

PAPER • OPEN ACCESS

Plant Diversity Assessment and Traditional Knowledge Documentation of Home Gardens in Parit Raja, Batu Pahat, Johor

To cite this article: S Ganesan *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **269** 012018

View the [article online](#) for updates and enhancements.



IOP | ebooks™

Bringing you innovative digital publishing with leading voices to create your essential collection of books in STEM research.

Start exploring the **collection** - download the first chapter of every title for free.

Plant Diversity Assessment and Traditional Knowledge Documentation of Home Gardens in Parit Raja, Batu Pahat, Johor

S Ganesan¹, S F Sabran^{1,2}, and M H Mazlun^{1,2}

¹ Department of Technology and Natural Resources, Faculty of Applied Sciences and Technology, Universiti Tun Hussein Onn Malaysia (UTHM), Malaysia

² Centre of Research, Sustainable Uses of Natural Resources (SUNR), Universiti Tun Hussein Onn Malaysia, Malaysia

Email: fatimahsb@uthm.edu.my

Abstract. Home gardens act as an important *ex situ* conservation for biodiversity. While many home gardens are based on traditional knowledge system, the erosion of traditional knowledge poses serious challenges to the preservation and conservation of plant diversity. Therefore, this study aimed to document ethnobotanical knowledge of cultivated plants and to assess their species diversity in the selected home gardens. A total of 50 home gardens in the center of Parit Raja, Johor were selected and the plant uses were documented using semi-structured questionnaires. In total, 127 plant species belonging to 55 families were recorded from the study area. Euphorbiaceae had the highest number of species (12), followed by the families of Rutaceae (8), and Zingiberaceae (6). The most cited plant species were *Codiaeum* sp. (35), *Cymbopogon citratus* (30), and *Capsicum annuum* (27). Of the recorded plant species, 51% were used as sources of food, 31% as ornamentals, 27% as medicinal, and 1% as dye and in ritual. The study shows that properly managed home gardens have high productivity and sustainability which help in conserving plant diversity, traditional knowledge, and food sufficiency.

1. Introduction

Home gardens are dynamic in their evolution, composition and uses [1]. The home gardens are where people grow variety of plants in their own land and such as vegetables, F, herbs or ornamental plants, most probably for subsistence to the families that maintain them. They also play as an important *ex situ* sites of plant diversity conservation and perhaps serve as germplasm bank of rare plant species. Besides that, home gardens can also be turned into a commercial purpose to secure food sufficiency. The United Nations estimated that the global population has been increasing and it is expected to reach nine billion in 2050 [2]. Consequently, food production demand will increase significantly to fulfil the basic requirement. Several strategies need to be addressed to mitigate any scarcity of food. Therefore, the practice of home gardening could be one of the strategies. Although the home garden practices are not globally exhaustive, they have been appreciated well around the world such as Indonesia, India, and Mexico.



Malay is a majority ethnic group in Malaysia which makes up to 50.2% of its population [3]. Johor state is situated in the southern part of Malaysia. In Johor, the Malays are commonly categorized into four subgroups which are Javanese-Malay, Bugis-Malay, Riau-Malay, and Banjar-Malay. Most of them still live in Malay *kampung* or villages located at suburban and rural areas. Due to rapid development and urbanization, the ‘traditional’ rural Malay community are regularly being transformed into a ‘modern’ urban one [4]. In relation to home garden studies in Malaysia, there are some reports on the home gardens in several villages in the state of Pahang and Negeri Sembilan, focusing on the ethnic minority such as Orang Asli and perhaps Malay-Minang [5][6]. Although different ethnics perform different traditional practices pertaining to home gardening, the lack of practices currently leads to erosion of this precious knowledge. Hence, more detailed and comprehensive studies on home gardens are urgently needed as an approach to monitor the role of the local community in the conservation of plant species and Malaysian natural heritage either in rural or urban settings. The objectives of this paper are to document ethnobotanical knowledge of cultivated plants in Johor, Malaysia and to assess their species diversity.

2. Methodology

2.1 Study Area

Data were collected between May, 2017 and August, 2017. The area of study was Parit Raja, a small town located at Batu Pahat district in the state of Johor. There were five villages which were Kampung Parit Haji Abdul Kadir, Kampung Parit Haji Rais, Kampung Parit Bengkok, Kampung Parit Haji Salleh Ros, and Kampung Parit Rasipan were selected based on high accessibility for this study. Parit Raja is approximately located 20 kilometer away from the main municipality of Batu Pahat and seven kilometers away from Ayer Hitam. The average distance between the five selected villages is 0.392 km. The selection of household were based on the presence and absence of their home gardens. In this study, ten households were selected for each village by convenience sampling. Population of all five villages were 1,095 people where most probably engaged with their own business, as farmers, and housewives.

2.2 Documentation of ethnobotanical knowledge

2.2.1 *Prior informed Consent (PIC)*. The purpose of the home garden study were explained to the home garden owner and Prior Informed Consent (PIC) was obtained from each home garden owner before starting the data collection.

2.2.2 *Surveys*. Surveys were conducted using semi-structured questionnaires [7] (Figure 1 and Figure 2) with 50 randomly selected home garden households. The semi-structured questionnaires consisted of two parts. The first part was collecting details of the households such as status, gender and occupation. The second part was documenting the ethnobotanical knowledge which consists of botanical information (local name, scientific name, family and type of plants), traditional uses, plant part used, method of preparation and ways of administration. Audio recordings were recorded from the home garden owners as evidence for this study. The number of individual plants were also recorded.

2.3 Assessment of plant diversity

2.3.1 *Preparation of herbarium specimens*. Herbarium specimens of each plant described by the home garden owners were prepared in triplicates. Photographs and morphological characteristics of each species were noted for species identification.

2.3.2 *Identification of plant species*. The plant species were identified using the standard plant identification references such as The Plant List (<http://www.theplantlist.org>).

2.3.3 Data analysis. Ethnobotanical data were analyzed using Microsoft Excel Software and presented as qualitative descriptive analysis. Shannon Wiener Index and Simpson Index formula were used to determine species evenness of plants and to determine species diversity of plants, respectively. Shannon Wiener Index, $H = -\sum (P_i) (\log n P_i)$ with P_i is proportion of total sample belonging to its species while Simpson Index, $D = \sum n (n-1) / N (N-1)$ with n : the total number of organism of particular species and N is the total number of organism of all species.



Figure 1. Survey session with one of the home garden owners



Figure 2. The home garden owner was showing the plants from her home garden area

3. Results

Among the 50 home garden owners, 35 female home garden owners were surveyed as compared to 15 male home garden owners. All the five villages were dominated by Javanese-Malay and Riau-Malay home garden owners which were 50% and 48%, respectively and only one home garden owner (2%) was Indian-Muslim. 94% of them were married and only three home garden owners were mentioned as single status. 46% of home garden owners said that they have finished their basic education until secondary level and only six home garden owners managed to pursue their higher education level. In this study, the higher percentage of female home garden owners indicates that gender plays a role in conserving home gardens. The role of women in maintaining the family's wellbeing have been highlighted especially in preparation of food⁸. The home garden owners with age of more than 61 years old was the highest frequency with 42%. Based on this present study, the older generation is more engaged to home garden practices and they use plants which are cultivated in their home gardens as their primary medicine as compared to modern medicine. In addition, older generation also have better ethnobotanical knowledge rather than the younger generation in the survey areas. By applying convenience sampling technique, the Javanese-Malay dominated the home garden study areas and they have approximately 10 to 20 years of experiences on cultivating home gardens. This finding indicates that the Javanese-Malay people are familiar with their own traditional knowledge particularly on the plant uses.

The 127 recorded species belong to 53 families and 97 genera (Table 1). The most common families are Euphorbiaceae (12 species), followed by Rutaceae (5 species), Fabaceae (4 species), Zingiberaceae (6 species), Apocynaceae, Fabaceae, and Malvaceae (2 species each). The most frequently used parts are fruits (53 species), whole plant (37 species), leaves (29 species), rhizome (3 species), flowers (3 species), tuber (2 species), and stem (1 species). The occurrence of 'uncertain' for the parts used as shown in Table 1 indicates that some of the traditional knowledge are probably not being practiced anymore.

In a few cases a single plant part has multiple uses, e.g., the mashed or sliced rhizome of *Zingiber aromaticum* is used by the locals to treat stomach ache, reduce flatulence, maintain healthcare, and used in cooking. The results also show that local home gardens are important reservoirs of plant species cultivated for food sources (51%), ornamentals (31%), medicines (27%), dye (1%), and in ritual (1%). Interestingly, 12% of all recorded plants have more than one use category. These multiple uses demonstrate the importance of these plants for subsistence and as a part of local cultural heritage. Even though almost 200 to 800 species of ethnobotanically-used plants were recorded in Malaysia [9], this study documented 127 cultivated plants. Some of these plants are common home garden plants but now being commercialized for herbal products and highlighted as among the ten most important plants in National Key Research Area [10] such as *Morinda citrifolia* and *Hibiscus sabdariffa*.

The top-five cultivated plants were *Codiaeum* sp. (34 home gardens), *Cymbopogon citratus* (30 home gardens), *Capsicum annuum* (27 home gardens), followed by *Hibiscus rosa-sinensis* and *Musa* sp. (25 home gardens each). *Codiaeum* sp. (*pokok puding*) was basically used as ornamental plants in the home gardens due to its attractive colors and easy to plant. All 127 cultivated plants were cited a total of 758 times by the respondents or home garden owners. The most cited multipurpose species was *Clinacanthus nutans* whose leaves decoction are used to treat diabetes, cancer, high blood pressure and eaten raw to treat diabetes and dizziness. In this research, medicinal plants were less recorded as compared to food plants and ornamentals. This is probably because modern medicine are higher in demand as compared to traditional herbal medicine. This study also documented *Clitoria ternatea* whose flower part is used as dye for food coloring. This species is unlikely utilized in Johor as it is traditionally used as food coloring by Kelantan-Malay subgroup for preparation of *nasi kerabu*, a local cuisine in Kelantan (eastern part of Peninsular Malaysia) [11] and also used by Baba and Nyonya ethnic to prepare *kueh tekan*, a traditional dessert.

The average Shannon-Wiener index ($H = 1.5399$) of cultivated plant diversity in the selected home gardens showed high evenness while Simpson index ($D = 0.0486$) depicted high abundance (Table 2). Among the five selected Malay villages, the Shannon-Wiener index value of Kampung Parit Haji

Salleh Ros ($H = 1.573$) indicated that the village has higher species evenness as compared to the other four villages. On the other hand, for Simpson index, Kampung Parit Salleh Ros showed higher species richness ($D = 0.0397$) as compared to other villages.

4. Conclusion

In conclusion, 127 species of cultivated plants documented in this study showed that the home gardens in these five selected Malay villages in Johor are high in diversity. Various uses of plants in the home gardens, particularly for food, ornamental, and medicine provide household sustenance that support economic status of Parit Raja local community as well as strengthen their role in sustaining food security. Although the uncertainties occurred in the documentation, the traditional practices of home garden is still being practiced by the households or home garden owners and continue to contribute to the preservation and conservation of Malaysian natural heritage.

Table 1. List of cultivated plants in home gardens of Malay villages in Johor, Malaysia.

NO	SPECIES	LOCAL NAME	FAMILY	USES (PARTS USED) ^a	
1	<i>Strobilanthes crispus</i>	Pokok pecah kaca	Acanthaceae	Medicine ⁱ	3
2	<i>Ruellia simplex</i> C. Wright	Pokok bunga Mexican	Acanthaceae	Ornamental ^g	1
3	<i>Clinacanthus nutans</i> (Burm.f.) Lindau	Belalai gajah	Acanthaceae	Medicine ⁱ	11
4	<i>Celosia</i> sp.	Bunga balung padi	Amaranthaceae	Ornamental ^g	1
5	<i>Celosia argentea</i> L.	Bunga balung ayam	Amaranthaceae	Ornamental ^g	2
6	<i>Gomphrena globosa</i> L.	Pokok bunga butang	Amaranthaceae	Ornamental ^g	2
7	<i>Mangifera</i> sp.	Pokok pelam	Anacardiaceae	Food ^c	16
8	<i>Anacardium occidentale</i>	Pokok gajus	Anacardiaceae	Food ^c ; Ornamental ^g	2
9	<i>Spondias dulcis</i> Parkinson	Pokok kedondong	Anacardiaceae	Food ^c ; Medicine ^h	5
10	<i>Mangifera</i> sp.	Pokok mangga	Anacardiaceae	Food ^c	8
11	<i>Canarium odorata</i> (Lam.) Hook.f. & Thomson	Pokok bunga kenanga	Annonaceae	Ornamental ^g	5
12	<i>Annona</i> sp.	Pokok nona	Annonaceae	Food ^c	2
13	<i>Annona muricata</i> L.	Pokok durian belanda	Annonaceae	Food ^c	8
14	<i>Lochnera rosea</i> (L.) Rchb. ex Endl	Pokok kemunting cina	Apocynaceae	Medicine ⁱ ; Ornamental ^g	4
15	<i>Allamanda</i> sp.	Alamanda oren	Apocynaceae	Ornamental ^g	1
16	<i>Allamanda blanchetii</i> A.DC	Alamanda ungu	Apocynaceae	Ornamental ^g	1
17	<i>Allamanda angustifolia</i> Pohl	Alamanda kuning	Apocynaceae	Ornamental ^g	1
18	<i>Thevetia peruviana</i> (Pers.) K.Schum	Pokok Jepun	Apocynaceae	Ornamental ^g	1
19	<i>Phoenix</i> sp.	Pokok kurma	Arecaceae	Food ^c	1
20	<i>Acorus calamus</i> L.	Jerangau	Arecaceae	Medicine ⁱ	3
21	<i>Areca catechu</i> L.	Pokok pinang	Arecaceae	Ornamental ^g	5
22	<i>Alocasia macrorrhizos</i> (L.) G.Don	Keladi birah	Arecaceae	Food ⁱ ; Ornamental ^g	11

23	<i>Nothopanax scutellarius</i> (Burm.f.) Merr.	Pokok puding mangkuk	Araliaceae	Food ⁱ	2
24	<i>Impatiens balsamina</i> L.	Pokok keembong	Balsaminaceae	Ornamental ^g	5
25	<i>Ananas</i> sp.	Nanas	Bromeliaceae	Food ^c	1
26	<i>Hylocereus undatus</i> (Haw.) Britton & Rose	Naga	Cactaceae	Food ^c	4
27	<i>Canna</i> sp.	Pokok bunga ganyong	Cannaceae	Ornamental ^g	1
28	<i>Carica papaya</i> L.	Pokok betik	Caricaceae	Food ^c	14
29	<i>Casuarina</i> sp.	Pokok ru	Casuarinaceae	Ornamental ^g	1
30	<i>Cleome gynandra</i> L.	Pokok maman	Cleomaceae	Food ⁱ	1
31	<i>Garcinia</i> sp.	Pokok manggis	Clusiaceae	Food ^c	4
32	<i>Quisqualis indica</i> L.	Pokok akar dani	Combretaceae	Ornamental ^g	1
33	<i>Cosmos caudatus</i> Kunth	Pokok ulam raja	Compositae	Food ⁱ	11
34	<i>Luffa acutangula</i> (L.) Roxb.	Petola	Cucurbitaceae	Food ^c	2
35	<i>Cycas</i> sp.	Pokok cycas	Cycadaceae	Ornamental ^g	1
36	<i>Euphorbia hirta</i> L.	Susu nabi	Euphorbiaceae	Medicine ⁱ	1
37	<i>Codiaeum</i> sp.	Pokok puding	Euphorbiaceae	Ornamental ^g	34
38	<i>Manihot</i> sp.	Pokok ubi	Euphorbiaceae	Food ^f	16
39	<i>Euphorbia milii</i> var. <i>splendens</i> (Bojer ex Hook.) Ursch & Leandri	Jejarum	Euphorbiaceae	Ornamental ^g	10
40	<i>Jatropha podagrica</i> Hook	Jarak bunting ^F	Euphorbiaceae	Ornamental ^g	1
41	<i>Manihot esculenta</i> Crantz	Pokok ubi kapak	Euphorbiaceae	Food ^{f,i}	4
42	<i>Pedilanthus tithymaloides</i> (L.) Poit.	Pokok lelipan	Euphorbiaceae	Ornamental ^g	1
43	<i>Euphorbia tithymaloides</i> L.	Pokok meeting bird	Euphorbiaceae	Ornamental ^g	1
44	<i>Phyllanthus pulcher</i> Wall. ex Müll.Arg.	Pokok naga buana	Euphorbiaceae	Medicine ^h	1
45	<i>Baccaurea motleyana</i> (Müll.Arg.) Müll.Arg.	Pokok rambai	Euphorbiaceae	Food ^c	1
46	<i>Sauropus androgynus</i> (L.) Merr.	Cekur manis/ pucuk manis	Euphorbiaceae	Food ⁱ	15
47	<i>Hura crepitans</i> L.	Pokok payung Indonesia	Euphorbiaceae	Ornamental ^g	1
48	<i>Christia vespertilionis</i> (L.f.) Bakh.f	Pokok rama-rama	Fabaceae	Medicine ⁱ	3
49	<i>Psophocarpus tetragonolobus</i> (L.) DC.	Kacang botol	Fabaceae	Food ^c	6
50	<i>Vigna</i> sp.	Kacang panjang	Fabaceae	Food ^c	2
51	<i>Delonix regia</i> (Hook.) Raf.	Pokok semarak api	Fabaceae	Ornamental ^g	1
52	<i>Erythrina fusca</i> Lour.	Pokok dedap	Fabaceae	Ornamental ^g	1
53	<i>Coleus</i> sp.	Pokok ati-ati (hijau)	Labiatae	Medicine ⁱ ; Ornamental ^g	5
54	<i>Coleus atropurpureus</i> Benth	Pokok ati-ati (merah)	Labiatae	Medicine ⁱ ; Ornamental ^g	7

55	<i>Leucaena leucocephala</i> (Lam.) de Wit	Petai belalang	Leguminoceae	Medicine ^c ; Food ⁱ	7
56	<i>Clitoria ternatea</i> L.	Bunga telang	Leguminoceae	Food ^d	2
57	<i>Aloe vera</i> (L.) Burm.f.	Lidah buaya	Liliceae	Medicine ⁱ	18
58	<i>Sansevieria trifasciata</i> Prain	Pokok lidah jin	Liliceae	Ornamental ^g	3
59	<i>Allium</i> sp.	Bawang	Liliceae	Ornamental ^g	1
60	<i>Punica granatum</i> L.	Pokok Delima	Lythraceae	Medicine ^c ; Food ^c	5
61	<i>Lawsonia inermis</i> L.	Pokok inai	Lythraceae	Medicine ^g	3
62	<i>Hibiscus rosa-sinensis</i> L.	Pokok bunga raya (merah)	Malvaceae	Medicine ⁱ ; Ornamental ^g	25
63	<i>Hibiscus sabdariffa</i> L.	Pokok roselle	Malvaceae	Food ^c	3
64	<i>Hibiscus esculentus</i> L.	Bendi	Malvaceae	Food ^c	1
65	<i>Tinospora crispa</i> (L.) Hook. f. & Thomson	Patawali	Menispermaceae	Medicine ^h	2
66	<i>Lansium parasiticum</i> (Osbeck) K.C.Sahni & Bennet	Dukung langsung	Meliaceae	Food ^c	1
67	<i>Artocarpus heterophyllus</i> Lam.	Pokok nangka	Moraceae	Food ^c	15
68	<i>Artocarpus integer</i> (Thunb.) Merr.	Pokok cempedak	Moraceae	Food ^c	5
69	<i>Ficus</i> sp.	Pokok buah tin	Moraceae	Food ^c	1
70	<i>Artocarpus altilis</i> (Parkinson ex F.A.Zorn) Fosberg	Pokok sukun	Moraceae	Food ^c	1
71	<i>Moringa oleifera</i> Lam.	Pokok kelor	Moringaceae	Medicine ⁱ	1
72	<i>Musa</i> sp.	Pokok pisang lilin	Musaseae	Food ^c	25
73	<i>Heliconia rostrata</i> Ruiz & Pav.	Pokok sepit udang	Musaseae	Ornamental ^g	1
74	<i>Psidium guajava</i> L.	Pokok jambu batu	Myrtaceae	Medicine ⁱ ; Food ^c	19
75	<i>Eugenia papillosa</i> Duthie	Pokok kelat paya	Myrtaceae	Ornamental ^g	3
76	<i>Syzygium malaccense</i> (L.) Merr. & L.M.Perry	Pokok jambu bol	Myrtaceae	Food ^c	1
77	<i>Syzygium jambos</i> (L.) Alston	Pokok jambu mawar	Myrtaceae	Food ^c	1
78	<i>Syzygium aqueum</i> (Burm.f.) Alston	Pokok jambu air	Myrtaceae	Food ^c	2
79	<i>Bougainvillea</i> sp.	Bunga kertas	Nyctaginaceae	Medicine ^d ; Ornamental ^g	23
80	<i>Jasminum polyanthum</i> Franch.	Pokok melati	Oleaceae	Medicine ^{d,i}	3
81	<i>Jasminum sambac</i> (L.) Aiton	Pokok melor	Oleaceae	Ornamental ^g	3
82	<i>Orchis</i> sp.	Anggerik	Orchidaceae	Ornamental ^g	12
83	<i>Averrhoa carambola</i> L.	Pokok belimbing	Oxalidaceae	Food ^c	11
84	<i>Averrhoa bilimbi</i> L.	Pokok belimbing buluh	Oxalidaceae	Food ^c	4

85	<i>Pandanus amaryllifolius</i> Roxb.	Pandan	Pandanaceae	Medicine ⁱ	13
86	<i>Piper betle</i> L.	Sireh	Piperaceae	Medicine ⁱ	5
87	<i>Piper sarmentosum</i> Roxb.	Kaduk	Piperaceae	Food ⁱ	3
88	<i>Piper nigrum</i> L.	Lada sulah	Piperaceae	Food ^c	1
89	<i>Saccharum</i> sp.	Tebu	Poaceae	Food ^e	6
90	<i>Cymbopogon citratus</i> (DC.) Stapf	Serai	Poaceae	Food ⁱ	30
91	<i>Talinum paniculatum</i> (Jacq.) Gaertn.	Akar ginseng jawa	Portulacaceae	Ornamental ^g	1
92	<i>Passiflora edulis</i> Sims	Pokok markisa	Pussifloraceae	Food ^c	3
93	<i>Rosa</i> sp.	Pokok bunga ros	Rosaceae	Ornamental ^g	8
94	<i>Prunus</i> sp.	Pokok cherry	Rosaceae	Food ^c ; Ornamental ^g	6
95	<i>Morinda citrifolia</i> L.	Pokok mengkudu	Rubiaceae	Medicine ^c ; Food ^c	7
96	<i>Mitragyna</i> sp.	Ketum cina	Rubiaceae	Medicine ⁱ	1
97	<i>Ruta graveolens</i> L.	Pokok garuda	Rutaceae	Medicine ⁱ	2
98	<i>Citrus microcarpa</i> Bunge	Pokok limau kasturi	Rutaceae	Medicine ^c ; Food ^c	19
99	<i>Citrus</i> sp.	Pokok limau madu	Rutaceae	Food ^c	1
100	<i>Citrus maxima</i> (Burm.) Merr.	Pokok limau bali	Rutaceae	Food ^c	1
101	<i>Citrus reticulata</i> Blanco	Pokok limau cina	Rutaceae	Food ^c	2
102	<i>Citrus hystrix</i> DC.	Pokok limau purut	Rutaceae	Food ^c	16
103	<i>Citrus aurantiifolia</i> (Christm.) Swingle	Pokok limau nipis	Rutaceae	Food ^c	16
104	<i>Murraya koenigii</i> (L.) Spreng.	Pokok daun kari	Rutaceae	Food ^c	21
105	<i>Ziziphus</i> sp.	Pokok epal bidara	Rhamnaceae	Food ^c	1
106	<i>Ziziphus mauritiana</i> Lam	Pokok bidara	Rhamnaceae	Ornamental ^g	1
107	<i>Manilkara zapota</i> (L.) P.Royen	Pokok ciku	Sapotaceae	Food ^c	14
108	<i>Nephelium mutabile</i> Blume	Pokok pulasan	Sapindaceae	Food ^c	9
109	<i>Nephelium lappaceum</i> L.	Pokok rambutan	Sapindaceae	Food ^c	11
110	<i>Dimocarpus</i> sp.	Pokok longan	Sapindaceae	Food ^c	6
111	<i>Solanum</i> sp.	Kentang	Solanaceae	Food ^c	1
112	<i>Capsicum annuum</i> L.	Pokok cili	Solanaceae	Food ^c	27
113	<i>Datura metel</i> L.	Kecubong	Solanaceae	Medicine ^h	1
114	<i>Solanum mammosum</i> L.	Terung pipit	Solanaceae	Medicine ^c	3
115	<i>Cestrum</i> sp.	Pokok santalia / harummalam	Solanaceae	Ornamental ^g	14
116	<i>Physalis angulata</i> L.	Pokok ciplokan	Solanaceae	Medicine ^c	2
117	<i>Phaleria macrocarpa</i> (Scheff.) Boerl.	Pokok mahkota dewa	Thymelaeaceae	Medicine ^c	5
118	<i>Anethum graveolens</i> L.	Adas manis	Umbelliferae	Medicine ^g	2

119	<i>Lantara</i> sp.	Pokok bunga tahi ayam	Verbenaceae	Ornamental ^g	4
120	<i>Premna foetida</i> Reinw. ex Blume	Pokok bebuas	Verbenaceae	Food ⁱ	4
121	<i>Vitis</i> sp.	Anggur	Vitaceae	Food ^c	1
122	<i>Kaempferia pulchra</i> Ridl.	Cekurmas	Zingiberaceae	Food ⁱ	2
123	<i>Phaeomeria speciosa</i> (Blume) Koord.	Kantan	Zingiberaceae	Food ^d	6
124	<i>Zingiber aromaticum</i> Noronha	Lempoyang	Zingiberaceae	Medicine ^b ; Food ^b	8
125	<i>Zingiber cassumunar</i> Roxb.	Halia bara	Zingiberaceae	Medicine ^b	6
126	<i>Zingiber</i> sp.	Bonglai	Zingiberaceae	Medicine ^b ; Ritual ^b	4
127	<i>Kaempferia galanga</i> L.	Cekur	Zingiberaceae	Food ⁱ	7

^a Frequency of citation^b Rhizome^c Fruit^d Flower^e Stem^f Tuber^g Whole plant^h Uncertainⁱ Leaves**Table 2.** List of cultivated plants in home gardens of Malay villages in Johor, Malaysia.

VILLAGES	SHANNON WIENER INDEX (H)	SIMPSON INDEX (D)
Kampung Parit Bengkok	1.3972	0.0595
Kampung Parit Haji Salleh Ros	1.573	0.0397
Kampung Parit Haji Rais	1.3394	0.0706
Kampung Parit Abdul Kadir	1.3063	0.0740
Kampung Parit Rasipan	1.1998	0.0995
Overall	1.5399	0.0486

References

- [1] Bhat S, Bhandary M J and Rajanna L 2014 Plant diversity in the homegardens of Karwar, Karnataka, India. *Biodiversitas Journal of Biological Diversity* **15** 229-35
- [2] United Nations 2005 www.un.org/en/development/desa/population/ (last accessed: November 18, 2017)
- [3] Department of Statistics Malaysia 2011 Preliminary count report *Population and Housing Census, Malaysia, 2010* (Department of Statistics Malaysia: Kuala Lumpur)
- [4] Thompson E C 2015 Rural villages as socially urban spaces in Malaysia. *Urban Studies* **41** 2357–76
- [5] Milow P, Malek S, Mohammad N S and Ong H C 2013 Diversity of plants pended or cultivated in orang asli homegardens in Negeri Sembilan, Peninsular Malaysia *Human Ecology* **41** 2357–76
- [6] P Milow, M R Ramli and O H Chooi 2010 Preliminary survey on plants in home hardens in Pahang, Malaysia *Journal of Biodiversity* **1** 19–25
- [7] Vogl C, Vogl-Lukasser B and Puri R K 2004 Tools and methods for data collection in ethnobotanical studies of homegardens *Field Methods*, **16** 285–306

- [8] Sood M and Gupta V and Jan A 2015 Role of women in conserving plant genetic resources and related traditional knowledge for food security *Plant Genetic Resources and Traditional Knowledge for Food Security* (Singapore: Springer Singapore) p 237–53
- [9] MONRE 2014 Malaysia's fifth national report to the convention on biological diversity. (MONRE: Putrajaya)
- [10] Malaysia Pharmaceutical Bureau (NPBC). *Malaysian Herbal Monograph*. (NPBC: Kuala Lumpur)
- [11] Rabeta M S and An Nabil Z 2013 Total phenolic compounds and scavenging activity in *Clitoria ternatea* and *Vitex negundo* linn. *International Food Research Journal* **20** 495-500

Acknowledgements

This research is funded by the Ministry of Higher Education Malaysia under Fundamental Research Grant Scheme (FRGS Vot No. 1645) and Universiti Tun Hussein Onn Malaysia under Postgraduate Research Grant (GPPS Vot No. H056).