Notes of Pioneer Species in Kuala Keniam and Surrounding Area at Taman Negara, Pahang, Peninsular Malaysia

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Abstract. Pioneer species of seed plants are common and important species in the succession. This group of plant occurred everywhere in Peninsular Malaysia especially in the gaps, open areas and roadsides. In this paper we discussed the list of pioneer species found in Kuala Keniam and surrounding area at Taman Negara Pahang. A total of 16 species of pioneers were recorded from Kuala Keniam and surrounding area at Taman Negara Pahang. Macaranga gigantea is among the common species found especially near the base camp of Kuala Keniam. Only two species of pioneers found in the plot studies, namely Balakata baccata and Cratoxylum formosum. The pioneer is uncommon in the forest except in certain forest gaps and disturbed area. Two species, viz. Mallotus floribundus and Melastoma malabathricum were found on the riverbanks.

1. Introduction

The heterogeneity of tropical rain forest harbours many taxa of plants including the climax and pioneer group. The pioneer is usually associated with canopy openness and is very important in the forest succession. The pioneer species is classified as early successional [1] with the short-lived tree species that require gaps for germination, establishment and for showing rapid growth. The trees are extremely light-demanding and intolerant of shade [2] [3] and always occur in the gaps [1]. Certain species of Mallotus spp. and almost all of Macaranga spp. belong to this group [4] [5] where Macaranga is the largest genus of pioneers in the world [6]. This group is also classified as secondary species [2] which usually occur in the secondary forest although some species were recorded in the primary forest such as Macaranga lowii and M. recurvata [4] [7]. There are some changes in taxonomic status such as the
status of certain species of Macaranga e.g., M. bancana) [8], Sapium baccatum transferred to Balakata bacata [9] and some species in Mallotus were resurrected to genus Hancea [10].

Pioneer species of seed plants can be found in the lowland to montane forest in Peninsular Malaysia. Many ecological studies and flora survey in primary lowland dipterocarp forest reported the occurrence of pioneers such as in Pasoh 50 ha plot [11] in Sungai Menyala Forest Reserve [2], in Bangi Forest Reserve [12]. The pioneers were also reported in hill dipterocarp (in Bukit Lagong Forest Reserve by Manokaran & Swaine [2]) and in upper hill dipterocarp forest (in Temengor Forest Reserve by Ahmad Fitri [13] [14]).

In this paper, we listed the pioneer species of trees gathered from the previous herbarium collections and our survey around the Kuala Keniam and surrounding areas in September 2020.

2. Materials and Methods
We also conducted preliminary survey around Kuala Keniam in September 2020. Leaf samples were collected for identification and records. The status of pioneer species was determined from previous literature [13] [14] [12] [15] [11] [2] [16] [17] [18] [19] [20]. Then, we examined the herbarium specimen lodge in the herbarium of Forest Research Institute Malaysia (KEP), herbarium of University of Malaya (KLU), herbarium of Universiti Kebangsaan Malaysia (UKMB) and herbarium of Rijksherbarium (L). Additional information from the herbarium labels such as the habits, general morphology, and occurrence of the taxa in their locality were also extracted.

3. Results and Discussion
Based on the observation in the field and record from the selected herbaria, there were 16 species of pioneers found around Taman Negara Pahang. This entire species also occurs throughout Malaysia’s peninsular in the secondary forest, disturbed areas, and roadsides. In the forest of Kuala Keniam including the area around the base camp, several species were recorded. The details are discussed below.
Figure 1. Pioneers around base camp of Kuala Keniam. A & B. *Macaranga gigantea* with large trilobed leaves, common around the base camp. C. *Mallotus floribundus* (on the right) found in the forest gaps near the canopy walk.

*Arthrophyllum diversifolium, Hibiscus macrophyllus, Macaranga gigantea* (Figure 1) and *Mallotus floribundus*. In the plot, the occurrence of pioneer was very rare. We counted two pioneer species such as *Cratoxylum formosum* and *Balakata baccata* which are only known from a single stem each. One species of *Macaranga* that was common, viz. *M. lowii* is not categorized as pioneer [7] and this species are usually found in primary forest under the canopy [4]. Some species are only inferred from herbarium specimen such as *Macaranga bancana, M. hosei, M. hullettii, Melastoma malabathricum* and *Trema angustifolia*. The pictures of certain species of pioneer are shown in Figure 2 and 3. Based on herbarium records, two species, namely *Mallotus floribundus* and *Melastoma malabathricum* were also reported on the riverbanks in Taman Negara. Meanwhile, *Macaranga diepenhorstii* were collected from the edge of seasonal swamp.

3.1 General discussion
Almost all species of pioneer in Taman Negara Pahang abundantly occurs in disturbed or secondary forests in Peninsular Malaysia. For example, *Arthrophyllum diversifolium* is sometimes abundant in regenerating forest or in badly disturbed sites [21]. *Balakata baccata* and *Cratoxylum formosum* are common in the secondary and primary forest of lowland and hill forest [4] [9] [22]. For *Macaranga*, most of the species are usually common in secondary forest as well as by the roadsides [4]. *Macaranga bancana* is one of the very common species throughout Peninsular Malaysia especially in the secondary
forest and forest gaps [4]. Macaranga diepenhorstii can be found in the secondary forest [23] and along rivers in primary forest [4]. Macaranga gigantea is one of the earliest colonists of degraded land but can also be found in large forest gaps within primary forest [23] and secondary forest [4]. It is regularly found to be one of the dominant tree species in regenerating forests after ten to twenty years following the abandonment of shifting cultivation [24]. Under good soil conditions, this species can grow exceptionally quick and can produce huge quantities of small seeds that are taken by a wide range of small birds and squirrels [23].

Macaranga hosei is a common early successional tree in lowland forests throughout west Malesia [23]. This species is a very high light-demanding pioneer tree and grows quickly in good conditions and can be found in degraded land, logged forest and in large openings within primary forest where it may persist for approximately 30 years [23].

Macaranga hulvetii is one of the very high light-demanding species of Macaranga [23] and is often found in partial shade within primary mixed dipterocarp forests to 600 m a.s.l. [4]. Macaranga hypoleuca is very high light-demanding and colonizes forests after selective logging, and regenerates abundantly following shifting agriculture [23]. This species is common in secondary forest but also can be found in the primary forest [4]. The small tree of M. tanarius is usually common in secondary forest [4]. Mallotus macrostachyus can be found in lowland to lower montane forest [4] especially at open area, very disturbed or burned places and along road sides [23]. The shrub species of Melastoma malabathricum can tolerate poor soils and is considered as weedy or invasive species [14]. For Trema angustifolia, this species is one of the most abundant species and always growing gregariously in the degraded sites of logging road, burning, cultivation and erosion sites [25].

As a comparison, a study by Ahmad Fitri [26] in Tranum Forest Reserve, Pahang, which covers the primary hill and upper hill dipterocarp forest, only four species of pioneer were listed during the survey namely Arthrophyllum diversifolium, Balakata baccata, Macaranga hypoleuca and Mallotus peltatus. In logged over lowland dipterocarp forest at Kluang Forest Reserve, Johor, Ahmad Fitri [27] also reported four pioneer species which were only found at the gap areas viz. Arthrophyllum diversifolium, Campnosperma auriculatum, Cratoxylum maingayi and Macaranga sp. In contrast, many species of pioneer were reported during the flora survey by Ahmad Fitri [28] in logged-over lowland dipterocarp forest at Remen Cereh Forest Reserve. The species that can be found includes Balakata baccata, Commersonia bartramia, Endospermum diadenum, Ficus fulva, F. grossularioides var. grossularioides, Macaranga denticulata, M. gigantea, M. hosei, M. laciniata, M. triloba, Maesa ramentacea and Mallotus paniculatus.

The list of all species of pioneers in Kuala Keniam and surrounding area of Taman Negara is as below and arranged in alphabetical order. The brief description of gross morphology, distribution in Peninsular Malaysia, habitat, uses and local names are includes.

3.2 The list of pioneer species

3.2.1 Arthrophyllum diversifolium Blume (Araliaceae)

Bijd. (1826) 879; DC. Prod. 3 (1830) 266; Miq. F1. Ind. Bat. 1.1 (1856) 767; Sum. (1861) 340, Arthrophyllum ovalifolium Jungh. & de Vriese, Fl. Malay Penins. 1(1922): 885; Arthrophyllum congestum Ridl., Fl. Malay Penins. 1(1922): 887; Stone, Tree Fl. Malaya 3 (1978): 17.

Small to medium-sized tree to 12 m tall; trunk to 20 cm DBH. Sparsely branched in age, the branches of 2 types (vegetative with spiral phylloxy or flowering with opposite or whorled leaves); leaves of flowering branches smaller with smaller and fewer leaflets but still with mostly 5-7 pairs of lateral nerves.

**Distribution in Peninsular Malaysia:** Throughout.

**Habitat:** forest margins or secondary forest in lowlands and hills.

**Local names:** Susun pelepah, Jolok hantu.
Uses: Fire wood. According to Philipson [29] concoctions of the root and bark are reported to have medicinal properties, including a remedy for syphilis, and the plant has stupefying and poisonous properties.

Materials examined: Kuala Keniam, Z. Ahmad Fitri et al. s.n., September 2020.

3.2.2 Balakata baccata (Roxb.) Esser (Euphorbiaceae)

Balakata baccata (Roxb.) Esser, Blumea 44 (1999): 155; Sapium baccatum Roxb. [Hort. Bengal. (1814) 69, nomen] Fl. Ind. ed. 1832, 3 (1832): 694; Ridl., Fl. Malay Penins. 3 (1924): 315; Burkhill, Dict. Econ. Prod. Malay Pen. 2 (1935): 1960; Corner, Wayside Trees 1 (1940): 276; Wyatt-Sm., Malay. For. Rec. 23, III-7 (1964): 14; Malay. For. Rec. 17 (1965): 51, 113, 345; Whitmore, Tree Fl. Malaya 2 (1973): 128-129.

Tree to 20 m tall, DBH to 50 cm, bole bending and twisting with many knobs, with irregular buttresses. Bark with deep longitudinal cracks and fissures; inner bark fibrous. Sapwood cream to white, soft, with a sour to sweet smell. Twigs usually in whorls. Stipules small, early caducous and rarely seen. Leaves are pinkish brown when young, withering yellow; blade mostly ovate, rarely elliptic, 8-20 cm x 4-10 cm, upper surface hardly shining, lower surface pale-papillate. Inflorescences in terminal whorls and in the axils of few uppermost leaves. Staminate cymules c. 5-flowered. Staminate flowers: pedicel 0.5–1.5 mm long. Pistillate flowers 10–13 per thyrse branch or sometimes absent. Fruits (1–)2-seeded, circular in shape, flattened. Seeds blackish.

Distribution in Peninsular Malaysia: Throughout.

Habitat: Lowland and hill forests.

Local names: Ludai.

Uses: Timber.

Materials examined: Kuala Keniam, Z. Ahmad Fitri, AFZ s.n., September 2020; Kuala Tahan, M.Y. Chew et al., TN 015, 2 October 2013, (KEP), TN 200, 3 October 2013, (KEP).

3.2.3 Cratoxylum formosum (Jack) Dyer (Guttiferae)

Dyer. Fl. Bri. Ind. 1 (1874): 258; Gogelein, Blumea 15 (1965): 467; Ridl. Fl. Malay. Penins. 1 (1922): 153; Kochummen, Tree Fl. Malaya 2 (1973): 251.

Medium to large tree to 40 m tall, deciduous. Twigs angled and swollen at nodes. Leaves stalk 0.6-1.6 cm long; blade membranous, narrowly to broadly elliptic, 4.5-16.0 cm x 3.0-7.0 cm; apex blunt or shortly pointed; base acute; reddish when young; midrib sunken above; secondary nerves 6-11 pairs. Flowers borne on the bare twigs, fragrant, petal pale pink. Fruit capsule, the sepals covering only the very base of the capsule.

Distribution in Peninsular Malaysia: Throughout.

Habitat: Lowland and hill forests.

Local names: Derum.

Uses: Timber and ornamental.

Materials examined: Kuala Keniam, Z. Ahmad Fitri, AFZ s.n., September 2020; Kuala Teku, Tahan Woods, T.C. Whitmore, FRI 4830, 22 February 1968, (KEP).

3.2.4 Hibiscus macrophyllus Roxb. ex Hornem. (Malvaceae)

Hort. Hafn. Suppt. (1819): 149; Ridl. Fl. Malay. Penins. 1(1922): 258; Kochummen, Tree Fl. Malaya 1 (1972): 312.

Small to medium size trees to 25 m tall. Twigs, leaf stalks and inflorescences finely with white hairs and bristly with long and tufted hairs. Leaves round, apex acuminate, base heart shaped. Flowers axillary, solitary, in few flowered cymes by reduction of upper leaves. Fruits ovoid to obovoid, bristly.

Distribution in Peninsular Malaysia: Melaka northwards.
Habitat: Common in primary and secondary lowland and hill forests.
Local names: Tutor.
Uses: Firewood.
Materials examined: Kuala Tahan, M.Y. Chew et al., TN 027, 2 October 2013, (KEP); Observed (single tree) in base camp of Kuala Keniam.

3.2.5 Macaranga bancana (Miq.) Müll.Arg. (Euphorbiaceae)
Macaranga bancana (Miq.) Müll.Arg. in DC., Prodr. 15, 2 (1866): 990. S.J.Davies, Harvard Pap. Bot. 6 (2001): 387; Macaranga triloba auct. non. (Thunb.) Müll.Arg.; Merr., Enum. Philipp. Flow. Pl. (1923): 448; Ridl., Fl. Malay. Penins. 3 (1924): 298; Corner, Wayside Trees (1940): 304; Whitmore, Tree Fl. Malaya 2 (1973): 107.

Small tree to 20 m tall, twigs glabrous or rarely with scattered minute ferrugineus hairs towards the apex, not glaucous, hollow, housing ants. Leaves blades broadly ovate, trilobed to rarely just tricuspid. Staminate inflorescences furfuraceous, reddish-brown, paniculate, erect. Staminate flowers, sessile; sepals fused. Pistillate flowers solitary in bract axils; calyx urceolate, stigma not dissected. Fruits bright green and slightly reddish on the sutures when fresh, subglobose, compressed, sessile.

Distribution in Peninsular Malaysia: Throughout.
Habitat: This species occurs in a broad range of habitats in the lowlands below 700 m. It is common on both clay and sandy soils, although clearly prefers the latter, which may in part be due to the water status of those soils, as it is also quite a common colonist of wet gullies along roadsides, alluvial forest areas, and the margins of degraded peat swamp forests.
Local names: Mahang merah, Mahang.
Uses: Firewood.
Materials examined: Kuala Tahan, J. Wyatt-Smith, KEP 77793, 3 March 1958, (KEP); Ulu Sepia, K. Aur Ranger Post, T.C. Whitmore, FRI 15315, 16 July 1970, (KEP).

3.2.6 Macaranga diepenhorstii Müll.Arg. (Euphorbiaceae)
Macaranga diepenhorstii (Miq.) Müll.Arg. in DC., Prodr. 15, 2 (1866): 998; Pax & K.Hoffm. in Engl., Pflanzenr. IV.147.vii (1914): 337; Whitmore, Tree Fl. Malaya 2 (1973): 111; in Airy Shaw, Kew Bull. 36 (1981): 321; Whitmore, Gen. Macaranga Prodr. (2008): 122. Mappa diepenhorstii Miq., Fl. Ind. Bat. Suppl. (1861): 457. Tanarius diepenhorstii (Miq.) Kuntze, Rev. Gen. 2 (1891): 620.

Small to medium size trees to 20 m tall. Twigs near tip drying angled; terete further from the tip, smooth, glabrous, dark brown with pale stipule scars. Stipules ovate oblong, apex acute, cucullate, warm brown, papery, glabrous, erect, subpersistent. Leaves: petioles 15-25 cm long, furfuraceous becoming glabrous, weakly kneed at both ends; blades ovate, 13-25 cm x 10-17 cm, papery, base broadly rounded, margin crenate and distantly glandular dentate, apex acute, drying dark brown, below closely finely granular glandular and glabrous except for sparse hairs on main nerves, secondary nerves curved, tertiaries closely scalariform and clearly visible especially below. Staminate inflorescences diffuse sinuous narrow panicles to 18 cm long; peduncle to 5 cm; flower clusters on 1 cm catkin-like tertiary branches, some with 1.0 cm basal stalk, towards tips these with overlapping erect persistent bracteoles subtending clusters of 4–8 flowers. Staminate flowers globose, sepals 2, glabrous; stamens 2, anthers 4-locular. Pistillate inflorescences as staminate but smaller, racemose, apical catkins more open; flowers solitary. Infructescences with 1 cm solitary infructescences. Fruits dicoccous, 0.5 x 1.0 cm, splitting, thinly woody, black granular glandular; pedicel 1.0 cm, glabrous; slender; styles 2, apical, slightly flattened, recurved. Seeds round, 0.2 cm, coarsely ridged, with sarcotesta.

Distribution in Peninsular Malaysia: Kelantan, Terengganu, Perak, Pahang, Selangor and Melaka.
Habitat: Secondary forest [23], also often along rivers in primary forests [4].
Local names: Mahang.
Uses: Firewood.
Materials examined: Sungai Keniam, T.C. Whitmore, FRI 4945, 3 March 1968, (KEP);

3.2.7 Macaranga gigantea (Rchb.f. & Zoll.) Müll.Arg. (Euphorbiaceae)
Macaranga gigantea (Rchb.f. & Zoll.) Müll.Arg. in DC., Prodr. 15, 2 (1866): 995; Corner, Wayside Trees (1940): 265; Whitmore, Malay. Nat. J. 20 (1967): 94, 96; Airy Shaw, Kew Bull. 26 (1972): 288; Whitmore, Tree Fl. Malaya 2 (1973): 107; in Airy Shaw, Kew Bull., Addit. Ser. 4 (1975): 157; Kew Bull. 36 (1981): 321; Airy Shaw, Kew Bull. 37 (1982): 26; S.J.Davies, Harvard Pap. Bot. 6 (2001): 427; Whitmore, Gen. Macaranga Prodr. (2008): 137.; Macaranga incisa Gage, Rec. Bot. Surv. India 9 (1922): 245; Ridl., Fl. Malay. Penins. 3 (1924): 301; Whitmore & Airy Shaw, Kew Bull. 25 (1971): 241.

Small to medium-sized tree to 20 m tall; twigs stout. Leaves blades huge, broadly ovate, often much larger in saplings, thickly coriaceous, trilobed. Staminate inflorescences paniculate, erect. Staminate flowers shortly pedicellate; sepals free. Pistillate inflorescences paniculate, erect, densely branched, Pistillate flowers c. 2 mm long; calyx urceolate, densely minutely golden pubescent. Fruits small, many, in 4 lobes with green stickiness on outside

Distribution in Peninsular Malaysia: Throughout.
Habitat: Disturbed lowland and hill forest, secondary forest and roadside.
Local names: Kobin, Mahang gajah.
Uses: Not known.
Materials examined: Sungai Riul, B. Everett, FRI 14449, 14 July 1970, (KEP); Ulu Sungai Sat, Mohd. Shah & Mohd. Noor, MS 1887, (KEP); Sungai Tembeling, F.S.P. Ng, FRI 020876 A, 24 February 1973, (KEP); observed near base camp of Kuala Keniam, September 2020.

3.2.8 Macaranga hosei King ex Hook.f. (Euphorbiaceae)
Macaranga hosei King ex Hook.f., Fl. Brit. India 5 (1887): 449; Pax & K.Hoffm. in Engl., Pflanzenr. IV.147.vii (1914): 309; Ridl, Fl. Malay. Penins. 3 (1924): 298; Airy Shaw, Kew Bull. 26 (1972): 289; Whitmore, Tree Fl. Malaya 2 (1973): 111; in Airy Shaw, Kew Bull., Addit. Ser. 4 (1975): 152; S.J.Davies, Harvard Pap. Bot. 6 (2001): 429.

Tree to 25 m tall and 30 cm DBH; twigs terete, glabrous, usually densely glaucous. Leaves blades broader than long to almost rounded, slightly convex, deeply trilobed. Staminate inflorescences erect narrow panicles often extending above the leaves. Staminate flowers, yellowish green, shortly pedicellate; sepals free. Pistillate inflorescences erect narrow panicles often extending above the leaves. Pistillate flowers c. 1.5 mm long. Fruits bilocular, green or yellowish green at maturity. Seeds black, shallowly pitted, encaised in a fleshy violet aril.

Distribution in Peninsular Malaysia: Throughout.
Habitat: Lowland and hill forests including secondary forest.
Local names: Mahang.
Uses: Not known.
Materials examined: Sungai Riul, B. Everett, FRI 14450, 14 July 1970, (KEP).

3.2.9 Macaranga hullettii King ex Hook.f. (Euphorbiaceae)
Macaranga hullettii King ex Hook.f., Fl. Brit. Ind. 5 (1887): 452; Pax & K.Hoffm. in Engl., Pflanzenr. IV.147.vii (1914): 383; Ridl. Fl. Malay. Penins. 3 (1924): 301; Whitmore, Tree Fl. Malaya 2 (1973): 107; Whitmore in Airy Shaw, Kew Bull., Addit. Ser. 4 (1975): 147; S.J.Davies, Harvard Pap. Bot. 6 (2001): 404.

Small tree to 15 m tall; twigs usually glabrous or with scattered to dense erect silvery hairs, hollow, housing ants. Leaves blades narrowly ovate to ovate, unlobed or tricuspid. Staminate inflorescences paniculate, erect, light green drying black. Staminate flowers 20–35 per cluster, sessile. Pistillate inflorescences, unbranched with the flowers/fruits clustered at the distal end of the axis. Pistillate flowers
3–5 by c. 0.2 cm. Fruits subglobose, sessile, covered in greenish-yellow, sticky exudate. Seeds ovoid, black, coarsely grooved, encased in a fleshy bright pinkish-red aril.

**Distribution in Peninsular Malaysia:** Kelantan, Terengganu, Perak, Pahang, Selangor, Negeri Sembilan, Melaka and Johor.

**Habitat:** Occurred in primary and secondary lowland and hill forests.

**Local names:** Mahang.

**Uses:** Not known.

**Materials examined:** Sungai Keniyam, T.C. Whitmore, FRI 8513, 3 March 1968, (KEP); Kuala Tahan Woods, T.C. Whitmore, FRI 4768, 20 February 1968 (KEP); Sungai Tembeling, Kuala Keniam, T.C. Whitmore, FRI 8582, 6 March 1968 (KEP).

### 3.2.10 Macaranga hypoleuca (Rchb.f. & Zoll.) Müll.Arg.

*Mucuna hypoleuca* (Rchb.f. & Zoll.) Müll.Arg. in DC., Prodr. 15, 2 (1866): 992; Hook.f., Fl. Brit. India 5 (1887): 448; Ridl., Fl. Malay. Penins. 3 (1924): 300; Corner, Wayside Trees (1940): 266; Airy Shaw, Kew Bull. 26 (1972): 289; Whitmore, Tree Fl. Malaya 2 (1973): 106; in Airy Shaw, Kew Bull., Addit. Ser. 4 (1975): 147; S.J.Davies, Harvard Pap. Bot. 6 (2001): 407.

Tree to 20 m tall and 30 cm DBH; twigs slightly angular at the apex especially when dry, glabrous or with scattered minute ferrugineous hairs towards the apex. Leaves blades broader than long to almost rounded, usually slightly convex, deeply trilobed. Staminate inflorescences erect panicles. Staminate flowers 10–15 per cluster, shortly pedicellate; sepals fused. Pistillate inflorescences 5–15 cm long. Pistillate flowers c. 0.2–0.3 cm long. Fruits 3-locular, sub-globose, bluish-green, glaucous.

**Distribution in Peninsular Malaysia:** Throughout.

**Habitat:** Secondary forest in lowland and hill forests.

**Local names:** Mahang putih.

**Uses:** Not known.

**Materials examined:** Kuala Tahan, M.Y. Chew et al., TN 053, 2 October 2013, (KEP); Kuala Keniam, Z. Ahmad Fitri et al., AFZ s.n., September 2020.

### 3.2.11 Macaranga tanarius (L.) Müll.Arg.

*Mucuna tanarius* (L.) Müll.Arg. in DC., Prodr. 15, 2 (1866): 997; Enum. Philipp. Flow. Pl. (1923): 443; Ridl., Fl. Malay. Penins. 3 (1924): 302; Backer & Bakh.f., Fl. Java 1 (1963): 488; Airy Shaw, Kew Bull. 23 (1969): 99; Kew Bull. 26 (1971): 291; Kew Bull. 31 (1976): 395; Whitmore, Gdn’s. Bull. Sing. 31 (1978): 56; Tree Fl. Malaya 2 (1973) 111; in Airy Shaw, Kew Bull., Addit. Ser. 4 (1975): 158; in Airy Shaw, Kew Bull. 36 (1981): 322; Whitmore, Gen. Macaranga Prodr. (2008): 255.

Small trees. Twigs finely pubescent or furfuraceous. Stipules broadly elliptic, apex acuminate to caudate, puberulous or furfuraceous, sometimes just on midline, sometimes becoming glabrous. Leaves: petioles slightly furfuraceous or pubescent, at least at tip; blades ovate to 15.0 cm x 12.0 cm, usually smaller, papery, base rounded, to 3 cm peltate, margin distantly finely toothed, apex acute to acuminate, drying dark chocolate brown, furfuraceous to pubescent on nerves below, sometimes just near petiole insertion, granular glands minute, inconspicuous, sparse to dense, golden or blackish. Staminate inflorescences 2 to 3 orders of furfuraceous axes, sometimes with axillary branches; bracteoles ovate, size very variable, apex acute to acuminate or caudate, margin usually distantly deeply toothed, both surfaces finely pubescent or rarely (almost) glabrous, concave, papery, with a conspicuous network of nerves, usually overlapping, subtending clusters of 5-12 flowers developing in sequence, and from which a next order axis often later developing; clusters grouped. Staminate flowers: sepals pubescent. Infructescences with peduncle and bracts furfuraceous. Fruits variously granular glandular.

**Distribution in Peninsular Malaysia:** Throughout.

**Habitat:** Common in secondary forests.

**Local names:** Mahang.
Uses: Not known.
Materials examined: Sungai Sat, Ulu Tembeling, M.R. Henderson, SFN 22028; 20 July 1929, (KEP);
Kuala Tahan, M.Y. Chew, TN 068, 2 Oktober 2013, (KEP);

3.2.12 Mallotus floribundus (Blume) Müll.Arg. (Euphorbiaceae)
Mallotus floribundus (Blume) Müll.Arg., Linnaea 34 (1865): 187; Ridl., Fl. Malay Penins. 3 (1924): 290; Pax & K.Hoffm. in Engl. & Harms; Burkill, Dict. Econ. Prod. Malay Penins. 2 (1935): 1395; Corner, Wayside Trees (1940): 271; Backer & Bakh.f., Fl. Java 1 (1964): 483; Airy Shaw, Kew Bull. 21 (1968): 385; Kew Bull. 26 (1972): 305; Whitmore, Tree Fl. Malaya 2 (1973): 113.

Small trees up to 15 m tall, DBH up to 20 cm. Branches lenticellate, glabrescent, gland-dotted on young parts. Leaves alternate to apically subopposite, peltate, glaucous, blade ovate to broadly ovate to orbicular. Staminate inflorescences up to 23 cm long. Staminate flowers 2–6 mm in diameter, white-yellowish. Pistillate inflorescences up to 22 cm long. Pistillate flowers pale green to whitish. Fruit an echinate, lobed capsule, green, glabrous to hairy.

Distribution in Peninsular Malaysia: Pahang northward and Johor.
Habitat: Lowland forest, common on river banks.
Local names: Balik angin.
Uses: According to van Welzen [23], the rather aromatic male flowers are used in Java with rice-flour in making scented medicinally applied powders. In Peninsular Malaysia, a decoction of the root is administered against fever, after childbirth, and against stomachache and cholera. In Sumatra, the tough wood is used to make small objects.

Materials examined: Sungai Keniam, T.C. Whitmore, FRI 8516, 3 March 1968; Sungai Tahan, L.E. Teo & G. Pachiappan, KL 3141, 29 April 1975, (KLU), Kuala Keniam, Ahmad Fitri et al., AFZ s.n., 7 September 2020.

3.2.13 Mallotus macrostachyus (Miq.) Müll.Arg. (Euphorbiaceae)
Mallotus macrostachyus (Miq.) Müll.Arg. in DC., Prodr. 15, 2 (1866): 963; Airy Shaw, Kew Bull., Addit. Ser. 4 (1975): 165; Corner, Wayside Trees, ed. 3, 1 (1988): 306; Slik, Priyono & Welzen, Gdn’s. Bull. Singapore 52 (2000): 59; S.E.C.Sierra & Welzen, Blumea 50 (2005): 254.

Shrubs to small trees up to 10 m tall, dioecious, occasionally monoecious; crown spreading, flat. Outer bark finely fissured, soft, brownish grey, inner bark fibrous inwards, yellowish green, sapwood white. Stipules triangular, persistent, margin entire, apex acute. Leaves alternate to apically subopposite; petiole 0.2–3.0 cm; blade subpeltate, broadly ovate to ovate, 8.5-25.0 cm x 7.0-20.0 cm, base truncate, rounded, to slightly cuneate, margin dentate, or serrate, rarely shallowly 2-lobed at widest part of blade, upper surface dark green, lower surface brownish grey, domatia with a dense tuft of woolly hairs, 3-nerved, nerves 7 or 8 per side. Inflorescences axillary or terminal, unisexual or bisexual; bracts triangular, persistent, margin entire, bracteoles absent. Staminate inflorescences up to 112 cm long, with 1 or 2 flowers per node. Staminate flowers fragrant; pedicels 0.3-0.4 cm long; sepals 3 or 4, anthers light yellow; pistilode present. Pistillate inflorescences spikes, up to 70 cm long. Pistillate flowers sessile; calyx 4- or 5-lobed; ovary 3-locular, stigmas dark brown. Fruits 0.1-0.15 cm x 1.0–1.3 cm, light green with brown tomentum, spines numerous, straight, thin, less hairy.

Distribution in Peninsular Malaysia: Throughout.
Habitat: Lowland to lower montane forest at 1200 m [4]. Locally common in mostly in open, often very disturbed or burned places, along road and river sides and swampy areas [23].

Local names: Balik angin.
Uses: According to van Welzen [23], the leaves are used as an antidote against snake-poison. The wood is used as firewood.

Materials examined: Tembeling, R.E. Holttum, SFN 24712, 24 April 1931, (KEP)
3.2.14 Melastoma malabathricum L. (Melastomataceae)  
Linn., Species Plantarum 1(1753): 390; Ridl. Fl. Malay. Penin. 1(1922): 764.

Shrub to 3 m tall. Leaves opposite, blade elliptic to lanceolate, bristly on the underside. Flowers are up to 8 cm wide, with petals that are light to dark magenta-pink, or occasionally white. Fruits are round, and open irregularly when ripe to expose dark blue pulp with many orange seeds. The fruits are edible but rather tasteless, with the pulp staining the tongue blue-black.  
**Distribution in Peninsular Malaysia:** Throughout.  
**Habitat:** Secondary forest in lowland and hill forest; including open area and road side.  
**Local names:** Senduduk.  
**Uses:** The bark is utilised for treating dysentery and toothache. A decoction of the leaves is used to treat diarrhoea, dysentery, indigestion, leucorrhoea, stomach-ache, piles, thrush, and weeping sores from insect stings. The leaves can be applied to cuts, painful arthritic joints, swellings and wounds too.  
**Materials examined:** Kuala Tahan, Sungai Tembeling, B. Everett, FRI 14474, 14 July 1970, (KEP); Sungai Tahan, Mohd. Shah & Ahmad Shukor, MS 2617, 14 August 1972, (KEP); Sungai Teku, E.J. Strugnell & Sow, KEP 42907, 28 July 1936, (KEP); Mohd. Shah, MS 1333, 20 February 1968, (KEP).

3.2.15 Trema angustifolia (Planch.) Blume  
Mus. Bot. Ludg. Bat. 2 (1852): 58. Ridl. Fl. Malay Penins. 4 (1924): 319. Soepadmo. Tree Fl. Malaya 2 (1973): 421.

Small, shrubby tree with dropping and slender branches. Leaves narrow, ovate-lanceolate, 4. long tipped; base symmetrical, rounded. Inflorescences condensed, racemose. Fruits ovoid, small, fresh green when young, ripening to red and black.  
**Distribution in Peninsular Malaysia:** Kedah, Pulau Pinang, Perak, Pahang, Selangor, Negeri Sembilan and Melaka.  
**Habitat:** Forest edges, along roadsides from lowland to lower montane forest.  
**Local names:** Menarong, Mengkirai.  
**Uses:** Not known.  
**Materials examined:** Kuala Tahan, Bukit Tersek, Mohd. Shah & Ahmad Shukor, MS 2639, 12 August 1972, (KEP); Lata Berkoh, K.C. Ang, FRI 23432, 30 April 1974, (KEP).

3.2.16 Vitex pinnata L.  
Linn. Species Plantarum (1753): 638; Ridl., Fl. Malay Penins. 2 (1923): 634; Corner, Wayside Trees (1940): 710; Kochummen, Tree F. Malaya 3 (1978): 311.

Medium-sized tree up to 20 m tall. Leaves palmately compound with almost sessile leaflets, blade elliptic, usually with 3 leaflets (sometimes 1-5 leaflets). Flowers in terminal panicles with greenish brown prominent bracts. Fruit round, green, ripening puple to black.  
**Distribution in Peninsular Malaysia:** Throughout.  
**Habitat:** Disturbed forest in lowland and hill forests.  
**Local names:** Leban, Halban.  
**Uses:** Not known.  
**Materials examined:** Sungai Tembeling, T.C. Whitmore, FRI 15388, 22 July 1970, (KEP); s. loc., K.C. Ang, FRI 23385, 26 April 1975, (KEP), Kuala Tahan, M.Y Chew et al., TN 009, 2 October 2013, (KEP), Ulu Sungai Sat, Mohd. Shah & Mohd. Noor, MS 1809A, 11 July 1970, (KEP).
Figure 2. Herbarium specimen of some pioneer species in Taman Negara, Pahang. A. *Balakata baccata*, B. *Cratoxylum formosum*, C. *Hibiscus macrophyllus*, D. *Macaranga bancana*.
Figure 3. Herbarium specimen of some pioneer species in Taman Negara, Pahang. A. *Macaranga diepenhorstii*. C. *M. hosei*. D. *M. hullettii*. 
Figure 4. Herbarium specimen of some pioneer species in Taman Negara, Pahang. A. *Macaranga hypoleuca*. B. *Macaranga tanarius*, C. *Mallotus floribundus*. D. *M. macrostachyus*.
**Figure 5.** Herbarium specimen of some pioneer species in Taman Negara, Pahang. A. *Melastoma malabathricum*. B. *Vitex pinnata*.

### 4. Conclusion
The forested area of Kuala Keniam and surrounding area of Taman Negara Pahang have recorded 16 species of pioneer including a single shrub of *Melastoma malabathricum*. The pioneers can be found in the disturbed area and are very rare in the plot ecology. Pioneer species of trees are uncommon in Kuala Keniam and surrounding area except for *Macaranga gigantea* which is common near the base camp. These findings support the status of the forest around the area as primary and undisturbed.

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