A Contribution to Trees and Shrubs Checklist in Kuala Keniam at Taman Negara, Pahang, Malaysia

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Abstract. The forested area around Kuala Keniam is a part of Taman Negara (Pahang) and is categorized as a primary lowland dipterocarp, riparian fringe and limestone forests. A study of flora that focuses on the trees and shrubs was conducted during the scientific expedition in September 2020, organised by Universiti Teknologi MARA (UiTM). The results identified as many as 187 taxa of trees and shrubs consisting of 124 genera and 49 plant families from the lowland dipterocarp forest. A total of nine endemic taxa to Peninsular Malaysia were also recorded namely *Aporosa globifera*, *Baccaurea pyriformis*, *Cinnamomum mollissimum*, *Enicosanthum fuscum*, *Lithocarpus curtisii*, *Mallotus griffithianus*, *M. penangensis*, *Ryparosa fasciculata* and *Schoutenia kunstleri*. Another three taxa viz. *Elaeocarpus obtusatus* ssp. *apiculatus*, *Popowia tomentosa* and *Sterculia rubiginosa* var. *setistipula* were considered as the new additional record for Pahang state. It is hoped that the information from this study can be used as references to help other researchers as well as stakeholders in ecotourism management and forest conservation plan.

1. Introduction

Taman Negara with an area of 434,351 ha of primary forest is the largest protected area in Peninsular Malaysia. These areas straddle across three states, namely, Pahang, Kelantan and Terengganu. The highest point in this forest is notably located on Gunung Tahan with the elevation of 2,187 m above sea level, the highest mountain in Peninsular Malaysia. These areas are also considered as one of the oldest rain forests in Peninsular Malaysia of more than 130 million years old. Based on classification by Symington [1] and Wyatt-Smith [2], there are several forest types which can be found in Taman

Negara such as lowland dipterocarp, hill dipterocarp, upper hill dipterocarp, montane oak, montane ericaceous, riparian fringe and limestone forests. Several rivers drain from Taman Negara (Pahang), viz. Sungai Tembeling, Sungai Tahan, Sungai Riul, Sungai Sat, Sungai Kenyam, Sungai Sepia and Sungai Teku. It has been considered as a hotspot for biodiversity as it hosts many species of flora and fauna and many of them are endemic and rare in Malaysia. Therefore, further studies on flora should be conducted to gather more information from these areas. The objective of this study is to record the diversity of trees and shrubs species found in Taman Negara at Kuala Keniam. The collection was then compared to other previous studies done in Pahang.

2. Materials and Methods

The study of flora was conducted in Taman Negara at Kuala Keniam for four days during a scientific expedition from 4th to 8th September 2020. Specimens of flowering or fruiting plants were collected around the permanent forest trails. Additional data were also obtained from five ecological plots with the size of 25 m x 20 m each. All trees with DBH $\geq$ 5 cm were tagged and measured. Samples were collected and marked with number tags, together with relevant information and photos were also captured. All specimens collected were identified by their family, genus and species. The identification method used was by matching the morphological similarities of the specimens with the existing collection from Herbarium, Universiti Kebangsaan Malaysia (UKMB) and Herbarium of Forest Research Institute Malaysia (KEP) as well as by using several publications on the morphological features that have been provided by taxonomists. In general, references for all plants are as described by Turner [3] and other verification references for tree species were referred to Ng [4] [5] and Whitmore [6] [7]. All voucher specimens were dried, identified and then deposited at the Herbarium of Universiti Kebangsaan Malaysia (UKMB). We have Brummit [8] for the classification of the flora with only a few exceptions for the recognition of genera [3]. Floristic compositions were tabulated into families, genera and species. The status of endemic species was derived from [3].

3. Results and Discussion

3.1 The floristic composition

A survey of flora conducted in Kuala Keniam at Taman Negara (Pahang) has found a total of 187 taxa of trees and shrubs consisting of 124 genera and 49 plant families (Table 1). The most speciose family species is Euphorbiaceae with 24 species, followed by Annonaceae with 12 species, Rubiaceae with 11 species and Leguminosae and Myrtaceae with 8 species each. The largest genus is *Syzygium* with eight species followed by *Aporosa* with seven species and *Diospyros* with five species (Table 2).

Table 1. Total number of genus/genera dan species for all families of trees and shrubs in Kuala Keniam at Taman Negara Pahang.

Family	Total number of genus/genera	Total number of species
Anacardiaceae	5	5
Annonaceae	8	12
Apocynaceae	1	1
Araliaceae	2	2
Aralidiaceae	1	1
Bombacaceae	1	1
Burseraceae	5	6
Chrysobalanaceae	1	1
Dipterocarpaceae	3	6
Ebenaceae	1	5
Elaeocarpaceae	1	2
Euphorbiaceae	12	24

Fagaceae	2	3
Flacourtiaceae	4	4
Guttiferae	3	7
Icacinaceae	2	2
Irvingiaceae	1	1
Ixonanthaceae	1	1
Lauraceae	4	6
Lecythidaceae	1	1
Leguminosae	7	8
Melastomataceae	3	4
Meliaceae	4	6
Moraceae	2	4
Myristicaceae	3	5
Myrsinaceae	1	1
Myrtaceae	1	8
Ochnaceae	1	1
Olacaceae	1	2
Opiliaceae	1	1
Oxalidaceae	1	1
Pandaceae	2	2
Passifloraceae	1	1
Polygalaceae	1	3
Proteaceae	1	2
Rosaceae	1	1
Rubiaceae	9	11
Rutaceae	1	1
Sapindaceae	5	7
Sapotaceae	3	5
Sterculiaceae	3	5
Styracaceae	1	1
Symplocaceae	1	2
Theaceae	1	1
Thymelaeaceae	2	2
Tiliaceae	4	6
Trigoniaceae	1	1
Ulmaceae	1	2
Verbenaceae	2	2
Total	124	187

Table 2. The 15 most speciose genera in Kuala Keniam at Taman Negara Pahang.

Genus	**Family**	**Total number of species**
Syzygium	Myrtaceae	8
Aporosa	Euphorbiaceae	7
Diospyros	Ebenaceae	5
Garcinia	Guttiferae	4
Shorea	Dipterocarpaceae	4
Antidesma	Euphorbiaceae	3
Artocarpus	Moraceae	3
Baccaurea	Euphorbiaceae	3
Ixora	Rubiaceae	3

Knema	Myristicaceae	3
Mallotus	Euphorbiaceae	3
Palaquium	Sapotaceae	3
Polyalthia	Annonaceae	3
Sterculia	Sterculiaceae	3
Xanthophyllum	Polygalaceae	3

3.2 The common species

The common tree species in this study include *Aporosa arborea, Aporosa microstachya, Baccaurea brevipes, Champereia manillana, Diplospora malaccensis, Elateriospermum tapos, Gironniera parvifolia, Gomphandra quadrifida, Hopea pubescens, Horsfieldia tomentosa, Knema hookeriana, Koompassia malaccensis, Macaranga lowii, Mallotus leucodermis, Mallotus penangensis, Payena lucida, Saraca cauliflora* and *Xerospermum noronhianum*. The common shrubs are *Chassalia chartacea* and *Ixora* spp. The pictures of selected species found during this study are shown in Figure 1. For saplings, the common species listed are *Aidia densiflora, Aquilaria malaccensis, Artocarpus lanceifolius, Cynometra malaccensis, Gonystylus maingayi* and *Shorea leprosula*.

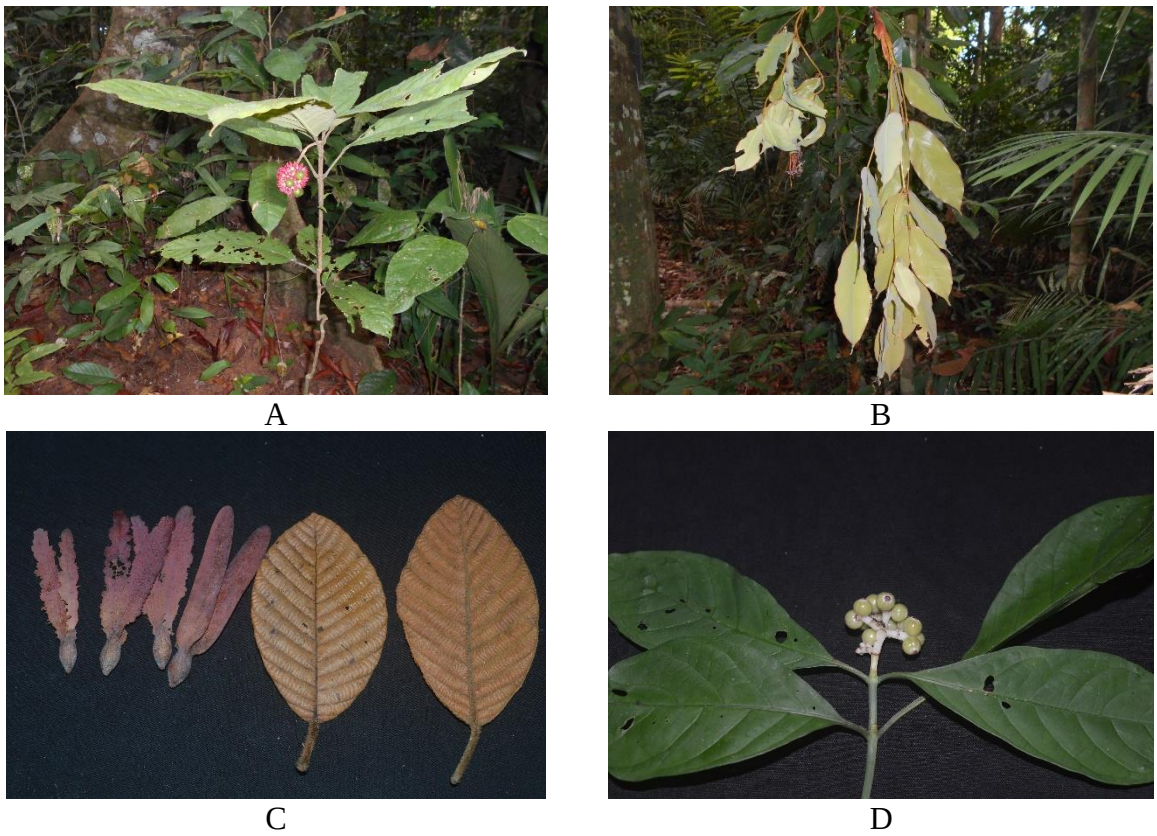

Figure 1. Some species of trees and shrubs found around Kuala Keniam at Taman Negara (Pahang). A. *Clerodendrum deflexum* (Verbenaceae); B. *Cynometra malaccensis* (Leguminosae); C. *Dipterocarpus crinitus* (Dipterocarpaceae); D. *Chassalia chartacea* (Rubiaceae).

3.3 The pioneer species

As the forest is not disturbed, the pioneer species stands are rare and the species that can be found include *Arthrophyllum diversifolium*, *Cratoxylum formosum* and *Macaranga hypoleuca*. Both *A. diversifolium* and *M. hypoleuca* are short-live pioneers that usually be found in the forest margin or secondary forest [3], [9].

3.4 The endemic taxa

From the total 187 taxa of flowering plants in the lowland forest at Kuala Keniam, nine species are identified as endemic species for Peninsular Malaysia (Table 3).

Table 3. Endemic species of trees and shrubs for Peninsular Malaysia around Kuala Keniam at Taman Negara Pahang.

Species	Family	Distribution
Enicosanthum fuscum	Annonaceae	Pk, Ph
Aporosa globifera	Euphorbiaceae	Kd, Pn, Kl, Pk, Ph
Baccaurea pyriformis	Euphorbiaceae	Pn, Ph, Sl, Ml, Jh
Mallotus griffithianus	Euphorbiaceae	Throughout
Mallotus penangensis	Euphorbiaceae	Throughout
Lithocarpus curtisii	Fagaceae	Pn, Kl, Tg, Pk, Ph, Sl
Ryparosa fasciculata	Flacourtiaceae	Ml and Ph northward
Cinnamomum mollissimum	Lauraceae	Pn, Kl, Tg, Pk, Ph, Sl, NS, Ml, Jh
Schoutenia kunstleri	Tiliaceae	Pn, Tg, Pk, Ph, Jh

* Legend: Kd = Kedah, Pn = Pulau Pinang, Pk = Perak, Sl = Selangor, Ml = Melaka, NS = Negeri Sembilan, Jh = Johor; Ph = Pahang, Tg = Terengganu, Kl = Kelantan

3.5 Additional new records for Pahang

A total of three taxa are the new records for Pahang after being compared with the checklist of [3] namely *Elaeocarpus obtusatus* ssp. *apiculatus*, *Popowia tomentosa* and *Sterculia rubiginosa* var. *setistipula*. According to [10], *Elaeocarpus obtusatus* ssp. *apiculatus* was previously recorded in Kedah, Kelantan, Terengganu and Perak. Meanwhile, *Popowia tomentosa* was previously documented in three states, viz. Pulau Pinang, Perak and Melaka [11]. *Sterculia rubiginosa* var. *setistipula* was only found in Selangor state [12].

3.6 The checklist of Trees and Shrubs

List of families, genera and species of flowering plants in alphabetical order are presented in Table 4. Habit of all taxon is also given either trees or shrubs.

Table 4. The checklist of trees and shrubs around Kuala Keniam at Taman Negara Pahang.

No.	**Family**	**Species**	**Habit**
1	Anacardiaceae	*Bouea macrophylla* Griff.	Tree
2	Anacardiaceae	*Buchanania sessifolia* Blume	Tree
3	Anacardiaceae	*Dracontomelon dao* (Blanco) Merr. & Rolfe	Tree
4	Anacardiaceae	*Pentaspadon motleyi* Hook.f.	Tree
5	Anacardiaceae	*Swintonia floribunda* Griff.	Tree
6	Annonaceae	*Desmos cochinchinensis* Lour.	Shrub
7	Annonaceae	*Enicosanthum fuscum* (King) Airy Shaw	Tree

8	Annonaceae	*Goniothalamus macrophyllus* (Blume) Hook.f. & Thomson	Tree
9	Annonaceae	*Monocarpia marginalis* (Scheff.) J. Sinclair	Tree
10	Annonaceae	*Polyalthia cauliflora* Hook.f. & Thomson	Tree
11	Annonaceae	*Polyalthia obliqua* Hook.f. & Thomson	Tree
12	Annonaceae	*Polyalthia sumatrana* (Miq.) Kurz	Tree
13	Annonaceae	*Popowia pisocarpa* (Blume) Endl.	Tree
14	Annonaceae	*Popowia tomentosa* Maingay ex Hook.f. & Thomson	Tree
15	Annonaceae	*Trivalvaria macrophylla* (Blume) Miq.	Tree
16	Annonaceae	*Xylopia magna* Maingay ex Hook.f. & Thomson	Tree
17	Annonaceae	*Xylopia stenopetala* Oliv.	Tree
18	Apocynaceae	*Dyera costulata* (Miq.) Hook.f.	Tree
19	Araliaceae	*Arthrophyllum diversifolium* Blume	Tree
20	Araliaceae	*Trevesia burckii* Boerl.	Treelet
21	Aralidiaceae	*Aralidium pinnatifitidum* (Jungh. & de Vriese) Miq.	Treelet
22	Bombacaceae	*Neesia synandra* Mast.	Tree
23	Burseraceae	*Canarium littorale* Blume	Tree
24	Burseraceae	*Canarium pilosum* Benn.	Tree
25	Burseraceae	*Dacryodes rugosa* (Blume) H.J. Lam	Tree
26	Burseraceae	*Santiria laevigata* Blume	Tree
27	Burseraceae	*Scutinanthe brunnea* Thwaites	Tree
28	Burseraceae	*Triomma malaccensis* Hook.f.	Tree
29	Chrysobalanaceae	*Parinari costata* (Korth.) Blume	Tree
30	Dipterocarpaceae	*Dipterocarpus crinitus* Dyer	Tree
31	Dipterocarpaceae	*Shorea hopeifolia* (F. Heim) Symington	Tree
32	Dipterocarpaceae	*Shorea leprosula* Miq.	Tree
33	Dipterocarpaceae	*Shorea ovalis* (Korth.) Blume	Tree
34	Dipterocarpaceae	*Shorea parvifolia* Dyer ssp. *parvifolia*	Tree
35	Dipterocarpaceae	*Vatica maingayi* Dyer	Tree
36	Ebenaceae	*Diospyros buxifolia* (Blume) Hiern	Tree
37	Ebenaceae	*Diospyros latisepala* Ridl.	Tree
38	Ebenaceae	*Diospyros pendula* Hasselt ex Hassk.	Tree
39	Ebenaceae	*Diospyros pilosanthera* Blanco var. *oblonga* (Wall. ex G. Don) Ng	Tree
40	Ebenaceae	*Diospyros sumatrana* Miq.	Tree
41	Elaeocarpaceae	*Elaeocarpus obtusatus* Blume ssp. *apiculatus* (Mast.) Coode	Tree
42	Elaeocarpaceae	*Elaeocarpus petiolatus* (Jack) Wall.	Tree
43	Euphorbiaceae	*Agrostistachys gaudichaudii* Müll.Arg.	Tree
44	Euphorbiaceae	*Antidesma coriaceum* Tul.	Tree
45	Euphorbiaceae	*Antidesma japonicum* Siebold & Zucc.	Tree
46	Euphorbiaceae	*Antidesma velutinosum* Blume	Tree
47	Euphorbiaceae	*Aporosa arborea* (Blume) Müll.Arg.	Tree
48	Euphorbiaceae	*Aporosa aurea* Hook.f.	Tree
49	Euphorbiaceae	*Aporosa benthamiana* Hook.f.	Tree
50	Euphorbiaceae	*Aporosa globifera* Hook.f.	Tree
51	Euphorbiaceae	*Aporosa microstachya* (Tul.) Müll.Arg.	Tree
52	Euphorbiaceae	*Aporosa nigricans* Hook.f.	Tree
53	Euphorbiaceae	*Aporosa symplocoides* (Hook.f.) Gage	Tree
54	Euphorbiaceae	*Baccaurea brevipes* Hook.f.	Tree
55	Euphorbiaceae	*Baccaurea pyriformis* Gage	Tree
56	Euphorbiaceae	*Baccaurea sumatrana* Müll.Arg.	Tree
57	Euphorbiaceae	*Blumeodendron subrotundifolium* (Elmer) Merr.	Tree

58	Euphorbiaceae	*Croton argyratus* Blume	Tree
59	Euphorbiaceae	*Drypetes longifolia* (Blume) Pax & K. Hoffm.	Tree
60	Euphorbiaceae	*Elateriospermum tapos* Blume	Tree
61	Euphorbiaceae	*Macaranga hypoleuca* (Rchb.f. & Zoll.) Müll.Arg.	Tree
62	Euphorbiaceae	*Mallotus griffithianus* Hook.f.	Tree
63	Euphorbiaceae	*Mallotus kingii* Hook.f.	Tree
64	Euphorbiaceae	*Mallotus penangensis* Müll.Arg.	Tree
65	Euphorbiaceae	*Pimelodendron griffithianum* (Müll.Arg.) Benth.	Tree
66	Euphorbiaceae	*Ptychopyxis caput-medusae* (Hook.f.) Ridl.	Tree
67	Fagaceae	*Castanopsis nephelioides* King ex Hook.f.	Tree
68	Fagaceae	*Lithocarpus curtisii* (King ex Hook.f.) A. Camus	Tree
69	Fagaceae	*Lithocarpus wallichianus* (Lindl. ex Hance) Rehder	Tree
70	Flacourtiaceae	*Flacourtia rukam* Zoll. & Moritzi	Tree
71	Flacourtiaceae	*Homalium longifolium* Benth.	Tree
72	Flacourtiaceae	*Hydnocarpus castanea* Hook.f. & Thomson	Tree
73	Flacourtiaceae	*Ryparosa fasciculata* King	Tree
74	Guttiferae	*Cratoxylum formosum* (Jack) Dyer	Tree
75	Guttiferae	*Garcinia cowa* Roxb.	Tree
76	Guttiferae	*Garcinia griffithii* T. Anderson	Tree
77	Guttiferae	*Garcinia parvifolia* (Miq.) Miq.	Tree
78	Guttiferae	*Garcinia prainiana* King	Tree
79	Guttiferae	*Mesua ferrea* L.	Tree
80	Guttiferae	*Mesua racemosa* (Planch. & Triana) Kosterm.	Tree
81	Icacinaceae	*Gomphandra quadrifida* (Blume) Sleumer	Tree
82	Icacinaceae	*Stemonurus malaccensis* (Mast.) Sleumer	Tree
83	Irvingiaceae	*Irvingia malayana* Oliv. ex Benn.	Tree
84	Ixonanthaceae	*Ixonanthes icosandra* Jack	Tree
85	Lauraceae	*Cinnamomum iners* Reinw.	Tree
86	Lauraceae	*Cinnamomum mollissimum* Hook.f.	Tree
87	Lauraceae	*Cryptocarya ferrea* Blume	Tree
88	Lauraceae	*Dehaasia cuneata* (Blume) Blume	Tree
89	Lauraceae	*Litsea elliptica* Blume	Tree
90	Lauraceae	*Litsea umbellata* (Lour.) Merr. var. *fuscotomentosa* (Meisn.) Kochummen ex I.M. Turner	Tree
91	Lecythidaceae	*Barringtonia macrostachya* (Jack) Kurz	Tree
92	Leguminosae	*Adenanthera malayana* Kosterm.	Tree
93	Leguminosae	*Callerya atropurpurea* (Wall.) Schot	Tree
94	Leguminosae	*Cynometra malaccensis* Meeuwen	Tree
95	Leguminosae	*Dialium platysepalum* Baker	Tree
96	Leguminosae	*Intsia palembanica* Miq.	Tree
97	Leguminosae	*Koompassia excelsa* (Becc.) Taub.	Tree
98	Leguminosae	*Koompassia malaccensis* Maing. ex Benth.	Tree
99	Leguminosae	*Sindora coriacea* (Baker) Maingay ex Prain	Tree
100	Melastomataceae	*Lijndenia laurina* Zoll. & Moritzi	Tree
101	Melastomataceae	*Memecylon edule* Roxb.	Tree
102	Melastomataceae	*Memecylon megacarpum* Furtado	Tree
103	Melastomataceae	*Pternandra echinata* Jack	Tree
104	Meliaceae	*Aglaia leptantha* Miq.	Tree
105	Meliaceae	*Aglaia tomentosa* Teijsm. & Binn.	Tree
106	Meliaceae	*Chisocheton erythrocarpus* Hiern	Tree
107	Meliaceae	*Chisocheton tomentosus* (Roxb.) Mabb.	Tree

108	Meliaceae	*Lansium domesticum* Corrêa	Tree
109	Meliaceae	*Walsura pinnata* Hassk.	Tree
110	Moraceae	*Artocarpus dadah* Miq.	Tree
111	Moraceae	*Artocarpus lanceifolius* Roxb.	Tree
112	Moraceae	*Artocarpus scortechinii* King	Tree
113	Moraceae	*Ficus fistulosa* Reinw. ex Blume var. *fistulosa*	Treelet
114	Myristicaceae	*Gymnacranthera farquhariana* (Hook.f. & Thomson) Warb.	Tree
115	Myristicaceae	*Horsfieldia sucosa* (King) Warb.	Tree
116	Myristicaceae	*Knema conferta* (King) Warb.	Tree
117	Myristicaceae	*Knema hookeriana* (Wall. ex Hook.f. & Thomson) Warb.	Tree
118	Myristicaceae	*Knema patentinervia* (J. Sinclair) W.J. de Wilde	Tree
119	Myrsinaceae	*Ardisia colorata* Roxb.	Treelet
120	Myrtaceae	*Syzygium cerasiforme* (Blume) Merr. & L.M. Perry	Tree
121	Myrtaceae	*Syzygium claviflorum* (Roxb.) Wall. ex A.M. Cowan & Cowan	Tree
122	Myrtaceae	*Syzygium fastigiatum* (Blume) Merr. & L.M. Perry	Tree
123	Myrtaceae	*Syzygium griffithii* (Duthie) Merr. & L.M. Perry	Tree
124	Myrtaceae	*Syzygium pseudoformosum* (King) Merr. & L.M. Perry	Tree
125	Myrtaceae	*Syzygium pycnanthum* Merr. & L.M. Perry	Tree
126	Myrtaceae	*Syzygium pyrifolium* (Blume) DC.	Tree
127	Myrtaceae	*Syzygium ridleyi* (King) P. Chantaranothai & J. Parn.	Tree
128	Ochnaceae	*Campylospermum serratum* (Gaertn.) Bittrich & M.C.E. Amaral	Tree
129	Olacaceae	*Strombosia ceylanica* Gardn.	Tree
130	Olacaceae	*Strombosia javanica* Blume	Tree
131	Opiliaceae	*Champereia manillana* (Blume) Merr.	Tree
132	Oxalidaceae	*Sarcotheca griffithii* (Planch. ex Hook.f.) Hallier f.	Tree
133	Pandaceae	*Galearia maingayi* Hook.f.	Tree
134	Pandaceae	*Microdesmis casearifolia* Planch.	Tree
135	Passifloraceae	*Paropsia vareciformis* (Griff.) Mast.	Tree
136	Polygalaceae	*Xanthophyllum affine* Korth. ex Miq.	Tree
137	Polygalaceae	*Xanthophyllum eurhynchum* Miq.	Tree
138	Polygalaceae	*Xanthophyllum griffithii* Hook.f. ex A.W. Benn.	Tree
139	Proteaceae	*Helicia attenuata* (Jack) Blume	Tree
140	Proteaceae	*Helicia petiolaris* Benn.	Tree
141	Rosaceae	*Prunus grisea* (Blume) Kalkman var. *tomentosa* (Koord. & Valeton) Kalkman	Tree
142	Rubiaceae	*Aidia densiflora* (Wall.) Masam.	Tree
143	Rubiaceae	*Chassalia chartacea* Craib	Shrub
144	Rubiaceae	*Diplospora malaccensis* Hook.f.	Tree
145	Rubiaceae	*Ixora congesta* Roxb.	Shrub
146	Rubiaceae	*Ixora grandifolia* Zoll. & Moritzi	Shrub
147	Rubiaceae	*Ixora javanica* (Blume) DC.	Shrub
148	Rubiaceae	*Nauclea officinalis* (Pierre ex Pit.) Merr. & Chun	Tree
149	Rubiaceae	*Pavetta graciliflora* Wall. ex Ridl.	Tree
150	Rubiaceae	*Porterandia anisophyllea* (Jack ex Roxb.) Ridl.	Tree
151	Rubiaceae	*Rennellia elliptica* Korth.	Shrub
152	Rubiaceae	*Saprosma* sp.	Shrub
153	Rutaceae	*Glycosmis chlorosperma* Spreng.	Tree
154	Sapindaceae	*Allophylus cobbe* (L.) Raeusch.	Tree
155	Sapindaceae	*Lepisanthes tetraphylla* (Vahl) Radlk.	Tree

156	Sapindaceae	*Litchi chinensis* Sonn.	Tree
157	Sapindaceae	*Nephelium cuspidatum* Blume var. *eriopetalum* (Miq.) Leenh.	Tree
158	Sapindaceae	*Nephelium lappaceum* L. var. *lappaceum*	Tree
159	Sapindaceae	*Xerospermum laevigatum* Radlk.	Tree
160	Sapindaceae	*Xerospermum noronhianum* (Blume) Blume	Tree
161	Sapotaceae	*Palaquium clarkeanum* King & Gamble	Tree
162	Sapotaceae	*Palaquium gutta* (Hook.f.) Baill.	Tree
163	Sapotaceae	*Palaquium hispidum* H.J. Lam	Tree
164	Sapotaceae	*Payena lucida* A. DC.	Tree
165	Sapotaceae	*Pouteria malaccensis* (C.B. Clarke) Baehni	Tree
166	Sterculiaceae	*Leptonychia caudata* (Wall. ex G. Don) Burret	Treelet
167	Sterculiaceae	*Scaphium macropodum* (Miq.) Beumée ex Heyne	Tree
168	Sterculiaceae	*Sterculia coccinea* Jack	Shrub
169	Sterculiaceae	*Sterculia rubiginosa* Vent. var. *rubiginosa*	Tree
170	Sterculiaceae	*Sterculia rubiginosa* Vent. var. *setistipula* (Merr.) Tantra	Tree
171	Styracaceae	*Styrax benzoin* Dryand. var. *benzoin*	Tree
172	Symplocaceae	*Symplocos crassipes* C.B. Clarke	Tree
173	Symplocaceae	*Symplocos fasciculata* Zoll.	Tree
174	Theaceae	*Pyrenaria acuminata* Planch.	Tree
175	Thymelaeaceae	*Aquilaria malaccensis* Lam.	Tree
176	Thymelaeaceae	*Gonystylus maingayi* Hook.f.	Tree
177	Tiliaceae	*Brownlowia helferiana* Pierre	Tree
178	Tiliaceae	*Microcos fibrocarpa* (Mast.) Burret	Tree
179	Tiliaceae	*Microcos lanceolata* (Miq.) Burret	Tree
180	Tiliaceae	*Pentace triptera* Mast.	Tree
181	Tiliaceae	*Schoutenia accrescens* (Mast.) C.H. Curtis ssp. *accrescens*	Tree
182	Tiliaceae	*Schoutenia kunstleri* King	Tree
183	Trigoniaceae	*Trigoniastrum hypoleucum* Miq.	Tree
184	Ulmaceae	*Gironniera nervosa* Planch.	Tree
185	Ulmaceae	*Gironniera subaequalis* Planch.	Tree
186	Verbenaceae	*Clerodendrum deflexum* Wall.	Shrub
187	Verbenaceae	*Teijsmanniodendron coriaceum* (C.B. Clarke) Kosterm.	Tree

3.7 Comparison with other studies

Compared to plant inventories of several localities in primary lowland forest of Peninsular Malaysia such as in Bukit Nanas Forest Reserve, Kuala Lumpur, the total number of trees and shrubs is quite similar. For instance, Ahmad Fitri et al. [13] reported 183 of trees and shrubs from 232 species of flowering plants in Bukit Nanas Forest Reserve. However, Kochummen et al. [14] reported more than 800 species of trees and shrubs in Pasoh Forest Reserve in the 50-ha plot.

4. Conclusion

This study recorded a total of more than 150 species of trees and shrubs around Kuala Keniam in Taman Negara (Pahang) including nine endemic taxa for Peninsular Malaysia and three additional new records for Pahang state. The findings emphasised that further studies on the flora in Taman Negara need to be conducted as many new records from the collection of plant specimens were found although the expedition was carried out in a short time (four days). Almost all of the plants found in this study are often seen in other lowland dipterocarp forest such as *Baccaurea brevipes*, *Elateriospermum tapos* and *Xerospermum noronhianum*.

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References
[1] Symington, C.F. 2004. *Foresters' Manual of Dipterocarps*. Second edition revised by Ashton, P.S. & Appanah, S. (2004). Malayan Forest Record No. 16. Kepong: Forest Research Institute Malaysia.
[2] Wyatt-Smith, J. 1995. *Manual of Malayan silviculture for inland forest.* Second Edition. Volume 1 & 2. Malayan Forest Records No. 23. Kepong. Forest Research Institute Malaysia.
[3] Turner, I.M. 1997. A catalogue of the vascular plants of Malaya. *Garden's Bulletin Singapore* 47: 1-757.
[4] Ng, F.S.P. (ed.). 1978. *Tree flora of Malaya. Volume 3*. Kuala Lumpur: Longman.
[5] Ng, F.S.P. (ed.). 1989. *Tree flora of Malaya. Volume 4*. Kuala Lumpur: Longman.
[6] Whitmore, T.C. (ed.). 1972. *Tree flora of Malaya. Volume 1*. Kuala Lumpur: Longman.
[7] Whitmore, T.C. (ed.). 1973. *Tree flora of Malaya. Volume 2*. Kuala Lumpur: Longman.
[8] Brummit, R.K. 1992. *Vascular plant families and genera*. Kew: Royal Botanic Gardens.
[9] Whitmore, T.C. 1973. Euphorbiaceae. In. Whitmore, T.C. (ed.). *Tree flora of Malaya*. Volume 2, pp.34-136. Kuala Lumpur: Longman Malaysia Sdn. Berhad.
[10] Ng, F.S. P. 1989. Elaeocarpaceae. In: Ng, F.S.P. (ed.). *Tree flora of Malaya. Volume 4.* pp. 82-97. Kuala Lumpur: Longman.
[11] Kochummen, K.M. 1972. Annonaceae. In: Whitmore, T.C. (ed.). *Tree flora of Malaya*. Volume 1, pp. 61-99. Kuala Lumpur: Longman.
[12] Kochummen, K.M. 1973. Sterculiaceae. In. Whitmore, T.C. (ed.). *Tree flora of Malaya*. Volume 2, pp. 353-382. Kuala Lumpur: Longman Malaysia Sdn. Berhad.
[13] Ahmad Fitri, Z. Mohamad Murshidi, Z., Mohamad Sobre, Z., Latiff, A., Nizam, M. S., Norazlinda, M.. 2018. Suatu senarai awal tumbuhan berbunga di Hutan Simpan Bukit Nanas, Kuala Lumpur. In: Nor Akhirrudin Mahmud, Mohd Rahim Rani, Badrol Hisam Abdul Rahman, Ag. Shaffie Ag. Ahmadni, Mohd Hafiz Hamzah, Arifhadi Johari Affandi & A. Latiff (eds.). Taman Eko-Rimba Kuala Lumpur: Pengurusan Hutan, Persekitaran Fizikal dan Kepelbagaian Biologi. Siri Kepelbagaian Biologi Hutan 24 : 137-160. Kuala Lumpur: Jabatan Perhutanan Semenanjung Malaysia.
[14] Kochummen, K.M., La Frankie, J.V. & Manokaran, N. 1990. Floristic composition of Pasoh Forest Reserve, a lowland rain forest in Peninsular Malaysia. *Journal of Tropical Forest Science* 3(1): 1-13.