicaceae	Leaves: Vegetables	Food	AT, ST	Exotic	1026
Brugmansia × *candida* Pers.	Solanaceae	Ornamentals	Environmental use	ST	Native	1082

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Bryophyllum pinnatum (Lam.) Oken	Crassulaceae	Ornamentals	Social use	AT	Exotic	999
Canna indica L.	Cannaceae	Ornamentals	Environmental use	AT, ST	Exotic	1027
Capsicum annuum L.	Solanaceae	Fruits: Spices	Food additive	AT, ST	Exotic	1022
Carica papaya L.	Caricaceae	Fruits: Vegetables, Dessert fruits	Food	AT, ST	Exotic	1028
Catharanthus roseus (L.) G. Don	Apocynaceae	Ornamentals	Environmental use	AT, ST	Exotic	1029
Celosia argentea L.	Amaranthaceae	Ornamentals	Environmental use	AT, ST	Exotic	1030
Centella asiatica (L.) Urb.	Apiaceae	Leaves: Vegetables	Food	ST	Exotic	1061
Cestrum nocturnum L.	Solanaceae	Ornamentals	Environmental use	AT	Exotic	983
Citrus aurantifolia (Christm.) Swingle	Rutaceae	Fruit juice: Souring agents	Food additive	ST	Native	1050
Citrus maxima (Burm.) Merr.	Rutaceae	Dessert fruits	Food	ST	Exotic	1083

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Codiaeum variegatum (L.) Rumph. ex A. Juss.	Euphorbiaceae	Ornamentals	Environmental use	ST	Exotic	1062
Coix lacryma-jobi L.	Poaceae	Root: Stone	Medicine	AT	Exotic	991
Colocasia esculenta (L.) Schott	Araceae	Unspecified aerial parts: pigs	Animal food	AT	Native	1031
Cordyline fruticosa (L.) A. Chev.	Asparagaceae	Ornamentals	Environmental use	AT	Exotic	989
Cosmos sulphureus Cav.	Compositae	Ornamentals	Environmental use	ST	Exotic	1084
Crinum asiaticum L.	Amaryllidaceae	Leaves: Pain	Medicine	ST	Native	1086
Crotalaria albida Roth	Leguminosae	Leaves: Pain	Medicine	AT	Native	1032
Cucurbita moschata Duchesne	Cucurbitaceae	Fruits: Vegetable	Food	ST	Exotic	1085
Curcuma longa L.	Zingiberaceae	Rhizome: Spices	Food additive	ST	Native	1063
Curcuma sp.	Zingiberaceae	Rhizomes: Flatulence	Medicine	AT	Native	1000
Cymbopogon citratus (DC.) Stapf	Poaceae	Bulbs: Spices	Food additive	AT, ST	Exotic	1033

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Dieffenbachia seguine (Jacq.) Schott	Araceae	Ornamentals	Environmental use	AT, ST	Exotic	1035
Dimocarpus longan Lour.	Sapindaceae	Dessert fruits	Food	ST	Native	1065
Dioscorea alata L.	Dioscoreaceae	Root: Starch	Food	AT	Native	974
Dracaena braunii Engl.	Asparagaceae	Ornamentals	Environmental use	AT, ST	Native	1087
Dracaena fragrans (L.) Ker Gawl.	Asparagaceae	Ornamentals	Environmental use	AT	Exotic	984
Dregea volubilis (L.f.) Benth. ex Hook.f.	Apocynaceae	Leaves: Vegetables	Food	ST	Native	1088
Elaeagnus latifolia L.	Elaeagnaceae	Dessert fruits	Food	ST	Native	1089
Elaeocarpus grandiflorus Sm.	Elaeocarpaceae	Ornamentals	Environmental use	ST	Native	1064
		Flowers: Religion uses	Social use	ST	Native	
Eleutherine bulbosa (Mill.) Urb.	Iridaceae	Bulbs: Insect sting	Medicine	AT	Exotic	988

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Eryngium foetidum L.	Apiaceae	Leaves: Herbs	Food additive	AT, ST	Exotic	1034
Eucharis grandiflora Planch. & Linden	Amaryllidaceae	Live plant in situ: Magic (Good luck)	Social use	ST	Exotic	1051
Eugenia nervosa Lour.	Myrtaceae	Dessert fruits	Food	AT	Native	992
Euphorbia milii Des Moul.	Euphorbiaceae	Ornamentals	Environmental use	AT, ST	Native	1036
Euphorbia pulcherrima Willd. ex Klotzsch	Euphorbiaceae	Ornamentals	Environmental use	AT, ST	Exotic	1013
Euphorbia tithymaloides L.	Euphorbiaceae	Ornamentals	Environmental use	AT	Exotic	985
Fagopyrum acutatum (Lehm.) Mansf. ex K. Hammer	Polygonaceae	Leaves: Insect bite	Medicine	AT	Native	1001
Ficus virens Aiton	Moraceae	Leaves: Vegetables	Food	AT	Native	1002
Gomphrena globosa L.	Amaranthaceae	Ornamentals	Environmental use	AT	Exotic	993
Helianthus annuus L.	Compositae	Ornamentals	Environmental use	ST	Exotic	1066

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Hippeastrum × *johnsonii* Bury	Amaryllidaceae	Ornamentals	Environmental use	ST	Native	1067
Houttuynia cordata Thunb.	Saururaceae	Leaves: Vegetables	Food	AT	Native	1037
		Leaves: Headache	Medicine	AT	Native	973
Hylocereus undatus (Haw.) Britton & Rose	Cactaceae	Dessert fruits	Food	ST	Exotic	1052
Hymenocallis littoralis (Jacq.) Salisb.	Amaryllidaceae	Ornamentals	Environmental use	AT	Exotic	986
Impatiens balsamina L.	Balsaminaceae	Ornamentals	Environmental use	AT	Exotic	975
Ipomoea batatas (L.) Lam.	Convolvulaceae	Unspecified aerial parts: pigs	Animal food	ST, AT	Exotic	1012
Justicia fragilis Wall.	Acanthaceae	Ornamentals	Environmental use	ST	Native	1060
Kaempferia galanga L.	Zingiberaceae	Rhizomes: Flatulence	Medicine	AT	Native	994
Lablab purpureus (L.) Sweet	Leguminosae	Fruits: Vegetables	Food	AT, ST	Native	1014

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Lagerstroemia speciosa (L.) Pers.	Lythraceae	Ornamentals	Environmental use	AT	Native	987
Litchi chinensis Sonn.	Sapindaceae	Fruits	Selling	ST	Exotic	1068
Luffa acutangula (L.) Roxb.	Cucurbitaceae	Fruits: Vegetables	Food	AT	Native	1049
Mangifera indica L.	Anacardiaceae	Dessert fruits, Leaves: Vegetables	Food	AT, ST	Native	1038
Mentha × *villosa* Huds.	Lamiaceae	Leaves: Herbs	Food additive	ST	Exotic	1090
Mirabilis jalapa L.	Nyctaginaceae	Ornamentals	Environmental use	AT, ST	Exotic	1011
Morus alba L.	Moraceae	Dessert fruits	Food	ST	Exotic	1069
Musa × *paradisiaca* L.	Musaceae	Dessert fruits	Food	ST	Exotic	1094
Neomarica longifolia (Link & Otto) Sprague	Iridaceae	Leaves: Insect bite	Medicine	AT	Exotic	1047
Ocimum basilicum L.	Lamiaceae	Leaves: Herbs	Food additive	AT	Exotic	972
Ocimum tenuiflorum L.	Lamiaceae	Leaves: Herbs	Food additive	ST	Native	1093

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Passiflora edulis Sims	Passifloraceae	Dessert fruits	Food	AT	Exotic	995
Passiflora laurifolia L.	Passifloraceae	Dessert fruits	Food	ST	Exotic	1053
Phyllanthus acidus (L.) Skeels	Phyllanthaceae	Dessert fruits	Food	AT, ST	Exotic	1046
Phyllanthus emblica L.	Phyllanthaceae	Dessert fruits	Food	AT	Native	1048
Piper betle L.	Piperaceae	Leaves: Chewing	Social use	ST	Native	1095
Platycladus orientalis (L.) Franco	Cupressaceae	Ornamentals	Environmental use	AT, ST	Exotic	1015
Plectranthus amboinicus (Lour.) Spreng.	Lamiaceae	Leaves: Insect bite	Medicine	AT	Exotic	976
Plumeria rubra L.	Apocynaceae	Ornamentals	Environmental use	ST	Exotic	1059
Portulaca grandiflora Hook.	Portulacaceae	Ornamentals	Environmental use	ST	Exotic	1091
Psidium guajava L.	Myrtaceae	Dessert fruits	Food	AT, ST	Exotic	1016
Psophocarpus tetragonolobus (L.) DC.	Leguminosae	Fruits: Vegetables	Food	ST	Exotic	1092

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Punica granatum L.	Lythraceae	Dessert fruits	Food	AT, ST	Exotic	1044
Rosa sp.	Rosaceae	Ornamentals	Environmental use	AT, ST	Exotic	1045
Saccharum officinarum L.	Poaceae	Cane Juice	Food	AT, ST	Exotic	1007
Sechium edule (Jacq.) Sw.	Cucurbitaceae	Fruits: Vegetables	Food	ST	Exotic	1071
Sedum burrito Moran	Crassulaceae	Ornamentals	Environmental use	AT	Native	1008
Solanum lycopersicum L.	Solanaceae	Fruits: Souing agent	Food additive	ST	Native	1072
Solanum melongena L.	Solanaceae	Fruits: Vegetables	Food	AT	Native	971
Spathiphyllum floribundum (Linden & André) N. E. Br.	Araceae	Ornamentals	Environmental use	ST	Exotic	1073
Spondias pinnata (L. f.) Kurz	Anacardiaceae	Dessert fruits	Food	AT, ST	Native	1041
Tagetes erecta L.	Compositae	Ornamentals	Environmental use	ST	Exotic	158
Tamarindus indica L.	Leguminosae	Dessert fruits	Food	ST	Exotic	1070

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Terminalia catappa L.	Combretaceae	Ornamentals	Environmental use	AT	Exotic	977
Terminalia ivorensis A. Chev.	Combretaceae	Ornamentals	Environmental use	AT	Exotic	1040
Thysanolaena latifolia (Roxb. ex Hornem.) Honda	Poaceae	Cane: Containers	Material	ST	Native	1054
Tinospora crispa (L.) Hook. f. & Thomson	Menispermaceae	Stems: Body nourishment	Medicine	ST	Native	1574
Trachyspermum roxburghianum (DC.) H. Wolff	Apiaceae	Leaves: Herbs	Food additive	AT	Exotic	996
Tradescantia spathacea Sw.	Commelinaceae	Ornamentals	Environmental use	AT	Exotic	1039
Tupistra muricata (Gagnep.) N. Tanaka	Asparagaceae	Inflorescences: Vegetables	Food	AT	Native	1009
Vigna umbellata (Thunb.) Ohwi & H. Ohashi	Leguminosae	Fruits: Vegetables	Food	AT	Exotic	970
Vigna unguiculata (L.) Walp.	Leguminosae	Fruits: Vegetables	Food	AT	Exotic	1043

Table 4.39 (continued)

Species	Family	Use	Use category	Village	Status	Voucher number (P- Prateep coll.)
Vitis vinifera L.	Vitaceae	Dessert fruits	Food	AT	Exotic	1042
Zamioculcas zamiifolia (Lodd.) Engl.	Araceae	Ornamentals	Environmental use	ST	Native	156
Zea mays L.	Poaceae	Grains: Cereal	Food	AT	Exotic	978
		Fruits	Selling	AT	Exotic	
Zingiber officinale Roscoe	Zingiberaceae	Rhizome: Vegetable	Food	AT	Native	1010
		Rhizome: Spices	Food additive	AT, ST	Native	
		Rhizome	Selling	AT	Native	
Zingiber ottensii Valeton	Zingiberaceae	Rhizomes: Flatulence	Medicine	AT	Native	979
Zinnia violacea Cav.	Compositae	Ornamentals	Environmental use	ST	Exotic	1055

Table 4.40 Diversity indices of woody plants in the Yunnan Chinese homegardens

Dieversity index		Arunothai	Suk Ruethai
Richness	Median	2	3
	Max	7	9
	Min	1	1
Abundance	Median	2	2
	Max	9	10
	Min	1	1
Shannon	Median	0.7	0.5
	Max	1.8	1.9
	Min	0	0
Evenness	Median	1	1
	Max	1	1
	Min	0.9	0.8

Table 4.41 The most dominant woody species in Yunnan Chinese villages (arranged in order of dominance).

Arunothai	Suk Ruethai
Carica papaya L.	*Artocarpus heterophyllus* Lam.
Dracaena fragrans (L.) Ker Gawl.	*Mangifera indica* L.
Ficus virens Aiton	*Psidium guajava* L.
Mangifera indica L.	*Dracaena fragrans* (L.) Ker Gawl.
Terminalia ivorensis A. Chev.	*Carica papaya* L.
Artocarpus heterophyllus Lam.	*Sauropus androgynus* (L.) Merr.
Punica granatum L. var. *granatum*	

Table 4.42 The most common (total number of homegardens found) woody species in Yunna Chinese villages (arranged in order of commonness).

Arunothai	Suk Ruethai
Carica papaya L.	*Dracaena fragrans* (L.) Ker Gawl.
Mangifera indica L.	*Mangifera indica* L.
Terminalia ivorensis A. Chev.	*Citrus x aurantifolia* (Christm.) Swingle
Ficus virens Aiton	*Cadiaeum variegatum* (L.) Rumph. ex A. Juss
Artocarpus heterophyllus Lam.	*Psidium guajava* L.
Punica granatum L. var. *granatum*	*Carica papaya* L.

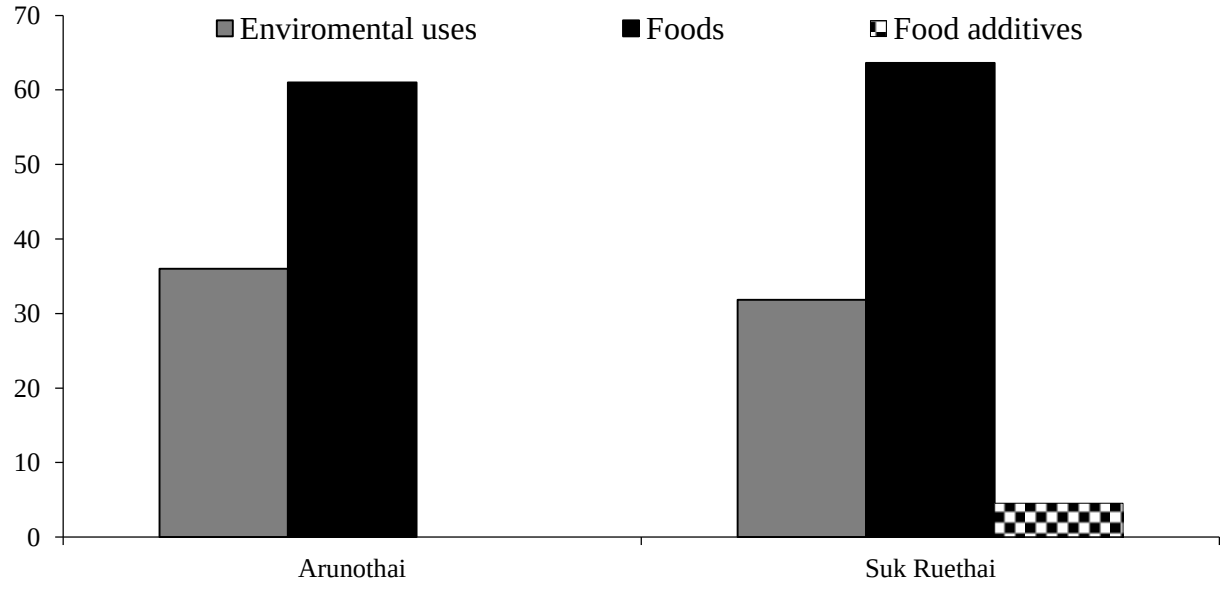

Fig. 4.52 Percentage of woody plant individuals in three use category of woody species in homegardens of two Yunnan Chinese villages.

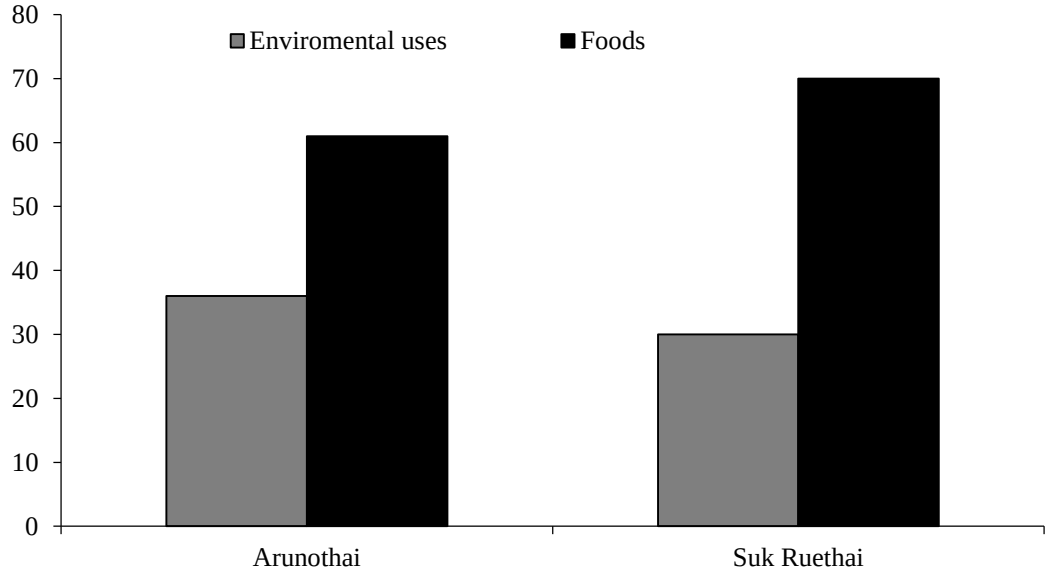

Fig. 4.53 Percentage of species in two use category of woody species in homegardens of two Yunnan Chinese villages.

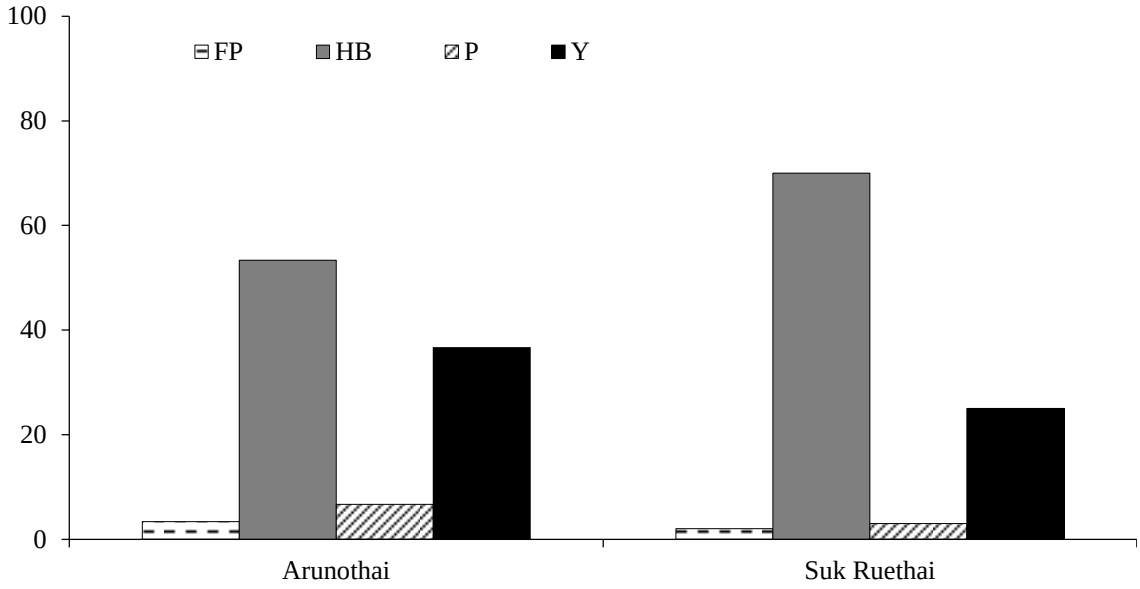

Fig. 4.54 Percentage of woody plant individuals in four horizontal zones in homegardens of two Yunnan Chinese villages (FP = fence plot, HB = homegarden boundary, P = pot, Y = yard)..

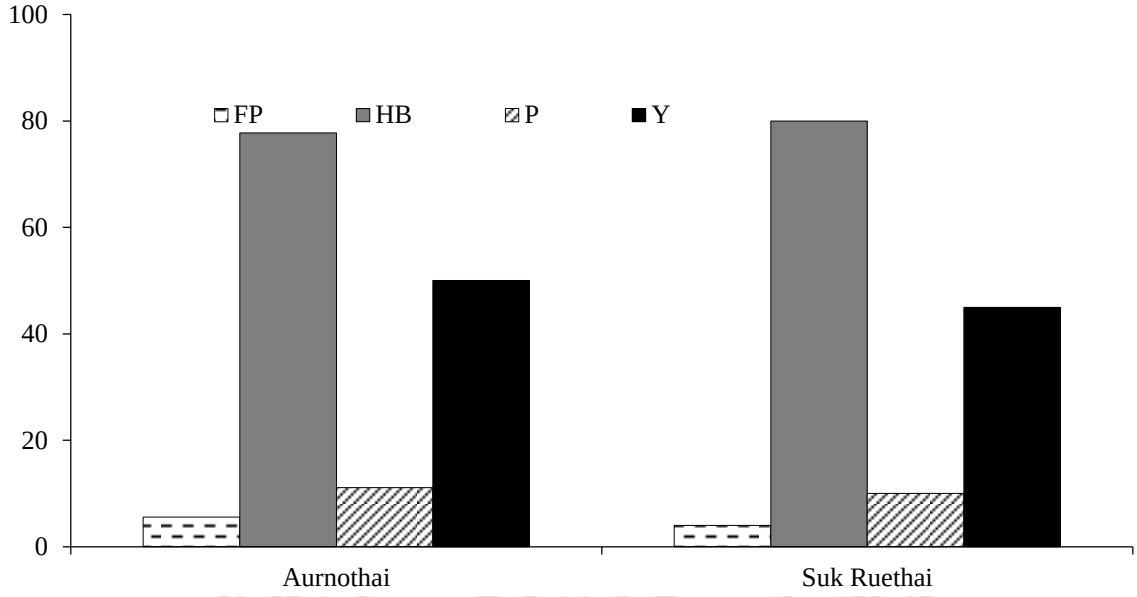

Fig. 4.55 Percentage of woody species in four horizontal zones in homegardens of two Yunnan Chinese villages (FP = fenced plot, HB = homegarden boundary, P = pot, Y = yard).

Non-woody species: Function, commonness, and horizontal distribution

There were a total of 80 species of non-woody species in the two studied Yunnan Chinese villages. The three largest categories in both villages were *environmental use, foods*, and *medicines* (Fig. 4.56). In both villages, most species were found at the homegarden boundaries, followed by pots and yards, respectively. There were three important zones in all villages, including yard, homegarden boundaries, and pot (Fig. 4.57).

There were four species of non-woody species present in both Yunnan Chinese villages (Table 4.43), including two food additives, *Capsicum frutescens* L. and *Zingiber officinale* Roscoe, and two ornamentals, *Euphorbia milii* Des Moul. and *Impatiens balsamina* L. The other common species in Aurnothai village included three environmental species (*Dracaena braunii* Engl., *Celosia argentea* L., *Rosa* sp.), two medicinal species (*Artemisia lactiflora* Wall. ex DC., *Houttuynia cordata* Thunb.), a

food species (*Amaranthus blitum* subsp. *oleraceus* (L.) Costea), and a food additive species (*Allium hookeri* Thwaites). The other common non-woody species in Suk Ruethai included three food additive species, *Cymbopogon citratus* (DC.) Stapf, *Eryngium foetidum* L., and *Solanumm lycopesicum* L.

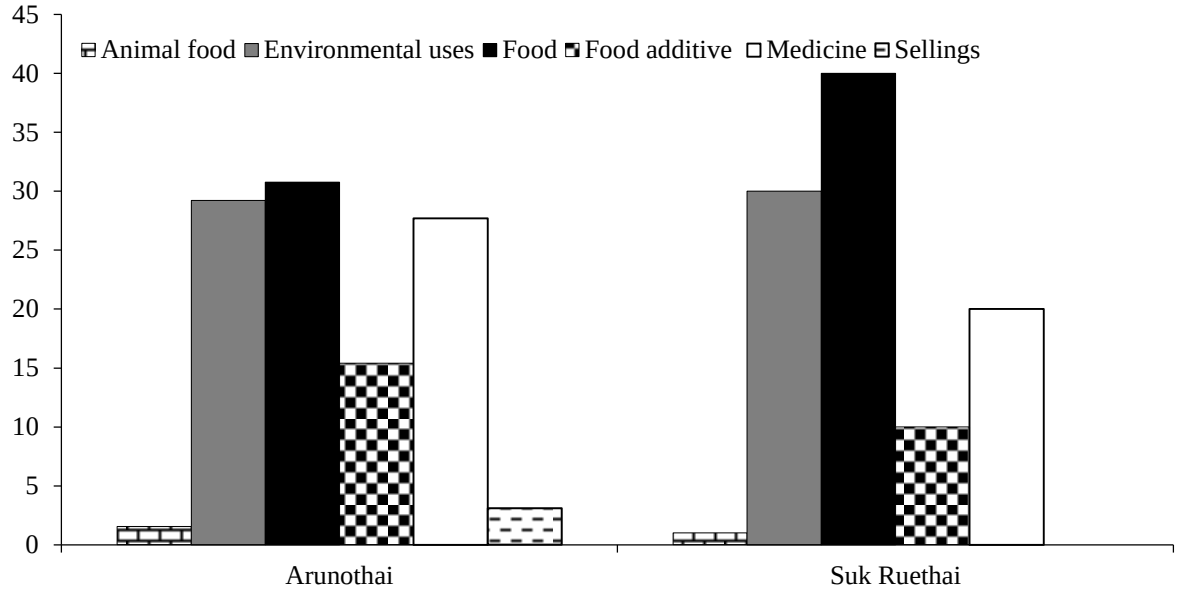

Fig. 4.56 The percentage of non-woody species found in six use categories in homegardens of two Yunnan Chinese villages

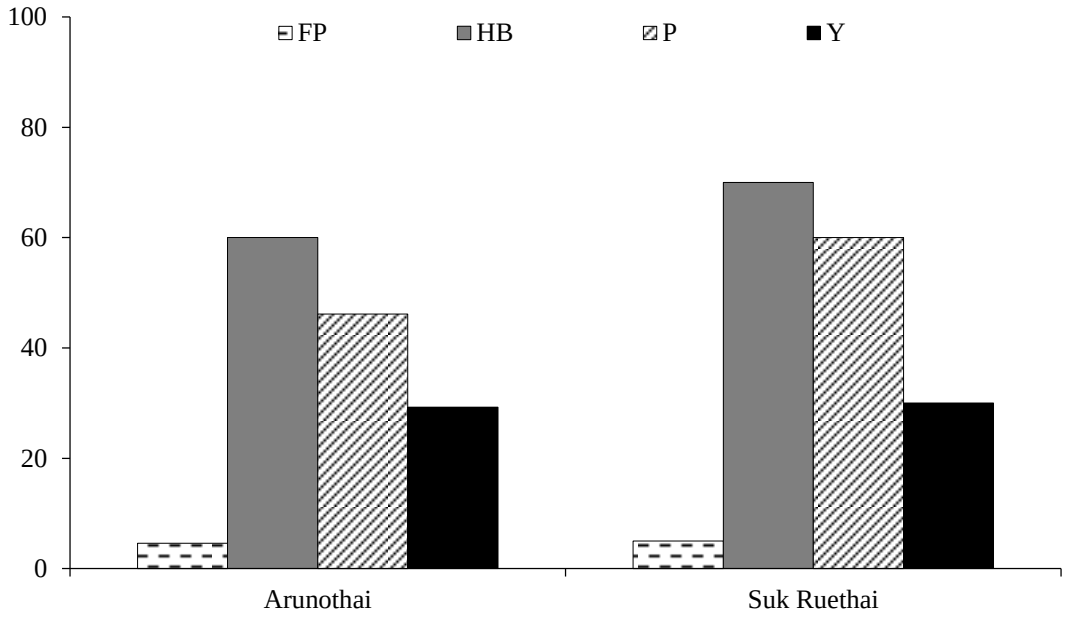

Fig. 4.57 Percentage of non-woody species found in four horizontal zones in homegardens of two Yunnan Chinese villages (FP = fenced plot, HB = homegarden boundary, P = pot, Y = yard).

Table 4.43 The most common non-woody species in homegardens of two Yunnan Chinese villages (arranged in order of commoness).

Arunothai	**Suk Ruethai**
Dracaena braunii Engl.	*Cymbopogon citratus* (DC.) Stapf
Allium hookeri Thwaites	*Capsicum frutescens* L.
Capsicum frutescens L.	*Zingiber officinale* Roscoe
Celosia argentea L.	*Euphorbia milii* Des Moul.
Rosa sp.	*Impatiens balsamina* L.
Amaranthus blitum subsp. *oleraceus* (L.) Costea	*Eryngium foetidum* L.
Artemisia lactiflora Wall. ex DC.	*Solanumm lycopesicum* L.
Euphorbia milii Des Moul.	
Houttuynia cordata Thunb.	
Impatiens balsamina L.	
Zingiber officinale Roscoe	