

THE HEART OF BORNEO SERIES 15

Fruits of 100 Angiosperms Plants of The Heart of Borneo



FOREST DEPARTMENT SARAWAK



The Heart of Borneo Series 15

SEEDS OF 100 ANGIOSPERM PLANTS IN THE HEART OF BORNEO

EDITORS

MEEKIONG, K.
RUNI, S.P.
ISMAILI, G.
SALINA, H.
AWANG AHMAD, Z.A.B.
SALLEH, H.
TEO, S.P.
NUR SAFINAS, J.
YAZID, K.

FOREST DEPARTMENT SARAWAK



Published by
FOREST DEPARTMENT SARAWAK

The Heart of Borneo Series 15: Seeds of 100 Angiosperm Plants in the Heart of Borneo Areas

First Published: 2023

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Editorial team: Meekiong, K., Runi, S.P., Ismaili, G., Salina, H., Awang Ahmad, Z.A.A.B., Salleh, H., Teo, S.P., Nur Safinas, J. & Yazid, K.

ISBN: 978-967-26032-3-8

Printed in Malaysia by
SUFRA QADRY HOLDINGS SDN BHD
PARCELS LOT NO. B142 & B143, GROUND FLOOR, BLOCK B
SECTION 64, KTLD, ICOM SQUARE, JALAN PENDING,
93450, KUCHING SARAWAK

Cover: fruit of *Vatica chartacea*
Back cover: belian fruit (*Eusideroxylon zwageri*)



Contents

Contents [iii]

Foreword [v]

Preface [vi]

What is the Heart of Borneo (HoB) Initiative? [1]

Seeds [4]

Selection of Species [5]

Achariaceae: *Pangium edule* [6]

Anacardiaceae: *Semecarpus heterophylla* [7]

Annonaceae: *Polyalthia hypoleuca* [8]

Aquifoliaceae: *Ilex cymosa* [9]

Araceae: *Aglaonema nitidum* [10]

Araceae: *Amorphophallus borneensis* [11]

Araceae: *Arisaema filiforme* [12]

Araceae: *Podolasia stipitata* [13]

Arecaceae: *Calamus sabalensis* [14]

Arecaceae: *Eleiodoxa conferta* [15]

Arecaceae: *Iguanura palmuncula* [16]

Arecaceae: *Licuala mantanensis* [17]

Arecaceae: *Pholidocarpus majadum* [18]

Bonnetiaceae: *Ploiarium alternifolium* [19]

Burseraceae: *Canarium littorale* [20]

Clusiaceae: *Calophyllum lanigerum* [21]

Costaceae: *Hellenia speciosa* [22]

Cucurbitaceae: *Hodgsonia macrocarpa* [23]

Cyperaceae: *Mapania meditensis* [24]

Cyperaceae: *Mapania wallichii* [25]

Dipterocarpaceae: *Anisoptera grossivenia* [26]

Dipterocarpaceae: *Cotylelobium melanoxyton* [27]

Dipterocarpaceae: *Dipterocarpus condorensis* [28]

Dipterocarpaceae: *Dipterocarpus crinitus* [29]

Dipterocarpaceae: *Dipterocarpus palembanicus* [30]

Dipterocarpaceae: *Dipterocarpus lowii* [31]

Dipterocarpaceae: *Dryobalanops beccarii* [32]

Dipterocarpaceae: *Dryobalanops oblongifolia* [33]

Dipterocarpaceae: *Hopea kerangasensis* [34]

Dipterocarpaceae: *Shorea seminis* [35]

Dipterocarpaceae: *Shorea beccariana* [36]

Dipterocarpaceae: *Vatica congesta* [37]

Dipterocarpaceae: *Vatica globosa* [38]

Dipterocarpaceae: *Vatica havilandii* [39]

Dipterocarpaceae: *Vatica sarawakensis* [40]

Dipterocarpaceae: *Vatica umbonata* [41]

Elaeocarpaceae: *Elaeocarpus pedunculatus* [42]

Euphorbiaceae: *Dimorphocalyx muricatus* [43]

Euphorbiaceae: *Homalanthus populneus* [44]

Fabaceae: *Pithecellobium jiringa* [45]

Fabaceae: *Callerya nieuwenhuisii* [46]

Fagaceae: *Castanopsis hypophoenicea* [47]

Fagaceae: *Lithocarpus pseudokunstleri* [48]

Flagellariaceae: *Flagellaria indica* [49]

Gentianaceae: *Utania racemosa* [50]

Hypoxidaceae: *Molineria latifolia* [51]

Lamiaceae: *Callicarpa pentandra* [52]

Lamiaceae: *Vitex pubescens* [53]

Lauraceae: *Beilschmiedia glabra* [54]

Lauraceae: *Eusideroxylon zwageri* [55]

Lauraceae: *Litsea globularia* [56]

Malvaceae: *Commersonia bartramia* [57]

Malvaceae: *Durio griffithii* [58]

Malvaceae: *Hibiscus tiliaceus* [59]

Melastomataceae: *Dissochaeta pulchra* [60]

Melastomataceae: *Dissochaeta reformata* [61]

Melastomataceae: *Medinilla speciosa* [62]

Melastomataceae: *Pternandra cogniauxii* [63]

Meliaceae: *Aphanamixis polystachys* [64]

Meliaceae: *Sandoricum koetjape* [65]

Moraceae: *Artocarpus elasticus* [66]

Moraceae: *Ficus grossularioides* [67]

Moraceae: *Ficus francisci* [68]

Moraceae: *Ficus punctata* [69]

Musaceae: *Musa campestris* [70]

Musaceae: *Musa juwiniana* [71]

Musaceae: *Musa lawitensis* [72]

Myrtaceae: *Rhodomyrtus tomentosa* [73]

Nepenthaceae: *Nepenthes gracilis* [74]

Ochnaceae: *Euterms minor* [75]

Oxalidaceae: *Sarcotheca glauca* [76]

Pandanaceae: *Benstonea affinis* [77]

Pentaphyllaceae: *Adinandra dumosa* [78]

Pentaphyllaceae: *Eurya acuminata* [79]



Phyllantaceae: *Antidesma tomentosum* [80]
Phyllantaceae: *Baccaurea reticulata* [81]
Phyllantaceae: *Bridelia glauca* [82]
Phyllantaceae: *Glochidion sericeum* [83]
Piperaceae: *Piper aduncum* [84]
Plantaginaceae: *Brookea tomentosa* [85]
Rosaceae: *Rubus moluccana* [86]
Rubiaceae: *Hydnophytum formicarum* [87]
Rubiaceae: *Lasianthus furcatoides* [88]
Rubiaceae: *Gardenia tubifera* [89]
Rubiaceae: *Ridsdalea grandis* [90]
Rubiaceae: *Timonius flavescens* [91]
Rubiaceae: *Urophyllum glabrum* [92]

Salicaceae: *Casearia capitellata* [93]
Sapindaceae: *Nephelium cuspidatum* [94]
Sapindaceae: *Nephelium maingayi* [95]
Sapindaceae: *Pometia pinnata* [96]
Simaroubaceae: *Eurycoma longifolia* [97]
Simaroubaceae: *Samadera indica* [98]
Tetrameristaceae: *Tetramerista glabra* [99]
Thymelaeaceae: *Gonystylus affinis* [100]
Vitaceae: *Pterisanthes polita* [101]
Zingiberaceae: *Alpinia capitellata* [102]
Zingiberaceae: *Etlingera pyramidosphaera* [103]
Zingiberaceae: *Sundamomum dictyocoleum* [104]
Zingiberaceae: *Plagiostachys albiflora* [105]

Selected References [106]
Acknowledgement [108]
Photo Credit [109]
Abbreviation [110]
Glossary [111]

FOREWORD

The Heart of Borneo (HoB) Initiative is a voluntary transboundary conservation project that spans three nations (Malaysia, Brunei, and Indonesia) and covers approximately 220,000 square kilometres. The conservation of Borneo's unique biodiversity is a vital component of the HoB Initiative effort, as the region is home to numerous native species that are rare and often indigenous to the region.

The biological richness of the HoB area is reflected in the diversity of the numerous fruits and seeds depicted in this magnificent work, which is vital for germplasm conservation. Since ancient times, humans have taken wild variety germplasm and domesticated it, which is the process of bringing wild species under human management. Plant domestication is a continual process that is one of the earliest and most important phases in producing a new type of crop. The majority of our daily requirements are met by a limited number of plants. The majority of today's cultivated plants are descended from wild species. In fact, less than 200 of the hundreds of fruit and vegetable species farmed for food account for a significant portion of global food production. However, new challenges such as climate change, invasive species, pollution, city sprawl, or exploitation of land lead these species to weaken, reducing their ability to produce or live in the future. Hundreds of plant species and variations that provided food for our forefathers are already under threat. Improving our understanding of plant fruits and seeds in order to maintain this essential genetic resource will be useful for breeding, crop development, and other future concerns.



Fruits and seeds are equally crucial for the survival and well-being of forests, and many are important food sources for both wildlife and humans. Forest survival also necessitates and is reliant on seed regeneration. Some of this reforestation will be accomplished through direct tree planting or active restoration, such as the Forest Department of Sarawak's initiative to employ "seed balls" for forest restoration in Sarawak. Yet, considering the scope of global restoration aims, this strategy may be excessively time-consuming and expensive. Conversely, passive restoration can supplement active restoration by allowing natural ecological processes to drive forest regeneration, which is essential for large-scale forest restoration. In addition to its role in maintaining healthy forests, seed dispersal is needed for forest restoration. The dispersal of fruits and seeds allows plant offspring to colonize areas with less competition and more resources. Without dispersal, plant offspring are less likely to survive, making it crucial for plants to reproduce and to sustain forest diversity. Some forest species help maintain diversity and prevent extinctions in their forest ecosystems because they produce fruit to sustain several animal species through times of scarcity. Therefore, we should deepen our knowledge of the fruits and seeds of our rain forest plants, and the production of this book is timely.

I would like to congratulate the authors, who put in a lot of effort to bring this fascinating book to fruition.

A stylized, handwritten signature in black ink.

DATU HAMDEN BIN HAJI MOHAMMAD
Director of Forests
SARAWAK



PREFACE

This book is one of a series of publications under the Heart of Borneo Project Initiative for Sarawak. "The Heart of Borneo Series 15: Seeds of 100 Angiosperm Plants in the Heart of Borneo" highlights the fruits or seeds of 100 selected Angiosperm plants that were recorded or observed in the Heart of Borneo areas, with a wealth of photographs and information to assist the reader in identifying and learning about the plants. For the scientific names and families found in this book, we used current classification. Where we did not have certain information to complete the description, we adopted it from the references. It must be noted that several species that are not native to Sarawak or common pioneer species of secondary forests are also treated in this book. All flowering plants are considered, as long as they are found in Sarawak's Heart of Borneo areas (including cultivated and introduced species). In this series, we only focus on the fruits and seeds that might be useful for identification and as self-contained as possible. Some of the terms related to and used in this book are also briefly defined in the glossary. We also do not encourage self-medication with the plant species with medicinal value described here. Also, the plant parts are usually prepared as a concoction with instructions from traditional practitioners.

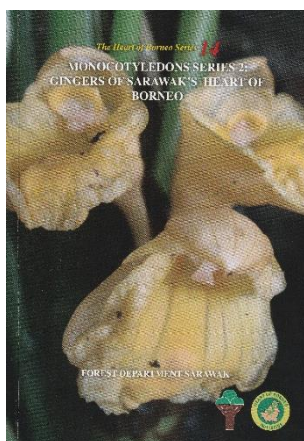
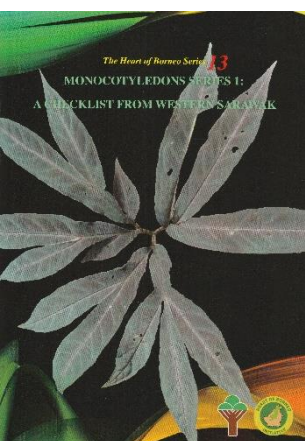
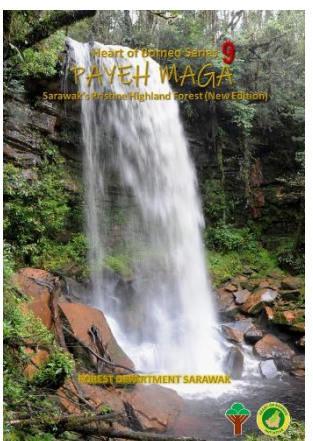
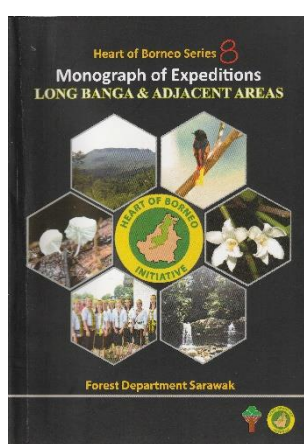
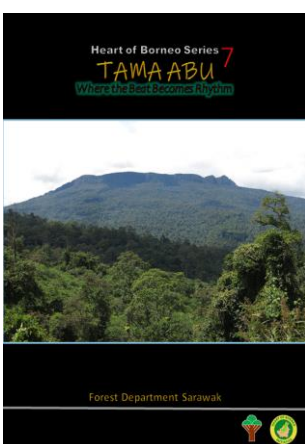
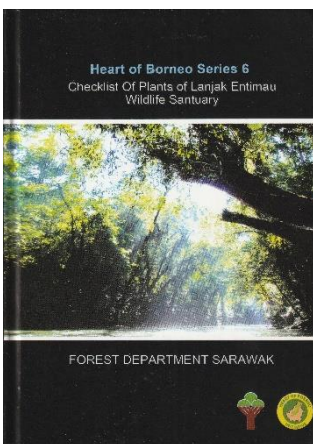
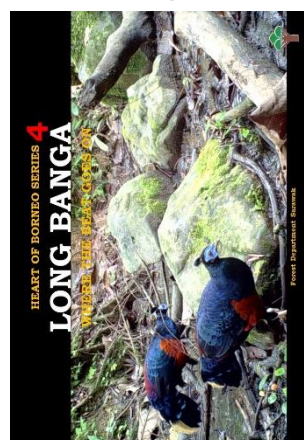
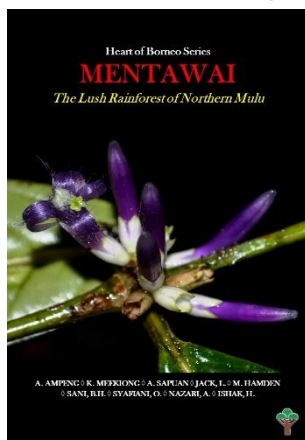
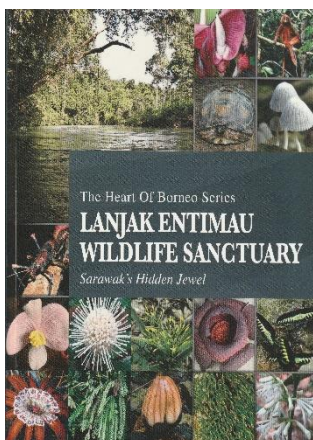
EDITORS

Meekiong, K. (Chief Editor)

Runi, S.P.; Ismaili, G.; Salina, H.; Awang Ahmad, Z.A.B.

Salleh, H.; Teo, S.P.; Nur Safinas, J. & Yazid, K.

The Heart of Borneo Series (Selected Books)



What is the Heart of Borneo (HoB) Initiative?

Heart of Borneo (HoB) Initiative is voluntary transboundary cooperation between Brunei, Indonesia and Malaysia to enable conservation and environment protection while enhancing sustainable development that improves the welfare of those living on the island. The cooperation of the three ASEAN nations was officially launched in Brazil on 27 March 2006. On 12 February 2007, the Minister of Natural Resources and Environment, Malaysia; the Minister of Forestry, Republic of Indonesia and the Minister of Industry and Primary Resources, Brunei Darussalam signed and jointly issued a Declaration in Bali, Indonesia.



Bali Declaration 2007

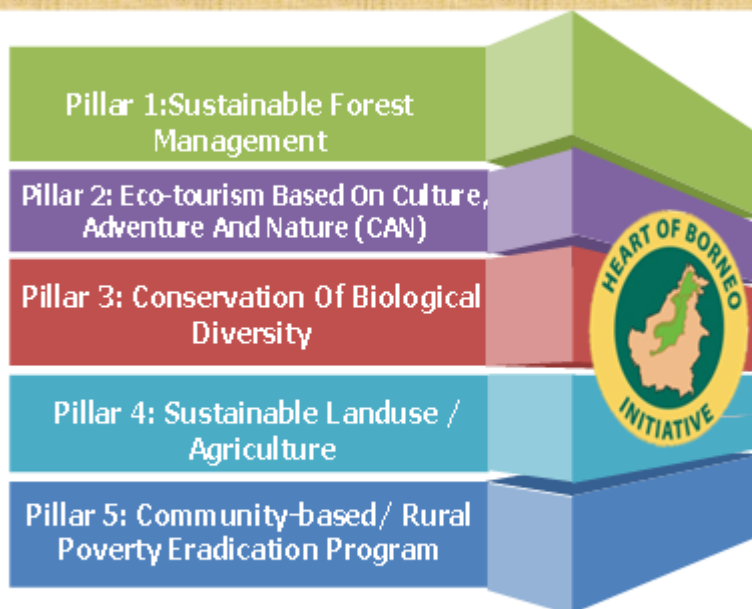
Because of the global concerns and controversies about tropical forest development, the long-term objective of the HoB Initiative, as enshrined in the Bali Declaration, is as follows:

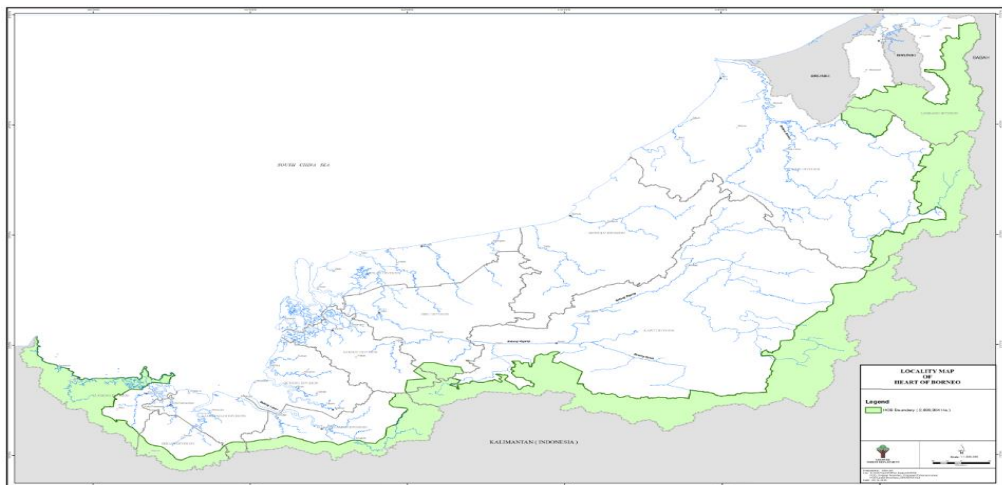
“With one conservation vision and to promote people's welfare, we will cooperate in ensuring the effective management of forest resources and conservation of a network of protected areas, productive forests and other sustainable uses”.



1	Represents the area designated as the Heart of Borneo area.
2	Represents the boundary of Heart of Borneo.
3	Represents the integrity of the forest which is crucially important. All in gold denoting under the good care of the 3 respective countries.
4	Represents the forest as the core element of the <u>HoB</u> initiative.
5	Represents the Global Earth
6	<ul style="list-style-type: none"> Leaves representing the three pillars of sustainable development which are Economic, Social and Environmental requirements. They are interlinked to represent the importance of forest connectivity for biodiversity conservation.

5 PILLARS OF THE HEART OF BORNEO





In Sarawak, the HoB covers 2.7 million ha over a contiguous block along Sarawak's boundaries with Kalimantan and with Sabah and Brunei. The HoB is fully in line with existing policies by both the state and federal governments.

HoB Sarawak started with a total area of 2.1 million hectares and is divided into three regions, namely the Northern, Central, and Southern Regions. In 2018, the HoB areas were extended to 2.7 million hectares and approved by the State Cabinet. The expansion involves the area from Batang Ai to the western region of Sarawak. This includes the Kelingkang Range FR, Gunung Apeng National Park, Bungo Range National Park, Gunung Pueh National Park, Kubah National Park, Gunung Gading National Park, Samunsam WS, Matang WC, Kuching Wetland National Park, Bako National Park, Sampadi National Park, Santubong National Park, and Tanjung Datu National Park.

Seeds

Angiosperms and gymnosperms are the two types of plants that produce seeds. The production of seeds from an original tree is very important to replace and produce more trees in the area. Seeds are mature ovules that have developed and contain embryonic plants, stored nutrients, and a protective layer (Kozlowski & Gunn, 1972). The complex structure of the seed supports the formation of seed embryos to become mature (nutrient source), which allows germination to occur. As expressed by Kozlowski and Gunn (1972), angiosperm seeds are capable of storing food inside the endosperm or cotyledons (for some species), while gymnosperm seeds usually store food in the female gametophyte (megametophyte). Several categories of seeds have been stated by Baskin and Baskin (2014): i) the embryo is relatively large and well formed; ii) the endosperm is negligible or absent and the seed is inactive or inactive; iii) the endosperm is present and the seed is inactive or inactive; iv) relatively small or slightly differentiated embryos; and v) embryos are in small and abnormal formation.

Seeds are produced in many variations, such as shape, colour, and size. According to Kozlowski and Gunn (1972), seed variation is classified as stenospermous (seed species with little variation) or eurypermous (seed species with a lot of variation). Referring to the variation of seed sizes, the larger seeds are often associated with perennial plants, especially woody plants, and these plants are considered primitive (Salisbury, 1942). According to Kozlowski and Gunn (1972), the most common colour seen on seeds is brown, with some seeds also having black and brown, and brightly coloured seeds such as green, red, yellow, and white being rare.



A sepia-toned photograph of a plant branch with several round, fuzzy fruits. A large, detailed leaf is visible in the background. The text "SELECTION OF SPECIES" is overlaid in the center.

SELECTION OF SPECIES

Family: Achariaceae

Species: *Pangium edule* Reinw.

Local name: Kepayang, Payang, Umpaya, Pa'eng

Fruit description: Fruit is an indehiscent fruit that is ellipsoid-shaped, 15–25 x 7.5–12 cm in size. The pericarp is brown, firm, and thick. Contain 20–25 seeds, triangular-ovoid, 3–4 cm diameter, immersed in white aromatic pulp, unevenly compressed, firm testa, oily endosperm, and foliaceous cotyledons.

Notes: A monotypic genus, native to Southeast Asia. Cultivated, occasional in the primary forest on alluvium at the base of limestone hills. The plant produces a large poisonous fruit which can be made edible by the fermentation process.



Family: Anacardiaceae

Species: *Semecarpus heterophylla* Blume

Synonym: *Semecarpus cinerea* H.H.W. Pearson

Local name: Rengas

Fruit description: Fruit consists of two parts, a green accessory fruit and drupe fruit with an obliquely ovoid shape and the presence of fine hairs on the surface of the fruit that grows at the end.

Notes: Frequently found in undisturbed forests, up to 2000 meter altitudes.



Family: Annonaceae

Species: *Polyalthia hypoleuca* Hook. f. & Th.

Local name: Selaut, Kayu semut, Udap, Akar larak hutan

Fruit description: Oblong-shaped fruit with thin red skin after ripened, size: 9 x 9 mm diameter. The fruit contained 1–15 tiny seeds.

Notes: Occasional, locally frequent, mixed swamp forest, but also occurs on sandy soils in MDF; distributed throughout Sarawak. A decoction of the roots is given as a protective medicine after childbirth. The fibrous bark is used for binding, mosquito repellent and also for traditional belief (to cast away the evil spirit).



Family: Aquifoliaceae

Species: *Ilex cymosa* Blume

Local name: Kerdam ayer, Mengkulat, Topu, Sapo, Sulau kelap

Fruit description: Fruit round, berry-like, with a dome-shaped stigma at the top and 9 persistent sepals at the base.

Notes: An important fruit tree for wildlife.



Family: Araceae

Species: *Aglaonema nitidum* (Jack) Kunth

Local name: Daun lidah, Bukou', Oblong-leafed Agloanema

Fruit description: The fruit is a multiple of berries, the cluster densely grouped on the fruiting spadix, looks like multiple fruits, turning into red after ripened and consisting of oily seed.

Notes: A common aroid in the tropical forest of Borneo, particular in the swampy areas and limestone foothills, up to sub-montane forest at altitudes 1200 meters above sea level.



Family: Araceae

Species: *Amorphophallus borneensis* (Engl.) Engl. & Gehrm.

Local name: Mayak, Bunga bangkai, Bunga mayat, Skot berungan, Tongkat naga

Fruit description: The fruit is a multiple of berries formed from a pollinated flower on a spadix, mature fruit showing dark yellow colour and paler toward the base after ripe.

Notes: Endemic to Borneo. Important ecological indicator plant.



Family: Araceae

Species: *Arisaema filiforme* (Reinw.) Blume

Local name: Cobra lily, Bunga lidah jin, Bakung tedong

Fruit description: The fruit grows unevenly, the fruit is multiple berries, a dense cluster gathers on the fruiting spadix, looks like multiple fruits, the immature fruit is dark green and turns orange after ripe.

Notes: Rhizomatous geophyte or lithophyte on rock surfaces and usually grows on damp areas of limestone boulders and gullies, and sub-montane forests. Two forms are recorded in the Heart of Borneo Sarawak; purplish and greenish spathe.





Family: Araceae

Species: *Podolasia stipitata* N.E. Br.

Fruit description: The fruits are globose or sub-globose, berries. Immature fruits greenish to dark green and paler toward the base, turned to orange colour when fully ripe.

Habitat: Frequently found in damp places, near streams or rivers, or in a deeply shaded area of gullies or slope bottoms.

Distribution in HoB: Widespread throughout Borneo (Kubah NP, Samunsam WS, LEWS, Mulu NP).

Notes: A monotypic genus, with *Podolasia stipitata* is the only species registered in the genus. Distributed in the Malay Archipelago (native to Sumatra, Peninsular Malaysia and Borneo). Vegetative features are similar to genus *Lasia* and floral features similar to *Cyrtosperma*.

Family: Arecaceae

Species: *Calamus sabalensis* J. Dransf.

Local name: Rotan

Fruit description: Mature fruit rounded, c. 9 mm diameter, beaked, covered in 15 vertical rows of red-brown scales. Seed rounded, c. 7 mm diameter, slightly flattened on one side; endosperm homogeneous.

Notes: Endemic to Borneo (Sarawak – Sabal, Padawan and Bau). A stemless palm, occasionally found in kerangas forest, up to 650 meters above sea level.





Family: Arecaceae

Species: *Eleiodoxa conferta* (Becc.) Burret

Local name: Asam paya, Asam kelubi, Buak Baon

Fruit description: The Inflorescence emerge at the ground level, bearing many fruits. The fruits are globular or spherical, with scaly moderately hard exocarp (outer layer); with one or occasionally two seeds.

Notes: The fruit is edible and often pickled and made into a sweet as well as a substitute for tamarind.



Family: Arecaceae

Species: *Iguanura palmuncula* Becc.

Local name: Palma

Fruit description: The pink fruit develops from the spicate inflorescence, fruit in a flat and five-pointed shape with a thin fruit wall layer. Each fruit consists of a single slimy seed which takes the shape of the endocarp.

Notes: This palm is endemic to Borneo

Family: Arecaceae

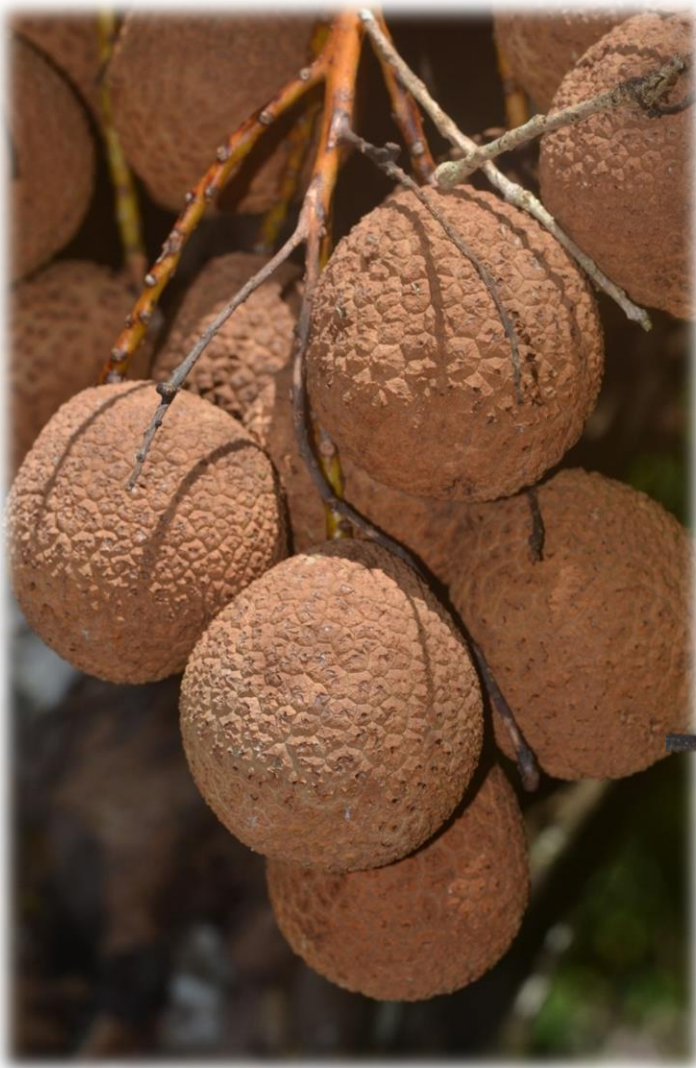
Species: *Licuala mantanensis* Becc.

Local name: Paradise palm, Daun iseng

Fruit description: Fruits are elongated ellipsoid, bright orange. They contain sickle-shaped seeds which quickly lose viability.

Notes: Endemic to Borneo (Sarawak and Kalimantan). Frequently found in a deep shade of limestone foothills and boulders.





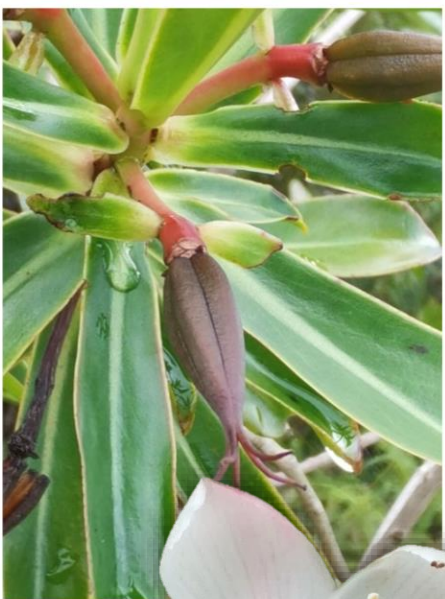
Family: Arecaceae

Species: *Pholidocarpus majadum* Becc.

Local name: Keping palm

Fruit description: Fruits are round, exocarp covered with a scale-like structure. Seed round.

Notes: Native to swampy and lowland forests of Borneo. Closely related to the genus *Livistona* but easily differentiated by the fruit and seed.



Family: Bonnetiaceae

Species: *Ploiarium alternifolium* (Vahl.) Melch.

Local name: Somah, Seromah, Cicada tree, Riang riang, Reriang, Kayu kuat, Sesudu paya, Nyatu kali muok.

Fruit description: Fruits terminal or at the leaf axil, conical with styles remnant at the apex. 5-loculed. Immature fruit green, turned to yellowish green and dehiscent when matured.

Notes: Locally frequent in kerangas forest and secondary forests, on damp degraded soils, throughout Sarawak.



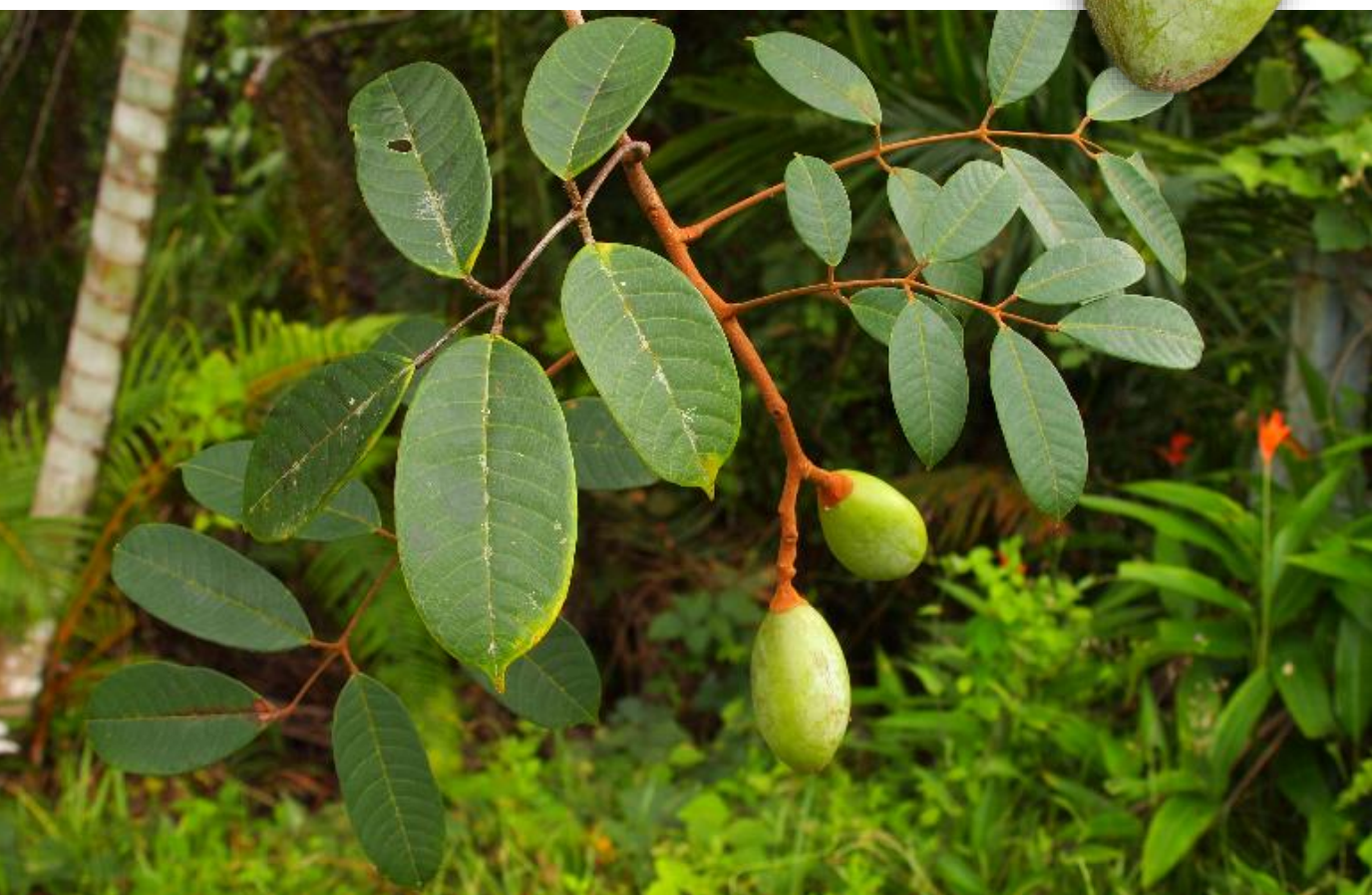
Family: Burseraceae

Species: *Canarium littorale* Blume

Local name: Kelamo manok, Mali suai, Puduk baku, Ruman, Sungkoh

Fruit description: Fruit is a drupe with ellipsoid 3-shouldered tapered at the base and apex, persistent calyx at the base. Consist of a stony endocarp and is attached to the stony inner layer of the mesocarp to form a thick-walled pyrene.

Notes: Occasional and widespread in MDF on mainly clay soils. Recorded throughout Sarawak.



Family: Clusiaceae

Species: *Calophyllum lanigerum* Miq.

Local name: Bintangor, Bitá'oh, Churau

Fruit description: Infructescence

terminal or from axil, branching, simple.

Fruits are globose or round in shape, with

thin green endocarp, greenish-yellow exudate, and green to

greenish yellow when mature. Seed rounded, with a hard coat.

Notes: Occasional and widespread in MDF on sandy soils, throughout Sarawak. The wood is coarse-grained. It is used for planks, in-house and shipbuilding. The plant produces yellowish-green latex. It is claimed that latex has medicinal properties for curing Aids.



Family: Costaceae

Species: *Hellenia speciosa* (J. Koenig) S.R. Dutta

Local name: Setawar hutan

Fruit description: Fruit in red capsules, rounded to ovoid shaped, 1.5–2 cm long.

Notes: Edible leaves. Young leaves or tender shoots of this plant can be boiled and cooked. Washed and cleaned rhizome then boiled and eaten. Flower buds can also be eaten raw, they are a beautiful decorative agent and can be fried and added to food. Although bitter the plant parts are eaten to take advantage of the rich medicinal value of

this plant.





Family: Cucurbitaceae

Species: *Hodgsonia macrocarpa* (Blume) Cogn.

Local name: Akar kepayang, Akar kepawang, Kelepayang, Pepayang, Kadam, Hoit (Jah Hut), Teruah.

Fruit description: Fruit grey-green, 10–18 cm, thick mesocarp and seeds covered with a thin endocarp; seeds measuring 6–9 cm long.

Notes: Leaves are used to cure nasal ulcers and treat nasal problems, by drinking boiled water from the leaves and smoking like a cigar then the smoke is blown out through the nose. Seed oil is a mosquito repellent. A decoction of the leaves is used as a drink to reduce fever. In Borneo, oil squeezed from fresh seeds is applied to the abdomen and breasts after childbirth to deflate swelling. Raw seeds are poisonous and intoxicating but are eaten in many cultures as a delicacy after cooking.



Family: Cyperaceae

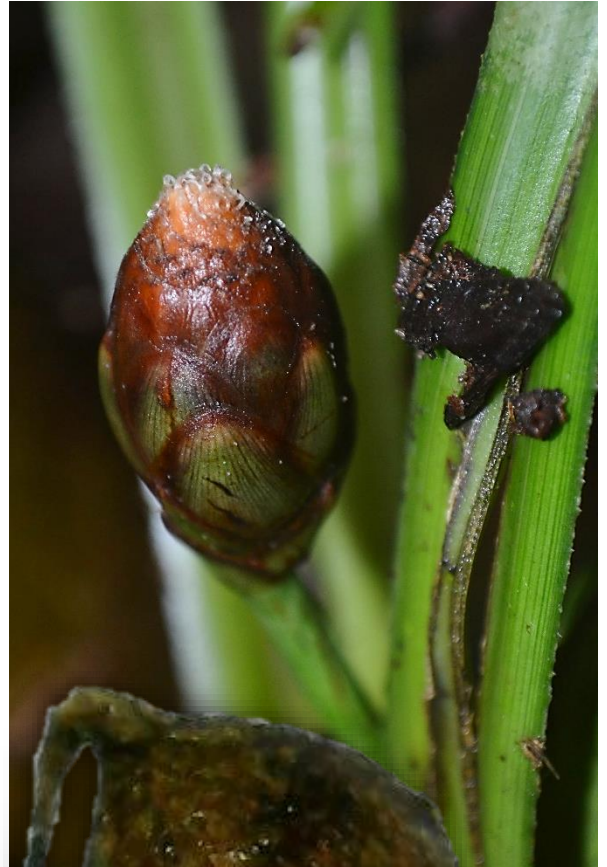
Species: *Mapania meditensis* D.A. Simpson

Local name: Rumput serapat

Fruit description: Infructescence obscured by the leaf sheath, in spindle-shaped spike, bracts imbricate. Fruit one per bract, elongated/spindle-shaped with hard exocarp.

Notes: Common in MDF, at wet places and shaded areas, particularly near streams or riverbanks. Also, in the gullies of limestone habitat.

Medicinal plant – used by women after giving birth.



Family: Cyperaceae

Species: *Mapania wallichii* C.B. Clarke

Local name: Daon sisiet

Fruit description: Culm present, up to 30 cm long, from the leaf axil, spike terminal, solitary, bracts imbricate. Fruit ellipsoid, with long acumen c. 2 mm long, exocarp hard with a rough surface.

Notes: Sedge with pandan-liked leave

Family: Dipterocarpaceae

Species: *Anisoptera grossivenia* Slooten

Local name: Mersawa kunyit

Fruit description: Calyx sparsely puberulent, tube to 13 mm diameter, 2 longer calyx lobes narrowly spatulate, 3 shorter ones linear. Nut apex obtuse, densely rufous puberulent.

Status: IUCN – EN (2015), Sarawak Plant Red List – LC. Endemic to Borneo.

Notes: Lowland MDF, kerangas and riparian forest, lowland to hill forest, elevation to 470 meters above sea level.



Family: Dipterocarpaceae

Species: *Cotylelobium melanoxylon* (Hook. f.) Pierre

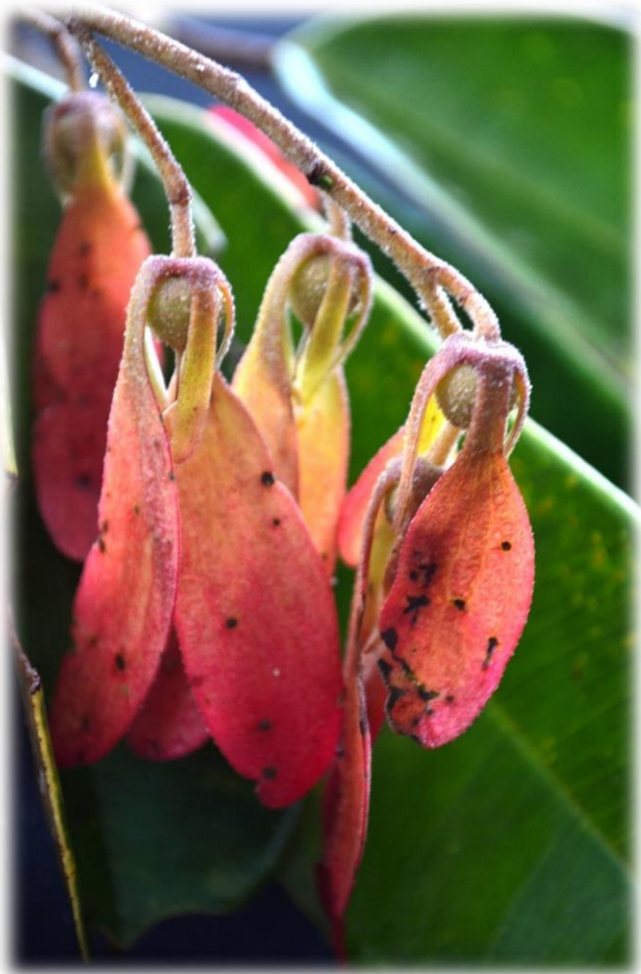
Synonym: *Vatica melanoxylon* (Hook. f.) Miq.; *Anisoptera melanoxylon* Hook. f.; *Cotylelobium beccarii* (F. Heim.) Pierre.

Local name: Resak hitam

Fruit description: 2 longer calyx lobes oblong, obtuse, shorter ones hastate-acute. Nut ovoid, c. 6 mm diameter, style remnant at the fruit apex.

Status: IUCN – EN; Sarawak Plant Red List – LC. Native to Sumatra, Peninsular Malaysia and Borneo.

Notes: In primary forest or logged over MDF, kerangas and riparian forest at elevations to 470 meters, mainly on sandy or clay loam soils.





Family: Dipterocarpaceae

Species: *Dipterocarpus condorensis* ssp. *penangianus* (Foxw.) P.S. Ashton & Luu

Synonym: *Dipterocarpus penangianus* Foxw.

Local name: Keruing gasing

Fruit description: Basal quarter of fruit fused to calyx tube, with 2 calyx lobes enlarged into wings and 3 minor calyxes.

The fruit turns dark brown when dried.

Status: IUCN – NE; Sarawak Plant Red List - VU

Notes: Occasional in MDF and kerangas forest, up to 560 meter altitudes.



Family: Dipterocarpaceae

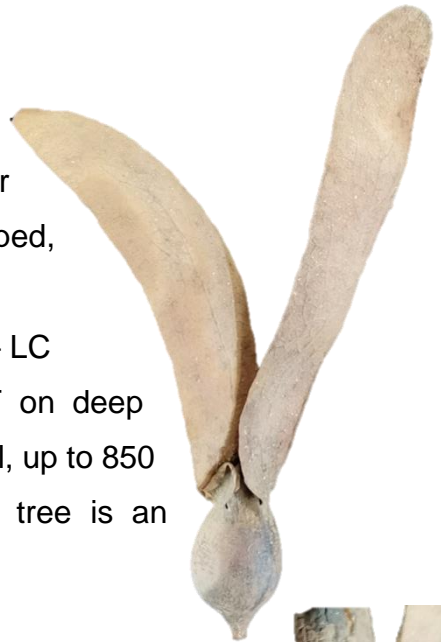
Species: *Dipterocarpus crinitus* Dyer

Local name: Keruing mempelas

Fruit description: Fruit sessile, calyx tube ellipsoid, to 18 x 8 mm, smooth, 2 major calyx lobes to 8 x 15 mm, 3 small deltoid-shaped, c. 3 mm long, acute.

Status: IUCN – EN; Sarawak Plant Red List – LC

Notes: Occasional and widespread in MDF on deep sandy soils, kerangas forest, lowland to the hill, up to 850 meter elevations. throughout Sarawak. The tree is an important source of timber.



Family: Dipterocarpaceae

Species: *Dipterocarpus palembanicus* Fox.

Local name: Keruing ternek

Fruit description: The fruit has 5 folded ridges along the exocarp. It has 2 enlarged calyxes, 12 cm long and 3 cm wide, forming wings while the remaining 3 calyxes remain small 5 mm long and 7 mm wide. The fruit turns from reddish-green to reddish brown when dried.

Status: Locally occasional in MDF.



Family: Dipterocarpaceae

Species: *Dipterocarpus lowii* Hook. f.

Local name: Keruing sol

Fruit description: The surface of the fruit is scattered, with 5 folded ridges along the exocarp. It has 2 enlarged petals, forming wings while the remaining 3 petals remain small. The fruit turns from reddish-green to dark brown when dried.

Status: IUCN (Near Threatened)





Family: Dipterocarpaceae

Species: *Dryobalanops beccarii* Dyer

Local name: Kapur bukit, Keladan, Kapur keladan

Fruit description: Fruit glabrous, calyx base cup-shaped, becoming constricted at the rim, lobes spatulate, obtuse, 4–6 cm x 8–20 mm, tapering, wide at the base. Nuts ovoid with a short style remnant.

Status: Listed as EN by the IUCN Red List (2013). Well represented in the TPA and FMUs. Therefore, listed as LC by the Sarawak Plant Red List (2014).

Notes: Frequently and widespread in MDF on clay-rich ridges, and yellow sandy soils derived from ferruginous sandstone. Distributed in Sumatra, Peninsular Malaysia and Borneo. Throughout Sarawak.



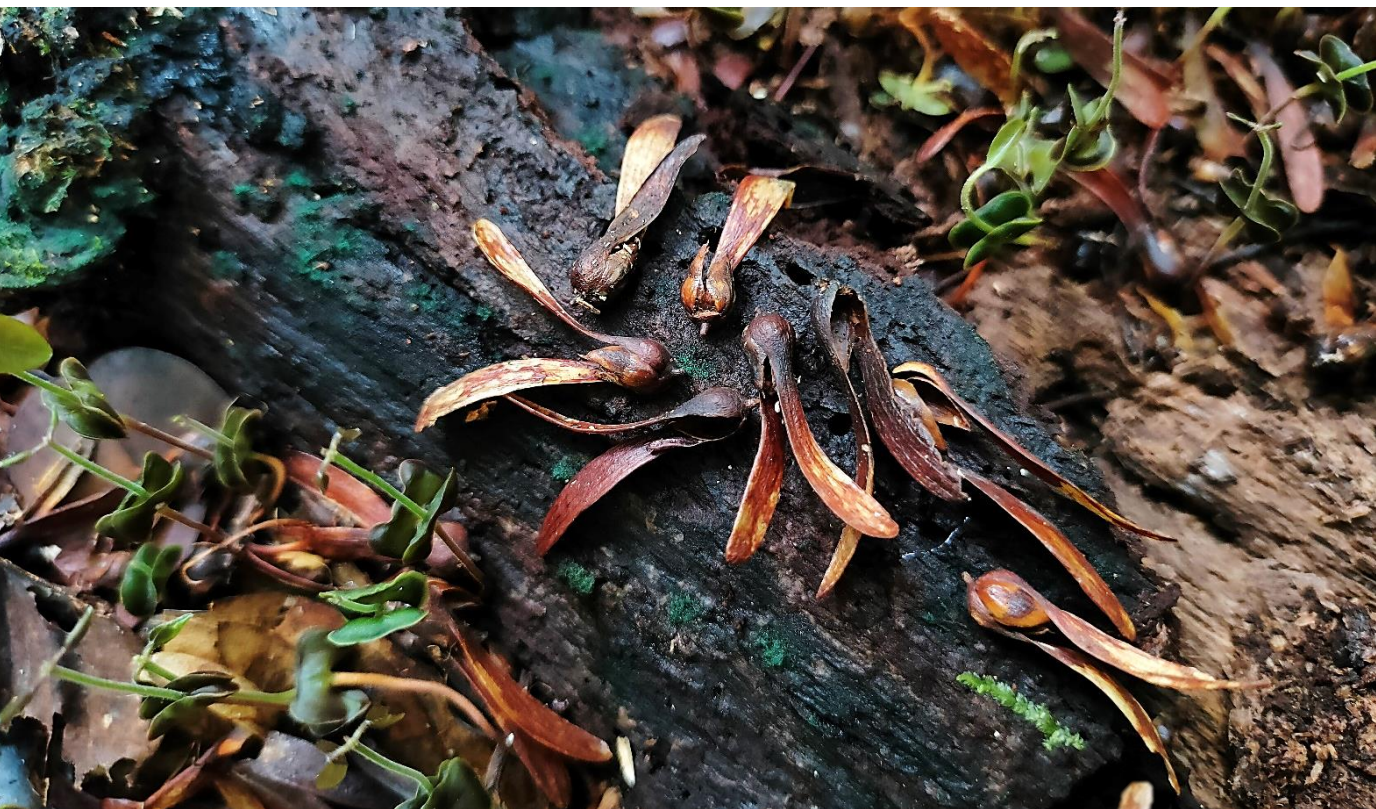


Family: Dipterocarpaceae

Species: *Dryobalanops oblongifolia* Dyer

Local name: Kapur kelansau, Kelansau

Fruit description: Hairy fruit surface. Has a short pedicel, joined to the petals. Calyx lobes up to 5–7 mm, bordered by 15 mm deep, up to 15 mm diameter massive incrassate cups. Nut to 3.5–2.7 cm, ellipsoid to obovoid, obtuse to mucronate, distinctly lenticellate.



Family: Dipterocarpaceae

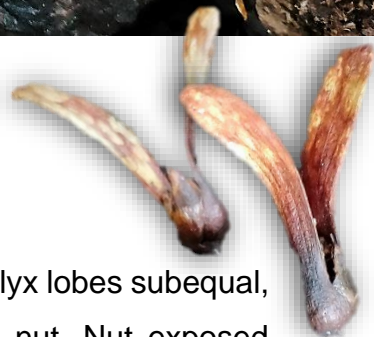
Species: *Hopea kerangasensis* Ashton

Local name: Luis kerangas

Fruit description: Fruit stalk short, c. 1 mm long, calyx lobes subequal, ovate, 6 x 5 mm, saccate, appressed against the nut. Nut exposed above calyx toward apex, ovoid.

Status: Listed as Critically Endangered (CR) by the IUCN (2015). This species is widely distributed in the south Sarawak and well represented in the TPA, therefore listed as Least Concern (LC) in the Sarawak Plant Red List.

Notes: A small to medium size tree, locally abundant in MDF on leached clay-rich soils and in kerangas podsols.





Family: Dipterocarpaceae

Species: *Shorea seminis* (De Vr.) Slooten

Local name: Engkabang terendak, Engkabang kaping, Selepak, Kelam, Lichong, Jajag, Peran nyakit, Tekam tegelam, Tegelam, Kawang tikus

Fruit description: Consists of 3 persistent clear calyces, and 2 smaller-sized calyces. The immature fruit is green and turns light brown when dried. the colour of the calyx is brighter than the fruit exocarp.

Status: Protected Plant under the WPO





Family: Dipterocarpaceae

Species: *Shorea beccariana* Burck

Local name: Meranti langgai, Engkabang langgai, Langgai, Misatong.

Fruit description: The fruit has 5 calyxes, 3 of them modified into wings with wings that appear reddish green after ripening.

Status: IUCN Red List (Threatened)

Family: Dipterocarpaceae

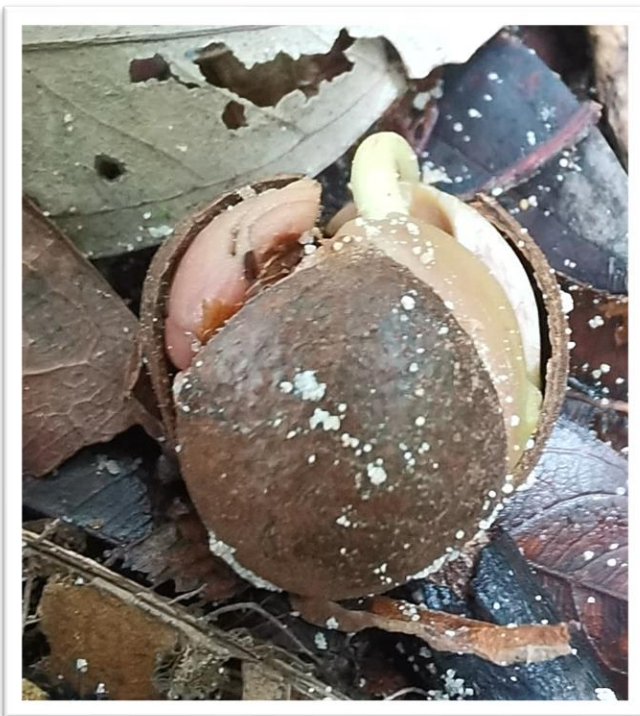
Species: *Vatica congesta* Ashton

Local name: Resak, Ngerih, Kowan, Selumar

Fruit description: Fruit fused with calyx tube; 2 of the calyx lobes develop into wings. Fruit covered by calyx. Wings are reddish green when mature.

Notes: IUCN Red List
(Threatened)





Family: Dipterocarpaceae

Species: *Vatica globosa* Ashton

Local name: Resak buah bulat

Fruit description: Calyx lobes equal, free, oblong, obtuse, to 4 mm, reflexed, not concealing the nut. Nut globose, to 2 cm diameter, 3-sutured.

Status: Listed as CR by the IUCN (2015). In Sarawak, most of the populations are recorded outside the TPAs, therefore listed as Near Threatened (NT) by the Sarawak Plant Red List.

Notes: Endemic to Borneo (Sarawak & Kalimantan).





Family: Dipterocarpaceae

Species: *Vatica havilandii* Brandis

Local name: Resak degong

Fruit description: Fruit free from sepals. Unwinged fruit. The structure of the fruit skin look-alike fingers that cover the cotyledon inside. The fruit is yellowish-green.

Status: Listed as CR by the IUCN (1998).
Declared as EN by Malaysia Plant Red List (2021).





Family: Dipterocarpaceae

Species: *Vatica sarawakensis* Heim.

Local name: Resak Sarawak, Resak daun besar

Fruit description: The fruit is green with a slightly sandy surface. Fruit fused into calyx tube with 5 unwinged calyxes. Having a clear line on the surface in dark green color.

Status: IUCN (Threatened), Listed as DD in Malaysia Plant Red List (2021).

Family: Dipterocarpaceae

Species: *Vatica umbonata* (Hook. f.) Burck ssp. *umbonata*

Local name: Resak ayer

Fruit description: Fruit without sepals, ovoid or globose, up to 30 mm long, with 5-lobed corky calyx fused to a verrucose pericarp.

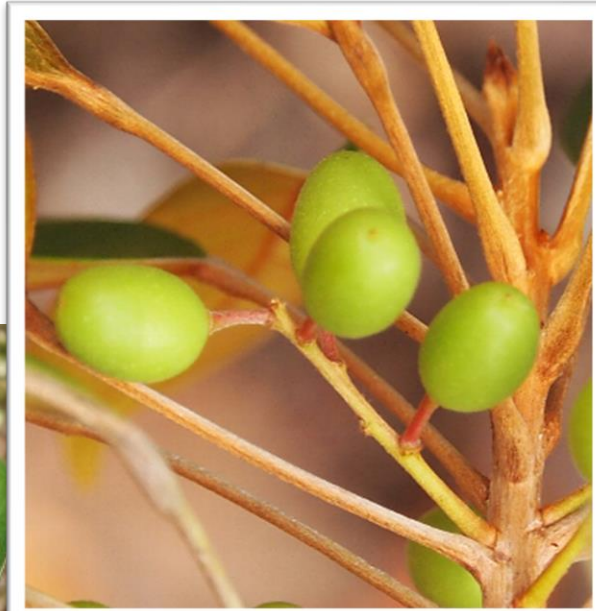


Family: Elaeocarpaceae

Species: *Elaeocarpus pedunculatus* Wall. ex Mast.

Local name: Sengkurat

Fruit description: A drupe fruit that contains a single seed in each of its 2–5 locules and a fleshy external mesocarp. The inner mesocarps of the pyrene are likely to be fused to the endocarps. Membranous and thick albumen seed coat. Immature greenish turns to bluish-black when ripe.





Family: Euphorbiaceae

Species: *Dimorphocalyx muricatus* (Hook. f.) Airy Shaw

Local name: Bantas

Fruit description: Fruit muricate with spines often united into short ledges, 18–35 x 15–27 mm, dark green to pink yellow to brown, wall woody, exocarp and endocarp usually completely separating. Seeds are sub-ellipsoid with usually abaxially a lengthwise ridge.

Notes: Shrub to a small tree (up to 10 m tall), not common in the MDF, recorded from Kuching to Kapit division.

Family: Euphorbiaceae

Species: *Homalanthus populneus* (Geisel.) Pax

Synonym: *Omalthus populneus* (Geisel.) Pax

Local name: Tapang lalat, Nyila bulan, Lemutah, Kayu mata buta darat, Kayu ludahi

Fruit description: Fruit is a subglobose capsule with two cylinders each bearing a single black seed, about 10 mm in diameter, two-lobed, not carinate, and glaucous.

Notes: Plant has medicinal properties. Fruits are used to treat wounds. Leaves are used to treat fever, and after giving birth.





Family: Fabaceae

Species: *Pithecellobium jiringa* (Jack) Prain

Local name: Jiring, Jering, Babai jering, Joring.

Fruit description: Fruit pods of this plant are coiled, leathery, and strongly lobed at each seed. It is displaying the reddish-brown seeds, they split open and turn a dull purplish-brown colour. Garlic-like odour emanates from its seeds.

Family: Fabaceae

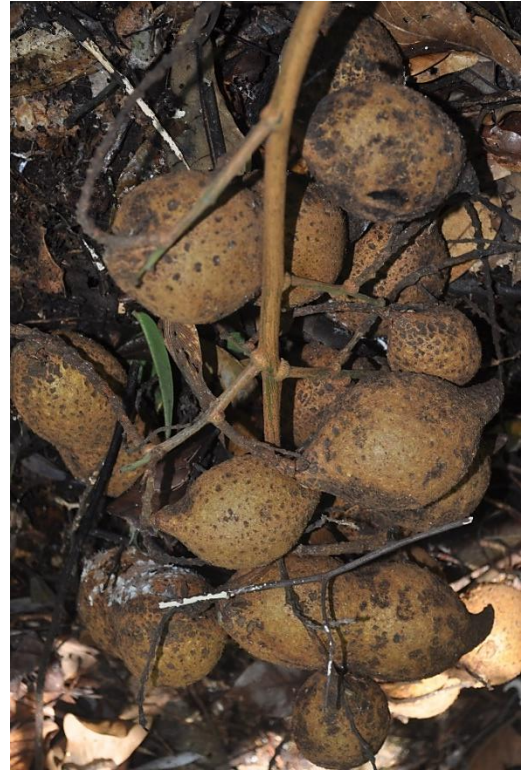
Species: *Callerya nieuwenhuisii* (J.J. Sm.) Schot.

Synonym: *Millettia cuspidata* Ridl.;
Whitfordiodendron nieuwenhuisii (J.J. Sm.)
Merr.; *Adinobotrys myrianthus* Dunn.

Local name: Buah belum, Buah ketatau,
Buah balungai, Buah ukah, Buah tatau, Akar
kelalai, Akar belungi, Rendan belum

Fruit description: Legume with double-
ellipsoid or ellipsoid. Brown in colour with a
rough surface and grunting skin and dark
brown spots on the surface.

Notes: The fruits are edible, but may need to
be boiled or roasted before can be eaten.



Family: Fagaceae

Species: *Castanopsis hypophaenicea* (v. Seem.)

Soepadmo

Synonym: *Castanopsis disrperispina* Merr.

Local name: Berangan

Fruit description: Fruit up to 5 cm long, with c. 5 mm thick woody spiny exocarp, one-seed on each cupule. Seed ovoid to ellipsoid 35–60 x 25–45 mm.

Notes: The seed can be eaten raw or cooked, or can be roasted in the same way as chestnut (*Castanea* spp.).





Family: Fagaceae

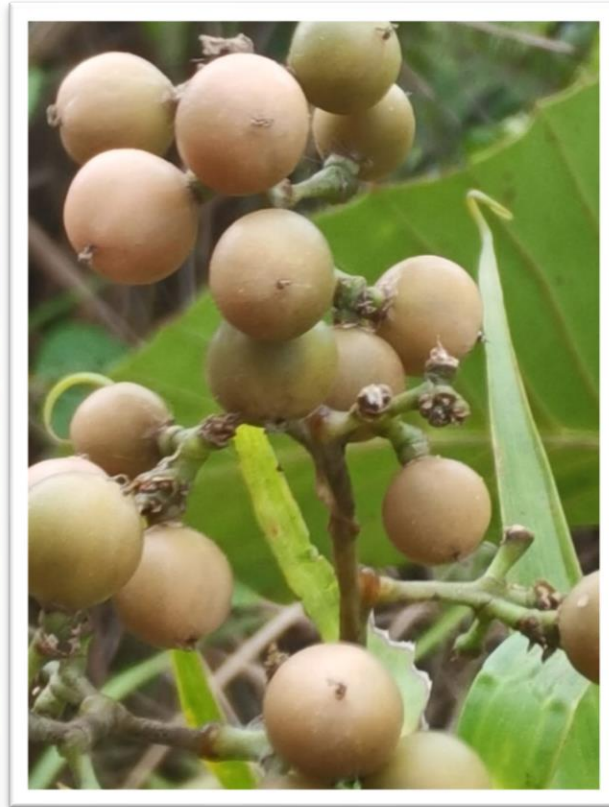
Species: *Lithocarpus pseudokunstleri* A. Camus

Local name: Empili, Empenit johari

Fruit description: Solitary nut, sitting on a cupule.

Grow a lot in one cluster of stalks. It has a hard nut and cupule structure. The stalked cupula is saucer-shaped and attached to the nut. the colour of the cupula is dark brown, and the light brown nut is almost white.





Family: Flagellariaceae

Species: *Flagellaria indica* L.

Local name: Rotan tikus, Wi chit

Fruit description: Fruit is a drupe in globose shape, 5 mm diameter, it has smooth skin, shiny berry, green turning pink to orange; each fruit consist of a single seed.

Notes: The tough stems are usually used as a substitute for rattan to tie or make a basket and other handicrafts. The plant is also used in various medicinal applications.

Family: Gentianaceae

Species: *Utania racemosa* (Jack) Sugumaran

Synonym: *Fagraea racemosa* Jack; *Fagraea malayana* Mart.

Local name: Tembusu air, Sepulih

Fruit description: Fruits are rounded or ellipsoid-ovoid in shape, greenish yellow and turn red when ripen.

Notes: Frequently found in secondary forests with swampy soils, or riverbanks. The flowers and bark can be used as an antidote for snakebites. A decoction of leaves can be used to treat fever and rheumatism.





Family: Hypoxidaceae

Species: *Molineria latifolia* (Dryand ex Aiton) Herb ex Kurz.

Local name: Lumba rimba, Kepala puyuh, Lemba.

Fruit description: The fruits are oval berries, ovoid, white hairy fruits, ripening white tinged pink, and contain many seeds. Enclosing small black seeds and edible white pulp.

Notes: Fruit has a similar taste to dragon fruit.



Family: Lamiaceae

Species: *Callicarpa pentandra* Roxb.

Local name: Sabar besi, Belau, Bilau

Fruit description: The fruit is a berry, immature green and turning pink after ripe, very conspicuous in clusters on bare branches after leaf fall. Berries are attached to the persistent calyx, which is finely hairy brown to the base of the stalk.

Notes: Locally frequent in secondary forest, throughout Sarawak. Ethnobotanical plant – used against toothaches.

Family: Lamiaceae

Species: *Vitex pubescens* Vahl.

Local name: Leban, Tebawan

Fruit description: Infrutescences are terminal (sometimes from axil), branching, bearing many-fruits. Fruits are drupe, globose, shiny and fruit attached to 5 persistent calyx. Contains seeds enclosed in a stony endocarp.

Notes: *Vitex pubescens* is often used as a medicinal cure by the local peoples of the Malesia region (particularly Malaysia and Indonesia). For example, the seeds are used to heal fever, while the barks and leaves are used to treat wounds and reduce pains. Frequently found in secondary forests, particularly in the urban areas. An important tree species, as their fruits are eaten by the birds and squirrels.





Family: Lauraceae

Species: *Beilschmiedia glabra* Kosterm.

Local name: Medang

Fruit description: A single-seeded berry. Globose shaped with fleshy walls, c. 25–35 mm diameter, with rusty-brown colour. The calyx is persistent basally. The seed coat is sandy and brown-orange.

Notes: In undisturbed MDF, altitudes are up to 800 meters above sea level. Often the riverbanks, or streams, in the secondary forest usually present as pre-disturbance remnant trees.



Family: Lauraceae

Species: *Eusideroxylon zwageri* Teijsm. & Binn.

Local name: Belian, Belian batu, Belian wi, belian buloh, Geriting, Sagat, Tahah, Terah, Teras, Ta'as.

Fruit description: Fruit in drupes. Hard seed coat in oblong shape or cup-shaped cupule. The seed has no endosperm. Size of seed: 115 mm (length) and 85 mm (width).

Notes: Locally frequent on alluvial soils, foothill of limestone, peat swamp, kerangas and lowland MDF; throughout Sarawak, but less common in the north.





Family: Lauraceae

Species: *Litsea globularia* Ng

Local name: Medang, Tiburus, Murus, Berawith

Fruit description: Infructescences borne on a twig, raceme axis, highly condensed. Fruit globose, 2.3–2.5 cm diameter, cupule forming a circular plate up to 10 mm wide, pedicel thick, 2–5 mm long. Immature fruits green turned to bright red or reddish when fully riped.

Notes: Described in 2005, this species is a medium-sized tree, endemic to Borneo.





Family: Malvaceae

Species: *Commersonia bartramia* (L.) Merr.

Local name: Brown Kurrajong

Fruit description: Fruits are globose capsules, outer surface covered with dense, white, stellate hairs beneath dense bristles. Bristle shaft with dense, stellate hairs; apical hair with erect or horizontal arms glossy dark brown ovoid seeds.

Notes: Frequent, locally abundant, in secondary forest, especially on bare soils throughout Sarawak.



Family: Malvaceae

Species: *Durio griffithii* (Mast.) Bakh.

Local name: Lisoh, Durian burung

Fruit description: The fruits are ellipsoid-obovoid with base and top acute, scarlet when fresh. Dehiscent into two to three on the branch. Seeds are glossy black with a thin orange or red aril, enveloping only the basal part of the seeds.





Family: Malvaceae

Species: *Hibiscus tiliaceus* L.

Local name: Baru laut

Fruit description: The fruit is a woody, ovoid capsule with 5 valves that turns brown as it matures and splits into five parts to release a large number of tiny kidney-shaped seeds.

Notes: Leaves are edible. Mature leaves are used to treat fevers and coughs, while leaf sap is employed during childbirth as a lubricant. flowers used to treat abscesses and ear infections. seeds that are used to make hair oils, fragrances, and ointments.





Family: Melastomataceae

Species: *Dissochaeta pulchra* (Korth.) J.F. Maxwell

Fruit description: Infructescence terminal, condensed, many fruits. Fruits are ovoid-urceolate, 8–10 x 7–8 mm, glabrous, blue-violet, calyx lobe remnants persistent, widened. Seeds are 6–8 mm long.

Notes: One most common climbers are in the secondary forests along the roadsides and streams. For lowland to sub-montane vegetation, altitude up to 1500 meters above sea level.



Family: Melastomataceae

Species: *Dissochaeta reformata* Blume (syn.: *Marumiya mucosa*)

Fruit description: The fruit is subglobose-urceolate in shape, with brownish hairs that cover the entire fruit body. When fruiting, the remnants of the calyx lobes are sometimes persistent in an erect.

Notes: The berries are used to make a tasty drink.



Family: Melastomataceae

Species: *Medinilla speciosa* Reinw. ex Blume

Synonym: *Medinilla speciosa* Reinw. ex Blume var. *genuina* Hochr.; *M. speciosa* f. *rubriflora* Hochr.; *M. speciosa* var. *minoriflora* Hochr.

Local name: Medinila, Bunga terabusak

Fruit description: Fruits are rounded, style remnant at the apex, one-seeded, first pink and turn to purplish-blue when ripe.

Notes: Medicinal properties – fruits are consumed by pregnant women as a health supplement and are also used for diarrhea, mouth sores, anti-inflammatory, anti-cancer and anti-bacterial.

Family: Melastomataceae

Species: *Pternandra cogniauxii* Nayar

Synonym: *Kibessia korthalsiana* Cogn.;

Pternandra cardiophylla Ohwi

Local name: Puloh, Seri-seri, Timberas burung

Fruit description: A berries with spine-like appendages (style) remain at the top, the wall ripening soft and pulpy with knurled surface. Bright pink after ripened.

Notes: In MDF, disturbed secondary forests, to sub-montane up to 1300 meter altitudes. Often on alluvial soils, especially along open river margins or forest edges and hill slopes. Sandy to clay soils.



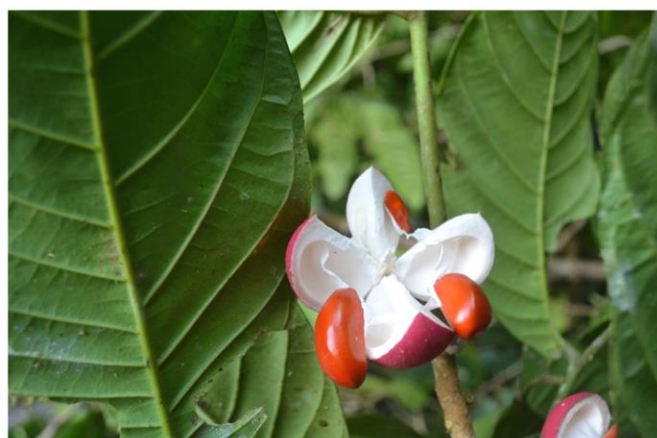
Family: Meliaceae

Species: *Aphanamixis polystachys* (Wall.) R.N. Parker

Local name: Segera

Fruit description: Infructescens terminal, 2–15 fruits (sometimes solitary). Fruits are globose, brick red to reddish colour, 4-locules, dehiscence during maturity stage, exposed bright white mesocarp and light brown seeds.

Notes: Oil extracted from the seeds is medicinal and applied externally for rheumatism



Family: Meliaceae

Species: *Sandoricum koetjape* (Burm. f.) Merr.

Local name: Kelampu, Sentul, Situ, Sitol

Fruit description: Infructescens terminal or axillary, many fruits, up to 30 fruits (or more). Fruit globose, immature pale to light green and turned yellowish when ripe.

Notes: Fruit edible.



Family: Moraceae

Species: *Artocarpus elasticus* Reinw. ex Blume

Local name: Terap, Tekalong, Pedalai, Pien, Tian, Kian, Buak titek

Fruit description: Fruit is cylindrical, with soft recurved spines, yellow-brown, covered by closely set; inter floral bracts scattered between the processes, slenderly stalked and with funnel-shaped upper parts; fruiting perianths numerous, the proximal free region fleshy and white. The fruit is cream yellow and ripened brownish with a rancid smell. Seed covered in white succulent flesh. Seed the thin, horny pericarp ellipsoidal, 10 x 6 mm.

Notes: Fruit edible.





Family: Moraceae

Species: *Ficus grossularioides* Burm. f.

Synonym: *Ficus alba* Reinw. ex Blume

Local name: Ara putih, white-leaved fig

Fruit description: Syconia fruit, ellipsoid to rounded, with soft, fine hairs when fresh. 6–15 mm diameter, usually occur in pairs or solitary along the stem or twigs, or at the leaf axils. Immature fruits are green, turned yellowish and darker when fully ripe.

Notes: Protected plant under the Sarawak WPO (1998)



Family: Moraceae

Species: *Ficus francisci* H. Winkler

Local name: Entimau, Kayu ara

Fruit description: The fruits are on the trunk (cauliflorous), compact in a group of 40–50 fruits. Outer surface with small lenticellate and ribbed from the apical. Fruit is made up of numerous tiny fruitlets and formed hollow-like in the middle. Immature light brown green and turning to orange-green when matured.

Status: Protected plant under Sarawak WPO (1998).

Notes: Locally occasional on fertile alluvial soils, sometime riparian or along the riverbanks, throughout Sarawak. A keystone species in the tropical rainforest, fruits are a food source for animals such as bats, squirrels and birds.





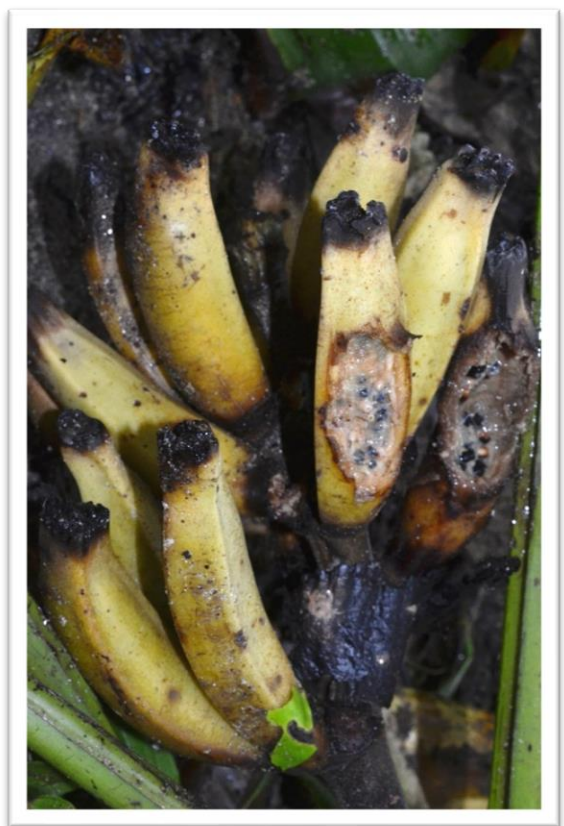
Family: Moraceae

Species: *Ficus punctata* Lam.

Local name: Ara

Fruit description: Fruit is a specialized complex structure made up of numerous tiny fruitlets. It is formed like a hollow sphere and has a thin apical aperture that is protected by overlapping scales. Most of the fruitlets are empty, while only a few of them might have seeds. There may also be stamens from recently pollinated male flowers among the fruitlets. Fruitlets with a thin, pulpy outer wall and a horny interior wall. Consist of a single seed and weak albumen.

Status: Protected plant under the WPO.



Family: Musaceae

Species: *Musa campestris* Becc.

Local name: Pisang htaun, Baliek putei, Pisak monyet, lengki

Fruit description: Fruit bunch erect, with 4–10 hands (sometimes more), 3–6 fruits per hand, inflorescence erect. Fruits are angular, bottle-neck shaped at both ends, calyx relict remains at the apex, pale green to green from immature to ripe (sometimes turned to pale yellow), many-seeded, with up to 150 seeds per fruit.

Notes: Endemic to Borneo.



Family: Musaceae

Species: *Musa juwiniana* Meekiong, Ipor & Tawan

Local name: Pisang hutan, baliek putei

Fruit description: Fruit bunch erect, with several hands (up to 10 hands) per bunch; 6–8 fruits per hand, arranged in two tiers. Fruits are angular with bottle-necked apex. Immature fruits green turned to yellowish orange when ripe. Pulp creamy white, taste sweet, with many-seeded.

Notes: Endemic to Borneo



Family: Musaceae

Species: *Musa lawitensis* Nasution & Supardiyono

Local name: Pisang hutan

Fruit description: Fruit bunch pendulous, with 4–8 hands per bunch; 6–10 fruits per hand, arrange on two tiers. Fruit angular with blunt top. Immature light yellow-green turned to yellowish when ripe. Pulp creamy, taste astringent, many seeds, up to 80 per fruit.

Notes: Endemic to Borneo. The pseudostems are very small, rarely more than 8 cm in diameter (probably the smallest among all the bananas).



Family: Myrtaceae

Species: *Rhodomyrtus tomentosa* (Aiton) Hassk.

Fruit description: Fruit drupe with a crown of five sepal remnants that resembles a berry. On axile placentas, there are 6 or 8 columns of pyrenes, with about 10 pyrenes per column, internally embedded in the pulpy-gritty mesocarp. Each column is produced as the mirror image of its mate in a pair of columns. One sharply curved seed is present in each pyrene, and the endocarp is bony on the outer curve. thin and delicate seed coat.



Family: Nepenthaceae

Species: *Nepenthes gracilis* Korth.

Local name: Periuk nera, Pok yuk, Gendi monyet

Fruit description: Specialized fruits develop from the flower into capsules, which break open when ripe to release the seeds. Seeds are fusiform, papillate at the centre which is then wind dispersed.

Notes: This species is one of many common pitcher plants found in secondary forests, degraded forests and forested areas along the roadsides. The stem can be used as a replacement for rattan to tie, and, the plant is also used in various medicinal applications.

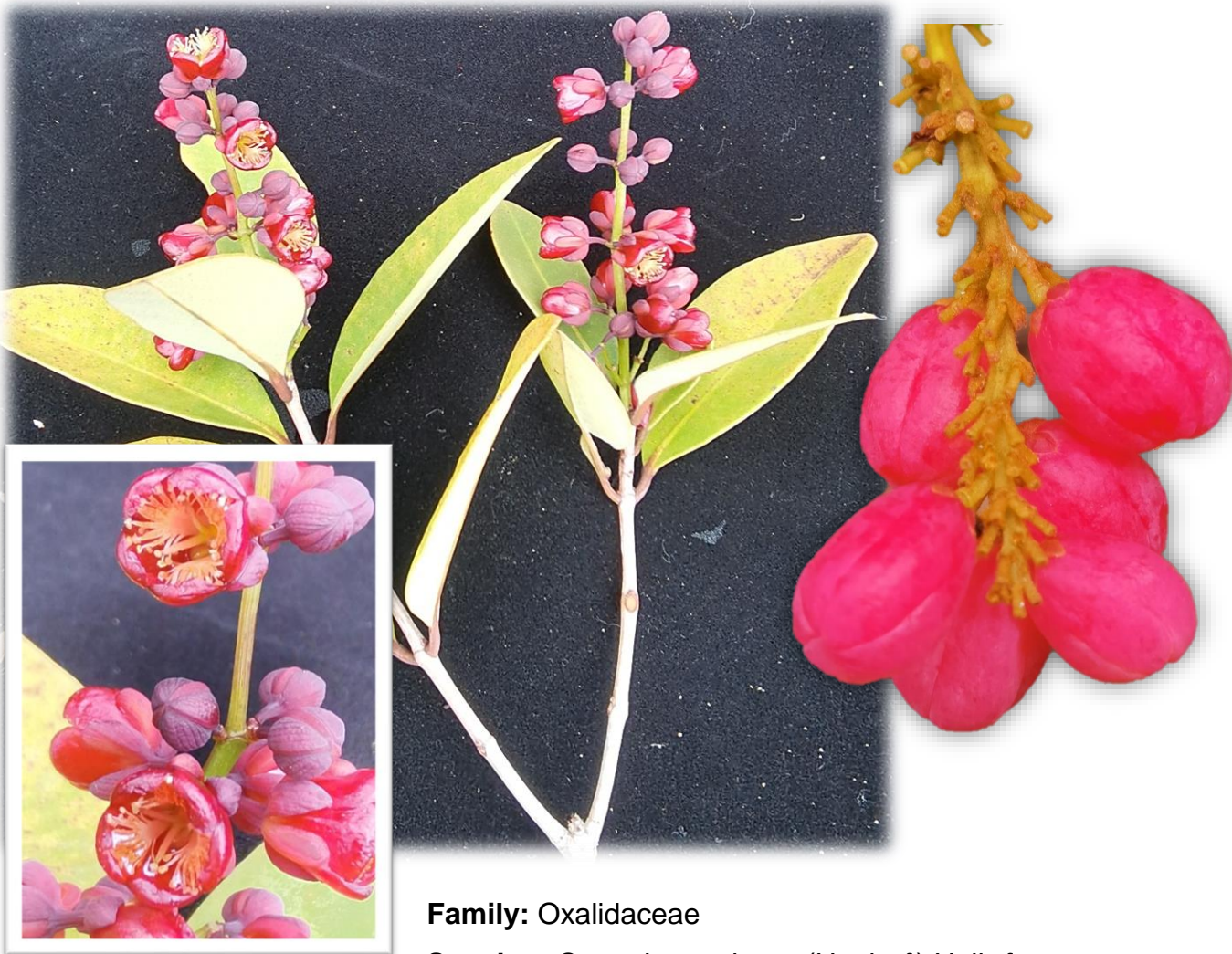
Family: Ochnaceae

Species: *Euthemis minor* Jack

Fruit description: Fruit globular, up to 6 mm diameter, acuminate, 5-ribbed, with style remnant at the apex, bright red when ripe. Split into 5 parts on the capsule when dried.

Notes: Malaysia Plant Red List (NT). Shrub or treelet up to 5 m tall. Common in open spaces in kerangas or padang forest.





Family: Oxalidaceae

Species: *Sarcotheca glauca* (Hook. f.) Hall. f.

Local name: Piang, Bakang, Tebaang, Kayu sumba, Tulang payong

Fruit description: Fruit is multi-seeded, subglobose to ellipsoid in shape, and can range in colour from bright pink to dark crimson.

Notes: Fruit edible. Occasional and widespread in kerangas and secondary kerangas, throughout Sarawak. Also, commonly along the roadsides.



Family: Pandanaceae

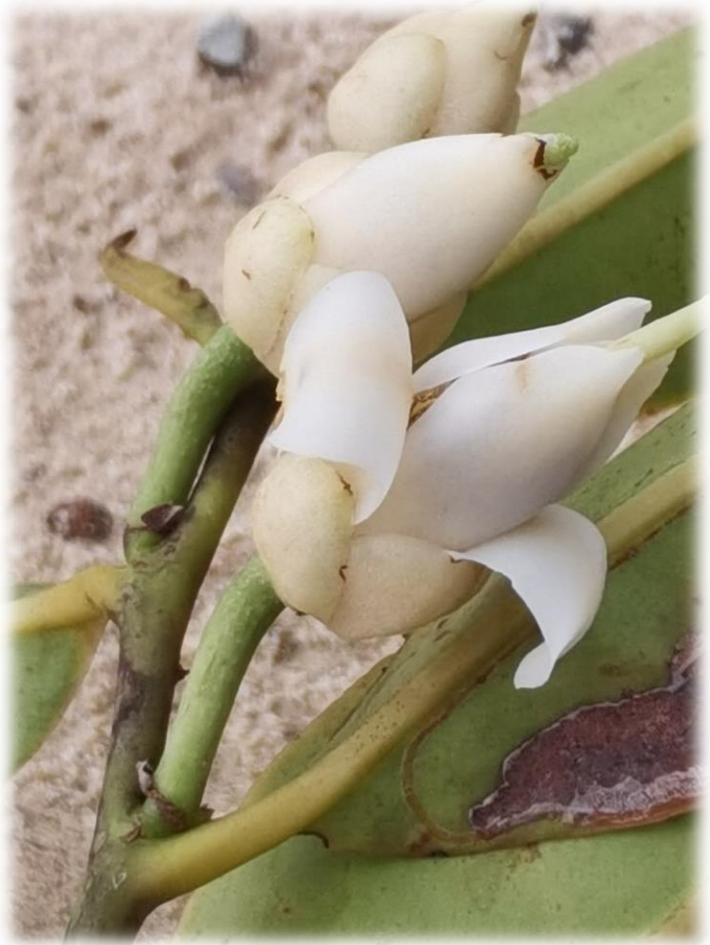
Species: *Benstonea affinis* (Kurz) Callm. & Beurki.

Synonym: *Pandanus affinis* Kurz; *P. aurantiacus* Ridl.

Local name: Mengkuang bunga, Pandan perah, Pandan ikan

Fruit description: Fruits are fleshy with a stony core, oblong-pyramidal 2–2.5 cm long in the numerous-fruited head. The fruit-heads are oblong-round, 3–9 fruits in cluster, dark green turn to orange-red when matured.

Notes: Frequently found in the freshwater swamp forest, riverine and shoreline. It has medicinal properties and is used by the local people as fish bait.



Family: Pentaphyllaceae

Species: *Adinandra dumosa* Jack

Local name: Legai, Tiup-tiup

Fruit description: Globose, berries on long stalks, the fruits of this plant ripen from green to brownish. Half of the lower part was covered by the calyx, and, with a long style at the other end; many seeds.

Notes: This species is one of many common species in the secondary forests, degraded forests and open spaces at low altitudes. The tree with low-quality wood, but is frequently used for light construction by the locals due to its availability.

Family: Pentaphyllaceae

Species: *Eurya acuminata* DC.

Fruit description: Fruits are borne axillary, berries, up to 6 mm in diameter, thinly fleshy, not splitting open, seeds many.

Notes: A small tree that is frequently found in the open secondary forest. The leaves are used to adulterate tea. A decoction of the leaves is used as a treatment for cholera, diarrhea and other stomachaches.



Family: Phyllantaceae

Species: *Antidesma tomentosum* Blume

Local name: Berenai, Buah jerawei

Fruit description: The skin of the fruit is red to pale pink on the base of the waxy skin. The fruit is stalkless, ovoid-oblong in shape.

Notes: The ripe fruits are eaten (edible). Medicinal properties – roots are chewed and applied for internal pains. The bark is burned, and the ash is rubbed on the teeth to whiten.



Family: Phyllanthaceae

Species: *Baccaurea reticulata* Hook. f.

Local name: Tampoi kuning

Fruit description: Fruit in 2 locular, fleshy fruit walls. Consist of two ovules in each locule, each ovule developed into a single seed. Flesh in dark yellow/orange colour. Seed c. 15 mm diameter.

Notes: Pulp translucent yellow, with a pleasant sweet-sour taste. Fruits are edible and occasionally cultivated.



Family: Phyllantaceae

Species: *Bridelia glauca* Blume

Local name: Patanak, Mertanak, Kayo nyelan, Lilan, Kajo delan, Tatah bua

Fruit description: The fruit is round or egg-shaped. The surface of the fruit is slightly rough and sandy. Turns to brownish purple with light white spots.

Notes: In primary and secondary forests, often near rivers,



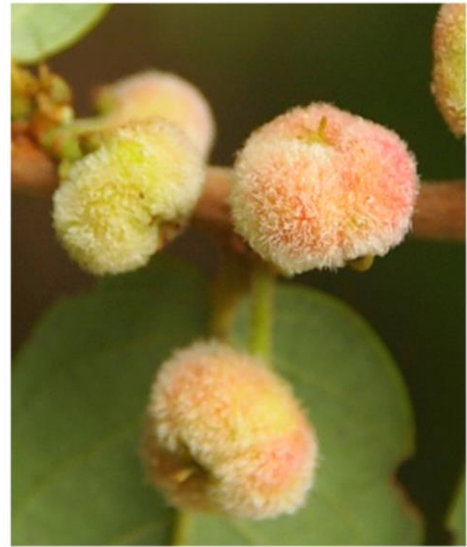
Family: Phyllantaceae

Species: *Glochidion sericeum* Hook. f.

Local name: Menyam, Entabangau, Nyam, Seleman

Fruit description: Bright, doughnut-shaped fruits with longitudinal grooves and deep dimples at the apex. The fluffy surface looks like a chick. It is classified as a capsule, splitting at the groove into 3 pieces each of which contains a seed.

Notes: Shrub or treelet, mainly in the secondary forest, but also occur in MSF and MDF.





Family: Piperaceae

Species: *Piper aduncum* L.

Synonym: *Piper angustifolium* Ruiz & Pavon.

Local name: Akar gelan, Kayu sirih,

Fruit description: Fruits are small, c. 1 mm diameter, drupe, yellow-blackish when matured.

Notes: This species is not native to Borneo, but has naturalized a long time ago, and is considered an invasive weed. Tea made from the leaves and roots is used to treat diarrhea, dysentery, vomiting, ulcers, and also can be used for the control of bleeding.

Family: Plantaginaceae

Species: *Brookea tomentosa* Benth.

Local name: Pagar, Merjimor

Fruit description: Infructescence terminal with short peduncle, bearing many fruits. Fruits ellipsoid, elongated with style remnant at the apex. Fruits are fully covered or half of the length with large hairy calyx.

Notes: Small tree, frequent in young secondary forests, especially in damp localities, throughout Sarawak. Previously this genus was placed in the family Scrophulariaceae and Stilbaceae (still in debate), for this publication we placed it under the family Plantaginaceae.





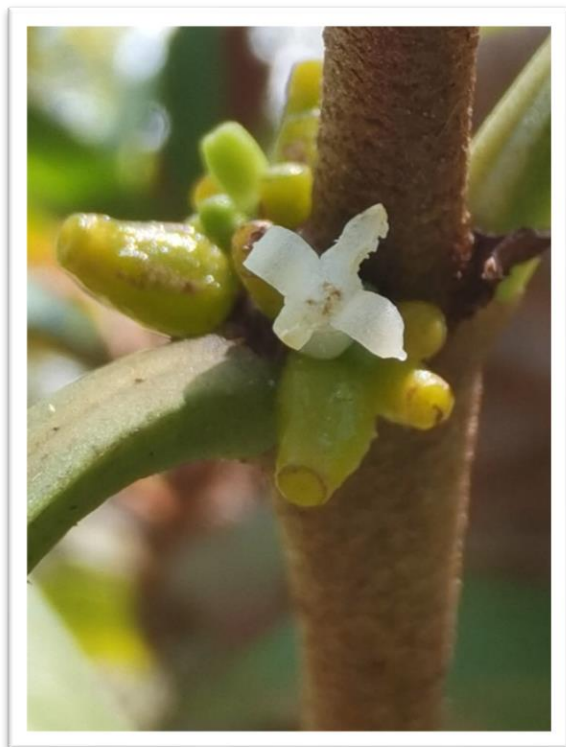
Family: Rosaceae

Species: *Rubus moluccana* L.

Local name: Molucca bramble, Broad-leaf bramble

Fruit description: Fleshy fruit, globular, 1-2 mm diameter, immature greenish-yellow turn red when ripened, knurled surface.

Notes: A scrambling shrub or climber, common in secondary forests or degraded areas. Native to Southeast Asia and the Pacific, and categorized as an invasive plant. Tasty edible fruit.



Family: Rubiaceae

Species: *Hydnophytum formicarum* Jack

Local name: Dedalu api laut, Hempedal itik, Kepala beruk, Pokok sarang semut, Ant-plant

Fruit description: Fruits are from the leaf axil, sessile or subsessile, drupe, and narrowly ellipsoid, 4–5 mm diameter, immature greenish yellow turn to orange-red when ripe.

Notes: It grows epiphytic on a tree in various habitats, from mangrove to lower montane forests. Sometimes cultivated as an ornamental plant; tubers are used as a poultice for headaches.

Family: Rubiaceae

Species: *Lasianthus furcatoides* H. Zhu

Local name: Sabar bubu

Fruit description: Fruit is a drupe with a stony endocarp that is 3–9 loculate, pulpy, and berry-like. The fruit's axis separates to create a central area as it ripens. One seed per locule, encased in albumen, with a thin, delicate seed coat and a linear embryo.

Notes: Endemic to Borneo. First published in 2012, based on the type specimen from Bintulu.



Family: Rubiaceae

Species: *Gardenia tubifera* Wall.

Synonym: *Gardenia resinifera* Roth.

Local name: Berabas hutan, Jambu batu hutan

Fruit description: Fruits are rounded, pale apple-green, 2.5–5 cm in diameter, split when ripe to expose many seeds in the orange to a red pulp.

Notes: Grows on hill and lowland MDF, but most often found by the riverbanks. An important food source for insects (flowers) and small mammals.



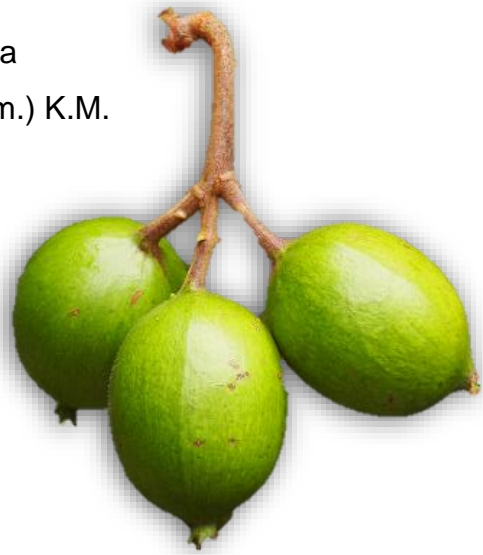
Family: Rubiaceae

Species: *Ridsdalea grandis* (Korth.) J.T. Pereira

Synonym: *Rothmannia kuchingensis* (W.W. Sm.) K.M. Wong; *Randia grandis* (Korth.) Val.

Local name: Berabas hutan

Fruit description: Fruit is a globose, biloculate drupe that resembles a berry, with a diameter ranging from 3–8 cm, depending on how many seeds have formed. Gritty-fleshy mesocarp, stony but thin endocarp.



Family: Rubiaceae

Species: *Timonius flavescens* (Jack) Baker

Synonym: *Timonius peduncularis* Ridl.

Local name: Rentap, Beratap, Sebulu, Medang suip

Fruit description: Fruits are berries, ellipsoid, c. 9–10 mm diameter, greenish yellow.

Notes: Common in secondary forests and open areas in swamp forests, MDF to sub-montane forests, altitudes up to 1700 meters above sea level. On ridges and hill slopes, but also on alluvial soils and along the rivers or streams. Has medicinal properties – e.g. the leaves are used to treat egg allergy.



Family: Rubiaceae

Species: *Urophyllum glabrum* Wall.

Local name: Sabar bubu, Melukut

Fruit description: Fruits are globose to sub-globose-shaped, with a persistent calyx limb and numerous, berry, green turning to yellowish-orange when ripe, and tiny seeds. Testa is crusty.

Notes: Shrub or small tree, to 5 m tall. Medicinal value – pounded leaves with lime used to poultice wounds.



Family: Salicaceae

Species: *Casearia capitellata* Blume

Synonym: *Casearia borneensis* Merr.; *C. latifolia* Ridl.

Local name: Senumpul

Fruit description: Fruit in ovoid shape, short-stalked fruits are found in bundles and turn yellow to orange when ripe. Few seeds are found in each fruit.



Family: Sapindaceae

Species: *Nephelium cuspidatum* Blume

Local name: Rambutan hutan, Buah Sibau

Fruit description: Fruit, a berry, formed from one of a 1–2 lobed ovary. Fruit walls have a surface that is noticeably hairy and leathery. Seed with a membranous inner seed coat and translucent white juicy edible sour to sweet sarcotesta.

Notes: Fruits are edible, fresh slightly sour. In lowland primary forest, largely confined to well-drained land on hills, ridges and slopes, on

sandy, yellow sandy clay soils, at elevations up to 800 m altitudes.



Family: Sapindaceae

Species: *Nephellium maingayi* Hiern

Local name: Serait, Buak butit, Duku, Katiau, Mujau

Fruit description: Fruit, a berry, formed from 1–2 lobed ovaries. Fruit wall has a leathery, bumpy, or pimply surface, style remnant a small point or hook just above the stipe. Fruits are green and turn reddish brown when ripe. Seed with a membranous inner seed coat and translucent white juicy edible sour to sweet sarcotesta.

Notes: This native plant is one of the important fruit trees for wildlife in the forests. Usually grows in peat swamp forests and along the riverbanks. Also infrequently found in undisturbed MDF and lower sub-montane forests, up to 1600 meter altitudes.



Family: Sapindaceae

Species: *Pometia pinnata* J.R. Forst & G. Forst.

Synonym: *Nephelium pinnatum* (J.R. Forst & G. Forst) Cambess;
Pometia pinnatum (Hook. f.) Radlk.; *Pometia coriacea* Radlk.

Local name: Kasai, Kristal, Lengeng, Lenggeng

Fruit description: Berry fruit formed from a single ovary lobe that had 2–3 lobes. The seed has a leathery inner seed coat and translucent white or yellowish edible sarcotesta.

Notes: The semi-transparent white sarcotesta is aromatic, juicy and sweet with enjoyable flavor. Usually found in the lowland, riverbanks, and swampy forests. Fast-growing species, reach up to 40 m tall. Often cultivated, and produce fruits as early as 3–4 years after planting.



Family: Simaroubaceae

Species: *Eurycoma longifolia* Jack

Local name: Tongkat ali, Payong ali, Penawar pahit

Fruit description: Fruits are ellipsoid, rounded or elongated, 10–20 x 5–12 mm, with one-seeded, yellowish orange turning reddish to dark red when ripe.

Notes: The plant is used in traditional medicine in Indonesia, Malaysia, Brunei Darussalam, Thailand and Vietnam.



Family: Simaroubaceae

Species: *Samadera indica* Gaertn.

Synonym: *Quassia indica* (Gaertn.) Nooteboom

Local name: Kelapahit, Empa'it, Adoi, Atiau, Pakalui, Sakalin.

Fruit description: The fruit is a rather flattened nut with a corky mesocarp and a thin, stony endocarp at the tip of common stalks. Membranous seed coat.

Status: IUCN – CR

Notes: The bark is used in the treatment of fever, and is also a cure for skin diseases. Decoction of leaves is taken to relieve cough, and also as a tonic.





Family: Tetrameristaceae

Species: *Tetramerista glabra* Miq.

Local name: Entuyut, Kayu hujan, Punah, Kajo tangiran, Kayu chelega



Fruit description: Fruit is a drupe

that resembles a berry; it ripens reddish red; it is highly juicy, and it has persistent sepals and petals at the base. The fruit wall is made up of four rocky pyrenes, a fleshy outer mesocarp, a pulpy interior mesocarp, and a thin, leathery exocarp. A sausage-shaped seed and the placenta's central continuation are both located on the inner side of the oblong, somewhat flattened Pyrene. thin and membranous seed coat.

Family: Thymelaeaceae

Species: *Gonystylus affinis* Radlk.

Local name: Ramin bukit, Banit, Bidaru

Fruit description: Fruit is a persistent, 3–7 lobed, firm-fleshy capsule with 2–5 shoulders, 3–5 locules, and a single seed per locule that splits loculicidal. Similar to orange, the fruit wall is thick and has oil pockets around its edges. Large, fully, or partially enclosed in an orange colour aril, joined at the base.

Notes: wood used for house construction.



Family: Vitaceae

Species: *Pterisanthes polita* (Miq.) Lawson

Local name: Akar janggut baung, Simple-leaved ribbon vine

Fruit description: Fruits are rounded, berries, about 3–6 mm in diameter (or sometimes larger). Immature fruits are green and turned to purplish black when ripped.



Family: Zingiberaceae

Species: *Alpinia capitellata* Jack

Local name: Lelamas hutan, Halia hutan, Tepus

Fruit description: Infructescence at the terminal of the leafy shoot, 10–15 fruits, congested, covered with a large papery bract. Fruits globose, 2–3 cm diameter, calyx remain at the apex, exocarp covered with golden brown hairs, immature fruits light green to green and turned to orange colour when ripe. Seeds are small, shape irregular, and light brown to black.

Status: IUCN - LC





Family: Zingibeaceae

Species: *Etlingera pyramidosphaera* (K. Schum.) R.M. Sm.

Local name: Kenchala, kantan

Fruit description: The infructescences with a long peduncle, up to 1.5 m tall, has a hemispherical involucre of sterile pink bracts. The fruits form a medieval-like war club head of horn-like spikey, green turning to yellow when ripe. Creamy white pulp, sour taste, with many black seeds.

Notes: The fruits are edible (sweet and sour taste). This species is occasionally planted for its inflorescence (uses similar to the true kantan – *Etlingera elatior*). Endemic to Borneo, widespread but scattered distribution in lowland and hill forests below 600 m altitudes. The epithet name refers to the hemispherical to the pyramid-shaped head of flowers.



Family: Zingiberaceae

Species: *Sundamomum dictyocoleum* (K. Schum) A.D. Poulsen & M.F. Newman (syn.: *Amomum dictyocoleum* K. Schum)

Local name: Tepus, Teben

Fruit description: Infructescences lie prostrate on the ground, ending in multiple fruits (up to 18 fruits). Fruits are fluted or ribbed.

Notes: This species is one of many common gingers in lowland forests, mixed dipterocarp forests and limestone habitats, particularly in damp areas, near streams or rivers. The species epithet refers to the deeply reticulate leaf sheaths.



Family: Zingiberaceae

Species: *Plagiostachys albiflora* Ridl.

Local name: Tepus, Torvu, Teben

Fruit description: Fruits are irregular-shaped, 6-8 cm long and 5 cm wide obviate, style relict remains at the apex; green and turned to paler colour when mature. pulp white, multiple seeds arranged in three locules. Seeds irregular shaped, black.

Notes: Pith of young shoots are sometimes harvested, and eaten raw as “ulam”.

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ACKNOWLEDGEMENT

Our gratitude to: -

Ministry of Energy and Natural Resources (KeTSA)

The Director of Forest Department Sarawak (FDS)

Universiti Malaysia Sarawak (UNIMAS)

Thanks to: -

Staffs of Research, Development and Innovation Division (RDID) – Hajah Mohizah Mohammed, Noorhana Mohd Sapawi, Yahud Wat

Staffs of Faculty of Resource Science and Technology, UNIMAS – Mohd Effendi Wasli, Hafsa Nahravi, Hashimah Elias, Mohd Akmal Mohd Raffi, Zinnirah Shabdin, Mogeret Sidi, Sekudan Tedong, Salim Arip.

Postgraduate students – Nurul Khaleeda Mohd Khalid, Nur Athirah Nabihah, Umie Nalya Asmadi, Nabilah Huda Mohd, Haziah Musa

PHOTO CREDIT

Awang Ahmad Zahid Awang Baim; Forest Department Sarawak (FDS); Haziah Musa; Isa Ipor; Jovita Eldersen Ripen; Ling C.Y.; Meekiong Kalu; Mohd Akmal Mohd Raffi; Umie Nalya Asmadi; Yazid Kalbi

ABBREVIATION

CR	- Critically Endangered
DD	- Data Deficient
EN	- Endangered
FR	- Forest Reserve
HoB	- Heart of Borneo
IUCN	- International Union for Conservation of Nature
LC	- Least Concern
LEWS	- Lanjak Entimau Wildlife Sanctuary
MDF	- Mixed dipterocarp forest
NP	- National Park
NT	- Near Threatened
VU	- Vulnerable
WPO	- Wildlife Protection Ordinance
WC	- Wildlife Centre
WS	- Wildlife Sanctuary



GLOSSARY

Aggregate fruit	- Fruit development from several pistils in one flower, as in jackfruit or pineapple.
Angiosperm	- A kind of plant that has seeds formed within an ovary
Annuals	- Plants that live for one year or less; in that time, they grow, flower, produce seed, and die
Aril	- A loose, papery appendage in some seeds originating as an extension from the outer integument
Biennials	- Plants that grow leaves the first year of life, and in the second year, they produce flowers, seed, and die
Calyx	- A collective term for all the sepals surrounding a flower; it forms part of the covering of some seeds
Capsule	- A dehiscent fruit with a dry pericarp, usually containing many seeds.
Carpel	- Female reproductive organ of flowering plants. One or more carpels may be united to form the pistil
Cotyledons	- The first green growth to emerge when a seed germinates, also called "seed leaves", they are a source of plant food before true leaves emerge.
Cupule	- A cup-shaped structure composed of coalescent bracts, such as the cup of an acorn.
Dehiscence	- The splitting open at maturity by pods or capsules along definite lines or joins.
Dioecious	- Refers to plants having stamens and pistils on different unisexual plants. Therefore, both sexes must be grown near each other before seed can be produced

Dormancy	- A physical or physiological condition of a viable seed that prevents germination, even in the presence of otherwise favorable germination conditions
Drupe	- One-seeded, stone fruit
Ellipsoid	- A 3-dimensional shape with elliptic outline
Embryo	- The generative part of a seed that develops from the union of the egg cell and sperm cell and during germination becomes the young plant
Endocarp	- Inner layer of the fruit wall (pericarp)
Endosperm	- The tissue of seeds that develops from sexual fusion of the polar nuclei of the ovule and the second male sperm cell. It provides nutrition for the developing, growing embryo
Epidermis	- The outer layer of cells in plants that protects them against drying and mechanical injury
Exocarp	- Outermost layer of the fruit wall (pericarp)
Fruit	- A mature ovary and any associated parts
Globose	- Globular. Roughly spherical.
Gymnosperm	- A kind of plant that produces seeds but no fruits. The seeds are not borne within an ovary and are said to be naked
Leathery	- Tough and flexible like leather and can be cut with sharp blade.
Locule	- The cavity of an ovary
Mesocarp	- Middle layer of the fruit wall (Pericarp)
Oblong	- An elongated shape with parallel sides.
Obovoid	- An egg-shaped, with the broadest part above the center
Ovate	- An outline with an egg-shaped, with the widest portion below the middle.
Parthenocarpy	- Production of fruits without seeds (e.g. banana)

Perennials	- Plants that live for more than two years and produce flowers and fruit every growing season.
Pericarp	- The ovary wall, it may be thin and fused with the seed coat
Perisperm	- A type of endosperm like storage tissue in a mature seed that develops from the nucleus of the parent plant, thus it has $2n$ chromosome number
Persistent	- Late shedding
Pistil	- The female, or seed-bearing organ of the flower. It is composed of the ovary, style, and stigma
Sarcotesta	- A pulpy or fleshy seed coat.
Seed	- A matured ovule formed during the sexual reproduction cycle of gymnosperms and angiosperms, with a protective coat enclosing an embryo and food storage.
Stony	- Hard as a stone
Sub-globose	- Inflated, but less than spherical



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