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Preliminary Survey on Plants in Home Gardens in Pahang, Malaysia

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ABSTRACT This preliminary survey was carried out on home gardens in Pahang, Malaysia in order to gain better insights into the trends in plant utilization and species diversity among households in the state. The survey was carried out through observation of the home gardens and semi-structured interviews with their owners. A total of 93 species of plants were encountered in thirteen home gardens. Most of the species were food plants with *Cocos nucifera* and *Mangifera indica* being the most common among the home gardens. The presence of medicinal plant *Eurycoma longifolia* in one the home gardens indicates that the species is being domesticated.

INTRODUCTION

A home garden is a bounded piece of land with a mixture of tended and cultivated plants on which a house is built. The most distinguishing and important characteristic of all home gardens is their species diversity: their intimate admixture of plants of all types - herbs, shrubs, vines, trees, other perennials, and so on - on the same parcel of land (Nair 2006). Plants grown or tended in home gardens and compounds have received great attention of economic botanists in recent years. The main reasons for this are their role in the conservation of genetic resources and household livelihood and economy. Home gardens and compounds in remote villages of South America are believed to be refuge for species and varieties of local plants. In addition to this, they provide food and supplementary income for the households. In Malaysia, most villages are easily accessible by roads and therefore, suburban in nature. Nevertheless, the role of home gardens and compounds in Malaysian villages in the conservation of plants and household livelihood cannot be over-emphasized.

Most literatures on plants in home gardens and compounds in Malaysia are based on casual observation during field trips and visits of the authors to districts and villages in the country. Information in these literatures often lacks the details to evaluate the importance of the plants to the households and the communities. Sufficient and reliable information on plants in home gardens and compounds is also important in understanding their diversity and preferences of plants by the house owners.

The objective of this study is to identify trends in the diversity of plants grown or tended in home gardens in Pahang. These will be used to construct hypotheses for future studies on home gardens in Pahang and Peninsular Malaysia.

MATERIALS AND METHOD

According to Leete (2007), who obtained the data from the Department of Statistics of Malaysia, the population of Pahang in 2005 was 1,427,000. The population comprised of 73.5% Bumiputera, 16.2% Chinese, 4.7% Indians, 5% non-citizens, and 0.7% others. Bumiputera here refers to the Malays and other indigenous tribes known as the Orang Asli.

Surveys on home gardens and interviews of the people in several towns and villages in the state of Pahang were conducted in 2008. Photographs of plants that were grown or tended in home gardens were taken for identification and records. Additional information on the plants was gathered through semi-structured interviews with the owners or caretakers of home gardens and house compounds. The location of each home garden was obtained using Magellan ®Triton ™500. The locality of home gardens visited during the survey is shown in Figure 1.

RESULTS

Thirteen home gardens were visited during the survey. Out of the thirteen owners of the home gardens, four are Orang Asli, eight are Malays, and one is a Chinese. The average number of species per home garden was seventeen. The highest number of species was thirty-seven which belonged to a Chinese. The home garden with

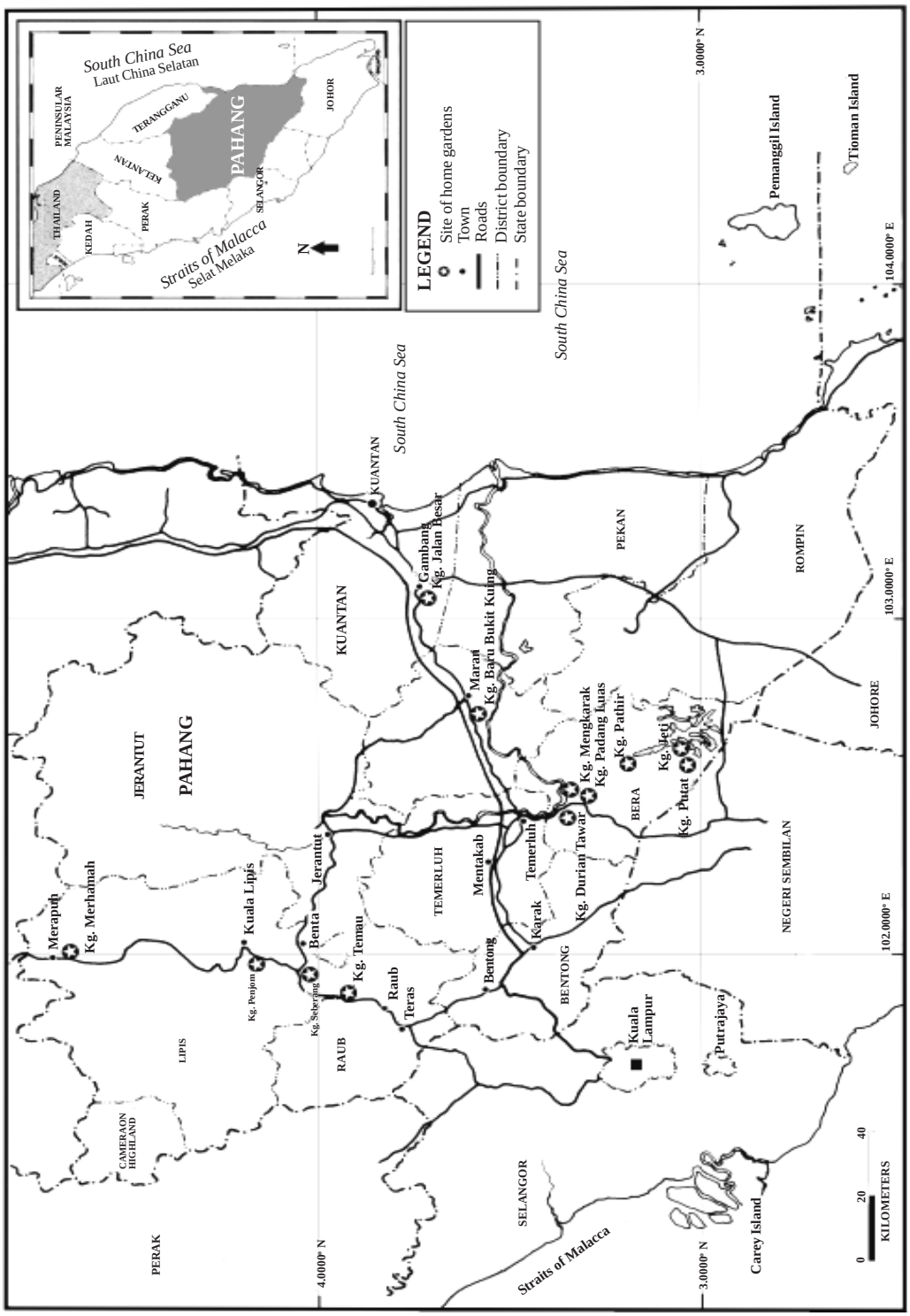

Fig. 1. Map of Pahang showing localities of home gardens that were surveyed. (Insert: Map of Peninsular Malaysia)

Table 1: Profile of home gardens which were surveyed in Pahang (arranged in chronological order of survey)

Homegarden in [ ] and date of visit in ( )	*Locality and location (in bracket) Kg. — short form for kampong, a local term for village*	*Ethnic group of home garden owners*	*Total number of species of plants present in home gardens*
[1] (25/09/2008)	Kg. Putat, Bera (3.03168^{0}N, 102.64958^{0}E)	Orang Asli	26
[2] (25/09/2008)	Kg. Rau-Rau, Bera (3.00775^{0}N, 102.63657^{0}E)	Orang Asli	2
[3](26/09/2008)	Kg. Jeti, Bera (3.02718^0 N, 102.65583^{0}E)	Orang Asli	10
[4] (26/09/2008)	Kg. Pathir, Bera (3.15562 ^{0}N, 102.5978 ^{0}E)	Orang Asli	27
[5] (27/09/2008)	Kg. Padang Luas, Bera (3.29417 ^{0}N, 102.46173 ^{0}E)	Malay	13
[6] (27/09/2008)	Kg. Mengkarak, Bera (3.32197 ^{0}N, 102.45217 ^{0}E)	Malay	5
[7] (27/09/2008)	Kg. Durian Tawar, Bera (3.35140 ^{0}N, 102.44138^{0}E)	Malay	7
[8] (17/11/2008)	Kg. Temau, Raub (3.92323 ^{0}N, 101.89508^{0}E)	Malay	24
[9] (17/11/2008)	Kg. Penjom, Lipis (4.12228^{0}N, 101.00922^{0}E)	Malay	22
[10] (17/11/2008)	Kg. Berang, Kuala Lipis (4.18173 ^{0}N, 101.96053 ^{0}E)	Malay	20
[11] (17/11/2008)	Kg. Berhamah, Merapoh (4.63612 ^{0}N, 102.00057^{0}E)	Malay	15
[12] (31/12/2008)	Kg. Jalan Besar, Gambang (3.70606^{0}N, 103.09908^{0}E)	Chinese	37
[13] (31/12/2008)	Kg. Baru Bukit Kuing, Maran (3.57044^{0}N, 102.74562^{0}E)	Malay	11

the lowest number of species was sample two which belonged to an Orang Asli. These and other details of the visits are shown in table 1 and Appendix. The locations of some of the home gardens could not be obtained on site due to the weather condition during the visits. Approximate coordinates based on maps are given instead.

The uses of plants found in the thirteen home gardens in Pahang are shown in table 2. Most the species are used as food or food source. Species of plants for ornamental use only and medicinal use only are respectively second and third highest in terms of their number. Species of plants with multiple uses is fourth in terms of number. Species which are for dye, fabric or handicraft, source of income, textile, and timber were least common.

Table 2: Local uses of plants in home gardens of Pahang and the number of species represented for each use

Use(s)	*Number of species*
Dye	1
Flavor	2
Food	49
Fabric or handicraft	1
Income	1
Medicinal	10
Ornamental	14
Spice	6
Textile	1
Timber	1
Multiple (food and medicinal, medicinal and ornamental, food and spice)	7

The species of plants which are grouped according to the number of home gardens they were present in out of the thirteen home gardens that were surveyed are shown in table 3. Most of the species of plants were present in one home garden only. *Cocos nucifera* and *Mangifera indica* were the most common among the thirteen home gardens. Each of them was present in eight home gardens.

DISCUSSION

Most home gardens in Pahang belong either to Malays or Orang Asli. Chinese mostly live in towns and housing estates which usually have little space for planting or gardening. However, this survey indicates that those with spacious house compounds utilize them to grow or keep diverse species of plants. The home garden with least number of species as shown in table 1 could be anomalous because of the obscure boundary between adjacent home gardens. Neighboring home garden owners are usually siblings and the use of plants are shared.

Table 2 shows that most species of plants in home gardens in Pahang are utilized for food followed by ornamental, medicinal, multiple uses, spice, and flavor. Species that were rarely encountered were those used as a source for dye, fabric or handicraft, textile and timber. This observation is similar to those done on home gardens in other tropical areas of other countries such as India (Das and Das 2005), Indonesia (Kehlenbeck and Maass 2004) and Peru (Coomes and Ban 2004). About half of the total species of plants encountered during the survey were specific to a particular home garden (Table 3). One of them is *Eurycoma longifolia*. In the wild, this plant is over-harvested for its medicinal value. Among the uses for this plant are as blood coagulant for complications during childbirth, as a treatment for dysentery, and as an aphrodisiac

Table 3. Species in home gardens of Pahang grouped according to the number of home gardens where they are found (arranged in increasing number of encounters)

Species	*Number of home garden(s) with each species (%)*	*Total no. of species (%)*
Alocasia sp., *Alstonia spathulata, Alternanthera ficoidea, Alternanthera sessilis, Annona muricata, Archidendron jiringa, Artocarpus integer, Azadirachta indica, Caladium bicolor, Canna indica, Cassia alata, Centella asiatica, Cinnamomum verum, Citrus reticulata, Coleus amboinicus, Coleus atropurpureus, Colocasia esculenta, Cosmos caudatus, Crescentia cujete, Diodia sp., Dipterocarpus eurynchus, Eclipta alba, Eleiodoxa conferta, Eurycoma longifolia, Ficus racemosa, Hibiscus rosa-sinensis, Ipomoea reptans, Justicia sp., Kaempferia galanga, Lawsonia inermis, Leucaena leucocephala, Luffa acutangula, Mangifera foetida, Mangifera odorata, Melastoma malabathricum, Mentha arvensis, Morinda citrifolia, Orthosiphon stamineus, Pithecellobium bubalinum, Platycerium wallichii, Psophocarpus tetragonolobus, Sauropus androgynus, Tagetes erecta, Tamarindus indica, Theobroma cacao, Uncaria ferrea, Zingiber officinale.*	1	48 (51.6)
Areca catechu, Athyrium esculentum, Baccaurea macrocarpa, Citrus suhuiensis, Codiaeum variegatum, Cyrtandromoea grandis, Ixora griffithiana, Manilkara zapota, Persicaria odorata, Saccharum officinarum, Salacca zalacca, Solanum melongena, S. torvum, Stenochlaena palustris, Syzygium polyanthum.	2	15 (16.1)
Ananas comosus, Averrhoa bilimbi, Ceiba pentandra, Capsicum frutescens, Citrus maxima, Cucurbita moschata, Dimocarpus longan, Murraya koenigii, Pandanus caricosus, Parkia speciosa, Psydium guajava, Piper betle.	3	12 (12.9)
Curcuma domestica, Ipomoea batatas, Etlingera eliator, Cymbopogon citratus, Syzygium aqueum.	4	5 (5.4)
Citrus aurantifolia, Durio zibethinus, Garcinia mangostana, Lansium domesticum, Languas galanga, Manihot esculenta, Pandanus odorus.	5	7 (7.5)
Carica papaya.	6	1 (0.01)
Artocarpus heterophyllus, Bougainvillea spectabilis, Musa paradisiaca, Nephelium lappaceum.	7	4 (4.3)
Cocos nucifera, Mangifera indica.	8	2 (2.15)

(Minorsky 2003). The presence of *Eurycoma longifolia* in one of the home gardens indicates the species is being domesticated, which therefore helps in the conservation of the species. The more common species among the home gardens were fruit trees, with *Cocos nucifera* and *Mangifera indica* as the most common. These two species were present in 61.5% of the home gardens surveyed.

Certain species of plants which were encountered during the survey are believed to be not planted but occur naturally and tended by owners of the home gardens. These include trees (e.g. *Alstonia spathulata, Archidendron jiringa, Cassia alata, Melastoma malabathricum, Parkia speciosa*), shrubs (e.g. *Solanum torvum*) and climber (e.g. *Uncaria ferrea*).

The percentage value of encounter of a plant species in the survey does not necessarily reflect its relative use by the households. Plants for almost all uses can readily be bought in nearby towns as most households were within the vicinity of towns or bazaars. Also, it is not uncommon for villagers to own a cultivated plot of land or orchard located a distant away from their houses. Result of this investigation might also have been affected by the number of households and the timing of the survey. Although only thirteen households were surveyed, the ethnic groups of the households reflect the ethnic composition of the population of the state. The timing of the survey is critical for plants which are removed after they or their useful parts are harvested. Such plants were not detected during the survey even though they may be planted regularly. Dependence on wild sources of plants is also a con-

tributory factor to some home gardens having lower species diversity.

More detailed studies will be conducted in the future which will focus on selected villages and households. Annual trend in the utilization of plant resources will be monitored. Plant resource utilization by different ethnic groups will be compared rigorously. Other factors that affect plant growth such as soil type and climate regime will be considered. These will be used to assess the value of each species for purpose of environmental evaluation and conservation.

ACKNOWLEDGEMENTS

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APPENDIX

S. No.	*Species*	*Common or Local Name(s)*	*Family*	*Household number [as in Table 1]*	*Use (s) and part used (in brackets)*	*No. of households with the plant (%)*
1	*Alocasia* sp	Keladi Hiasan	Araceae	[12]	Ornamental	1 (7.7)
2	*Alstonia spathulata*	Hard Milkwood/Pulai	Apocynaceae	[12]	Timber (stems)	1 (7.7)
3	*Alternanthera ficoidea*	Joyweed/	Amaranthaceae	[12]	Ornamental	1 (7.7)
4	*Alternanthera sessilis*	Keremak	Amaranthaceae	[12]	Food (young leaves)	1 (7.7)
5	*Ananas comosus*	Nanas	Bromeliaceae	[3]; [4]; [8]	Food (fruits)	3 (23.1)
6	*Annona muricata*	Durian Belanda	Annonaceae	[12]	Food (fruits)	1 (7.7)
7	*Archidendron jiringa*	Jering	Fabaceae	[8]	Food (seeds) medicinal (seeds)	1 (7.7)
8	*Areca catechu*	Pinang	Arecaceae	[4];[10]	Medicinal (seeds)	2 (15.4)
9	*Artocarpus heterophyllus*	Nangka	Moraceae	[1]; [3]; [4]; [8]; [10]; [11]; [12]	Food (fruits)	7 (53.8)
10	*Artocarpus integer*	Cempedak	Moraceae	[11]	Food (fruits)	1 (7.7)
11	*Athyrium esculentum*	Pucuk Paku Benar	Athyriaceae	[1]; [5]	Food (young fronds)	2 (15.4)
12	*Averrhoa bilimbi*	Belimbing Buluh	Oxalidaceae	[1]; [8]; [9]	Food (fruits)	3 (23.1)
13	*Azadirachta indica*	Neem	Meliaceae	[12]	Medicinal (leaves)	1 (7.7)
14	*Baccaurea macrocarpa*	Tampoi	Phyllanthaceae	[1]; [2]	Food (fruits)	2 (15.4)
15	*Bougainvillea spectabilis*	Bunga Kertas	Nyctaginaceae	[1]; [4]; [8]; [9]; [10]; [11]; [13]	Ornamental	7 (53.8)
16	*Caladium bicolor*	Keladi Merah	Araceae	[12]	Ornamental	1 (7.7)
17	*Canna indica*	Bunga Tasbih	Cannaceae	[12]	Ornamental	1 (7.7)
18	*Capsicum frutescens*	Cili padi	Solanaceae	[3]; [9]; [10]	Spice (fruits)	3 (23.1)
19	*Carica papaya*	Betik	Caricaceae	[1]; [5]; [7]; [8]; [10]; [12]	Food (fruits)	6 (46.2)
20	*Cassia alata*	Gelenggang	Fabaceae	[1]	Medicinal (leaves)	1 (7.7)
21	*Ceiba pentandra*	Kekabu	Bombacaceae	[5]; [6]; [10]	Textile (fruits)	3 (23.1)
22	*Centella asiatica*	Pegaga	Mackinlayaceae	[8]	Food (leaves)	1 (7.7)
23	*Cinnamomum verum*	Kayu manis	Lauraceae	[12]	Spice (bark)	1 (7.7)
24	*Citrus maxima*	Limau Bali	Rutaceae	[1]; [5]; [13]	Food (fruits)	3 (23.1)
25	*Citrus ourantifolia*	Limau nipis	Rutaceae	[1]; [3]; [4]; [9]; [12]	Food (fruits)	5 (38.5)
26	*Citrus reticulata*	Limau Mandarin	Rutaceae	[12]	Food (fruits)	1 (7.7)

Appendix: Contd.....

S. No.	*Species*	*Common or Local Name(s)*	*Family*	*Household number [as in Table 1]*	*Use (s) and part used (in brackets)*	*No. of house-holds with the plant (%)*
27	*Citrus suhuiensis*	Limau madu	Rutaceae	[8]; [10]	Food (fruits)	2 (15.4)
28	*Cocos nucifera*	Kelapa	Arecaceae	[1]; [4]; [5]; [7]; [8]; [10]; [11]; [13]	Food (fruits)	8 (61.5)
29	*Codiaeum variegatum*	Puding	Euphorbiaceae	[1]; [4]	Ornamental	2 (15.4)
30	*Coleus amboinicus*	Bangun-bangun	Lamiaceae	[12]	Ornamental; medicinal (whole plant)	1 (7.7)
31	*Coleus atropurpureus*	Ati-ati	Lamiaceae	[1]	Ornamental; medicinal (leaves)	1 (7.7)
32	*Colocasia esculenta*	Keladi Cina	Araceae	[12]	Food (leaves and tubers)	1 (7.7)
33	*Cosmos caudatus*	Ulam Raja	Asteraceae	[10]	Food (leaves)	1 (7.7)
34	*Crescentia cujete*	Kalabas	Bignoniaceae	[12]	Ornamental	1 (7.7)
35	*Cucurbita moschata*	Labu	Cucurbitaceae	[1]; [4]; [12]	Food (fruits)	3 (23.1)
36	*Curcuma domestica*	Kunyit	Zingiberaceae	[4]; [8]; [9]; [10]	Spice (rhizomes); food (leaves)	4 (30.8)
37	*Cymbopogon citratus*	Serai	Poaceae	[3]; [4]; [9]; [10]	Spice (leaves)	4 (30.8)
38	*Cyrtandromoea grandis*	Setawar	Gesneriaceae	[8]; [9]	Ornamental; medicinal (leaves)	2 (15.4)
39	*Dimocarpus longan*	Mata kucing	Sapindaceae	[7]; [8]; [9]	Food (fruits)	3 (23.1)
40	*Diodia sp*	Buttonweed	Rubiaceae	[12]	Ornamental	1 (7.7)
41	*Dipterocarpus eurynchus*	Keruing	Dipterocarpaceae	[2]	Income (oil)	1 (7.7)
42	*Durio zibethinus*	Durian	Bombacaceae	[4]; [8]; [10]; [12]; [13]	Food (fruits)	5 (46.2)
43	*Eclipta alba*	Urang-aring	Asteraceae	[12]	Medicinal (leaves)	1 (7.7)
44	*Eleiodoxa conferta*	Kelubi	Arecaceae	[11]	Food (fruits)	1 (7.7)
45	*Etlingera elatior*	Kantan	Zingiberaceae	[1]; [3]; [4]; [9]	Spice (flowers)	4 (30.8)
46	*Eurycoma longifolia*	Tongkat ali	Simaroubaceae	[9]	Medicinal (roots)	1 (7.7)
47	*Ficus racemosa*	Ara nasi	Moraceae	[12]	Ornamental	1 (7.7)
48	*Garcinia mangostana*	Manggis	Clusiaceae	[1]; [4]; [8]; [9]; [13]	Food (fruits)	5 (38.5)
49	*Hibiscus rosa-sinensis*	Bunga Raya	Malvaceae	[1]	Ornamental	1 (7.7)
50	*Ipomoea batatas*	Ubi keledek	Convolvulaceae	[7]; [8]; [9]; [12]	Food (tubers)	4 (30.8)
51	*Ipomoea reptans*	Kangkong	Convolvulaceae	[12]	Food (leaves, stems)	1 (7.7)
52	*Ixora griffithiana*	Jenjarum	Rubiaceae	[4]; [10]	Ornamental	2 (15.4)
53	*Justicia sp*	Gandarusa	Acanthaceae	[12]	Ornamental; medicinal (leaves)	1 (7.7)
54	*Kaempferia galanga*	Cekur	Zingiberaceae	[8]	Medicinal (leaves)	1 (7.7)
55	*Lansium domesticum*	Langsat	Meliaceae	[4]; [8]; [9]; [11]; [13]	Food (fruits)	5 (38.5)
56	*Lawsonia inermis*	Inai	Lythraceae	[1]	Dye (leaves)	1 (7.7)
57	*Languas galanga*	Lengkuas	Zingiberaceae	[4]; [5]; [8]; [10]; [13]	Spice (rhizomes)	5 (38.5)
58	*Leucaena leucocephala*	Petai Belalang	Fabaceae	[8]	Medicinal (fruits)	1 (7.7)
59	*Luffa acutangula*	Petola	Cucurbitaceae	[12]	Food (fruits)	1 (7.7)
60	*Mangifera foetida*	Bachang	Anacardiaceae	[11]	Food (fruits)	1 (7.7)
61	*Mangifera indica*	Mempelam	Anacardiaceae	[3]; [4]; [5]; [6]; [8]; [9]; [12]; [13]	Food (fruits)	8 (61.5)
62	*Mangifera odorata*	Kuini	Anacardiaceae	[11]	Food (fruits)	1 (7.7)
63	*Manihot esculenta*	Ubi Kayu	Euphorbiaceae	[1]; [3]; [4]; [8]; [10]	Food (tubers)	5 (38.5)
64	*Manilkara zapota*	Ciku	Sapotaceae	[5]; [8]	Food (fruits)	2 (15.4)
65	*Melastoma malabathricum*	Senduduk	Melastomataceae	[12]	Ornamental	1 (7.7)

Appendix: Contd....

S. No.	*Species*	*Common or Local Name(s)*	*Family*	*Household number [as in Table 1]*	*Use (s) and part used (in brackets)*	*No. of households with the plant (%)*
66	*Mentha arvensis*	Wild Mint	Lamiaceae	[12]	Flavour (leaves)	1 (7.7)
67	*Morinda citrifolia*	Mengkudu	Rubiaceae	[4]	Medicinal (fruits and leaves)	1 (7.7)
68	*Murraya koenigii*	Pokok Kari	Rutaceae	[1]; [3]; [4]	Spice (leaves)	3 (23.1)
69	*Musa paradisiaca*	Pisang	Musaceae	[1]; [5]; [8]; [9]; [10]; [11]; [12]	Food (fruits)	7 (53.8)
70	*Nephelium lappaceum*	Rambutan	Sapindaceae	[4]; [5]; [6]; [9]; [10]; [11]; [12]	Food (fruits)	7 (53.8)
71	*Orthosiphon stamineus*	Misai Kucing	Lamiaceae	[9]	Medicinal (leaves)	1 (7.7)
72	*Pandanus caricosus*	Mengkuang	Pandanaceae	[1]; [4]; [11]	Fabric or handicraft (leaves)	3 (15.4)
73	*Pandanus odorus*	Pandan	Pandanaceae	[3]; [7]; [8]; [9]; [10]	Flavour (leaves)	5 (38.5)
74	*Parkia speciosa*	Petai	Fabaceae	[5]; [8]; [11]	Food (fruits)	3 (23.1)
75	*Persicaria odorata*	Kesom	Polygonaceae	[7]; [12]	Flavour (leaves)	2 (15.4)
76	*Piper betle*	Sirih	Piperaceae	[1]; [4]; [5]	Medicinal (leaves)	3 (23.1)
77	*Pithecellobium bubalinum*	Kerdas	Fabaceae	[4]	Food (fruits)	1 (7.7)
78	*Platycerium wallichii*	Tanduk Rusa	Polypodiaceae	[11]	Ornamental	1 (7.7)
79	*Psidium guajava*	Jambu biji	Myrtaceae	[4]; [12]; [13]	Food (fruits)	3 (23.1)
80	*Psophocarpus tetragonolobus*	Kacang sirih	Fabaceae	[12]	Food (fruits)	1 (7.7)
81	*Saccharum officinarum*	Tebu	Poaceae	[4]; [12]	Food (stems)	2 (15.4)
82	*Salacca zalacca*	Salak	Arecaceae	[11]; [13]	Food (fruits)	2 (15.4)
83	*Sauropus androgynus*	Pokok asam/ sayur manis	Euphorbiaceae	[4]	Food (leaves and shoots)	1 (7.7)
84	*Solanum melongena*	Terung	Solanaceae	[1]; [9]	Food (fruits)	2 (15.4)
85	*Solanum torvum*	Terung pipit	Solanaceae	[5]; [12]	Food (fruits)	2 (15.4)
86	*Stenochlaena palustris*	Pucuk Paku	Dennstaedtiaceae	[1]; [7]	Food (young fronds)	2 (15.4)
87	*Syzygium aqueum*	Jambu air	Myrtaceae	[6]; [9]; [11]; [13]	Food (fruits)	4 (30.8)
88	*Syzygium polyanthum*	Serai kayu	Myrtaceae	[9]; [10]	Food (leaves, shoots)	2 (15.4)
89	*Tagetes erecta*	Tahi Ayam/Marigold	Asteraceae	[10]	Ornamental	1 (7.7)
90	*Tamarindus indica*	Asam Jawa	Fabaceae	[6]	Food (fruits); medicinal (fruits)	1 (7.7)
91	*Theobroma cacao*	Koko	Sterculiaceae	[1]	Food (seeds)	1 (7.7)
92	*Uncaria ferrea*	Cat's Claw	Rubiaceae	[12]	Medicinal (bark and roots)	1 (7.7)
93	*Zingiber officinale*	Halia	Zingiberaceae	[1]	Spice (rhizomes); food (young rhizomes)	1 (7.7)