THE SUMATRAN LICUALA REVISED

By:
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ABSTRACT

A taxonomic revision of the genus *Licuala* in Sumatra is presented, based on morphological observations of 121 specimens during January 1999 to January 2000 in Herbarium Bogoriense, Herbarium of Kebun Raya Bogor and Biotrop Herbarium. It is revealed that in Sumatra there are 14 species recognized, consisting of nine known species namely *L. ferruginea*, *L. ferruginoides*, *L. kunstleri*, *L. longipes*, *L. malajana*, *L. paludosa*, *L. peltata*, *L. pumila*, *L. spinosa* and five new species are proposed namely *L. alternata*, *L. minor*, *L. mogeana*, *L. natunaensis*, and *L. posthumusii*. 
ABSTRAK


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Since 1997 she received a scholarship from URGE Project to continue her study on Plant Taxonomy at the Graduate School of Bogor Institute of Agriculture. In 1999 she married Ahmad Ade Suhada SE, and now has one daughter.
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INTRODUCTION

The genus Licuala consists of about 130 species and is mainly South Asian in distribution. It occurs from Bangladesh, North-East India, Myanmar, the Andaman Island, Thailand, Cambodia, Laos, Vietnam, South China, the Malay Peninsula, Sumatra, Borneo, Java, Lesser Sunda Islands, Celebes, the Philippines, Moluccas Island, westwards to New Guinea, the Solomon Island, Vanuatu, and Queensland (Australia). New Guinea and the Sunda shelf territories of Borneo and the Malay Peninsula appear to have the most number of species. In the Malay Peninsula these are 41 species of Licuala (Saw, 1997)

The characteristic points of Licuala is fan shaped fond with segments that split right down to the hastula. Almost all petioles of Licuala spinous, its fruit drupaceous, globose to avoid. Licuala is somewhat allied to Livistona, from which it is sharply separated by the conformation of the flower and by its constant non arboreous stature. Licuala are only rarely arborescent, and Livistona are always arboreous plants, with the only exception of the little known Livistona rupicola.

The name of Licuala is derived from the Makassar vernacular name ‘lekowala’ (Backer, 1936). It was first described by Rumphius (1741) in his Herbarium Amboinense, based on Licuala arbor. In 1780 Wurmb described Licuala spinosa and this is the type of the genus of Licuala.

Beccari (1931) revised and published monograph of Asiatic Licuala. For the Malay Peninsula, revision of the genus was published by Furtado in 1940 and Saw in
1997. *Licuala* present serious problems to the monographer because it displays great morphological variation, and in some region is astonishingly varied. Vegetative differences, clearly manifest in the field, are less easily appreciated from herbarium specimens, and much of the taxonomy is based on inflorescence and flower details which are not always present in herbarium specimens.

It is considered essential to study in depth of the Sumatran genus *Licuala* as a first step for more complete understanding of *Licuala* in Malesia. The present study is to improve the classification, to determine relationship, to produce means of identifying the taxa, and provide the distribution data on the diversity of the Sumatran species of *Licuala*. 
MATERIALS AND METHOD

The research was conducted in the Herbarium Bogoriense from January 1999 to January 2000, based on an examination of the Herbarium material from BO, Biotrop, and Herbarium of Kebun Raya Bogor, Fresh material from Bogor Botanical Garden And photocopies of the type specimens. Measurement and Description are from dried material, except for floral and fruit sizes, which are based on rehydrated material (in boiling water). The observation were made by using a binocular microscope. Terminologies follow Steinmets (1947), Lawrence (1951), Stearn (1966), Radford et al. (1976), Radford (1986) and Uhl & Dransfield (1987).

Methods follow procedures as described by Rifai (1976), Radford (1986), and Vogel (1987). The work previously done form a foundation for further study, therefore the literature pertinent to the treatment were carefully studied. Characters were studied through the entire range of the taxon to determine any intergradation between two or more taxa, based on the circumscription of the taxa recommended, the identification, and nomenclature.
RESULT AND DISCUSSION

1. Morphological Characters

1.1. Vegetative Organs

*Licuala* a rarely treelike, is very small to medium sized, solitary or clustered, acaulescent and shrubby. *L. ferruginea, L. longipes, L. peltata, L. pumila* are solitary. Very small *Licuala* is represented here by *L. minor*. The plants is not more than 40 cm tall. Petioles mostly are armed with spines on the margin at least in their lower portion, but *L. moceana* and *L. natunaensis* have no spine.

Fronds mostly are orbicular, but leaves from some specimens of *L. longipes, L. paludosa, L. spinosa, L. minor* have peltate frond. The surface of leaves is usually glabrous at abaxial and adaxial side. The costae of *Licuala* average number of main nerves though the leaf sometimes is useful in identification of a species. The central segment usually entire, mostly about equal size as lateral segment, except in *L. alternata* which has the central segment larger than the lateral segment.

1.2. Generative Organs

The inflorescence is erect to patent, varies in aspect and degree of branching, from spicate to branched of two orders on rarely to three orders. *L. pumila* usually consists of only 2, divaricated, rather robust, floriferous branchlets and the upper ones simple. *L. alternata* has alternate branching to the left and right. *L. ferruginea* has rebranched first order branches. *L. ferruginea, L. ferruginoides, L. kunstleri, L.
longipes, L. malayana, L. paludosa, L. peltata, L. pumila, L. spinosa and L. posthumusii have rusty tomentose inflorescence. L. mogeana, L. minor, and L. natunaensis have glabrous inflorescence.

Flower of Licuala can be distinguished from hairy or glabrous. The flowers of L. ferruginea, L. ferruginoides, L. kunstleri, L. malajana, L. peltata, L. spinosa, L. longipes, and L. posthumusii, are hairy. L. paludosa, L. mogeana, L. natunaensis have glabrous flowers. Common flowers of Licuala are sessile, but L. kunstleri, and L. peltata have prominent c. 0.5-1 mm floral stalk. L. peltata has larger flowers, more than 14 mm long, while the others are less than 10 mm long.

The calyx of L. paludosa, L. mogeana, L. natunaensis, and L. alternata are glabrous others are glabrous. The corolla of L. paludosa, L. posthumusii, L. minor, and L. natunaensis are glabrous. Other species have hairy calyx and corolla, color and type of calyx and corolla hairs vary, e.g. simple ferruginous hairs (such in L. ferruginea, L. ferruginoides), golden brown hair (such in L. longipes), etc. The shape calyx of Licuala varies from cyathiform to urceolate from calyx of L. peltata, L. paludosa and L. ferruginoides which are cyathiform, calyx of L. ferruginea, L. mogeana, L. posthumusii, have a vase shape. Calyx of Licuala kunstleri are obconical. Calyx of L. malajana and L. spinosa are cylindrical (partly are cyathiaform) and calyx of L. alternata, L. minor, L. natunaensis are urceolate. Corolla of Licuala exceeding the calyx. Corolla usually thick with lobes acute, tubular at base. The ovary of L. ferruginea, L. ferruginoides, L. kunstleri, L. longipes, L. mogeana, L. natunaensis, and L. alternata are cylindrical. L. pumila, L. paludosa, L. spinosa, L. mogeana, L. minor are turbinate, and L. malajana has fusiform ovary.
Hairy ovary is found in *L. ferruginea*, *L. ferruginoides*, *L. longipes* and *L. peltata* while the others have a glabrous ovary.

Fruit globose to ellipsoid, with smooth surface or covered by tomentose hairs. *L. ferruginea* and *L. ferruginoides* have crimson to pink in immature fruit, while of all other species the immature fruits are green. Seed of *Licuala* basally attached, globose, endosperm homogenous, 5 - 8 mm across.

This present account recognised 14 species of *Licuala* in Sumatra including five new species in addition two incompletely specimen are noted here and only can be shared further after some more material are collected.

2. Generic Description

*Licuala*


*Pericycla* Blume, Rumphia 2: 47 (1838). Type: *P. penduliflora* Blume (= *Licuala penduliflora* (Blume) Miq.)


Very small to medium size, solitary or cluster, acaulescent to shrubby, rarely treelike, armed or in armed, pleonanthic, hermaphrodite, very rarely dioecious, sinous or glabrous. Stem erect, decumbent, or very short and subterranean. Leaves palmate, leaf sheath disintegrating into web of fibres, petioles armed along margins with triangular spines, and some species unarmed, covered with caducous dense indumentum. Adaxial hastula well developed, usually triangular, abaxial hastula absent. Frond entire, peltate, or orbicular, with vary in size. Central segment entire, sessile. Lateral segment straight, slightly curve, much equal than central segment, sometimes central segments larger than lateral segment.

Inflorescence interfoliar, shorter or longer than leaves to spicate to branched in two order, rarely in three orders; peduncle short to very long, bearing a basal 2-keeled tubular prophyll, tubular closely sheathing, glabrous or tomentose peduncular
bract; rachis bract usually tubular, sometimes much inflated, splitting on one side, sometimes not; subsequent orders of bract minute; rachilla few to c. 30 or more, crowded or patent, glabrous to variously scaly or hairy, wiry to swollen, sometimes ornamented with longitudinal ridges, bearing spirally arranged, distant or very crowded flowers. Flowers solitary or in groups of up to 5 or more, sessile or on short floral stalks. Calyx loosely to tightly enclosing corolla, sometimes stalked at base, cylindrical, cyathiform, vase shape, truncate, urceolate, irregularly splitting, or with 3 neat triangular pointed, bifid or rounded lobes, striate, sometimes not, glabrous variously hairy; corolla usually exceeding calyx, tubular at base, divided into 3 thick triangular valvate lobes, glabrous to variously hairy, usually marked near tip of adaxial face with impression of anthers; stamen 6, epipetalous, filaments distinct, somewhat flattened, or united into a conspicuous tube tipped with 6 equal or biseriate short and long teeth bearing erect or pendulous anthers, or androecial ring 3-lobed, 3 anthers borne on short distinct filament.

Fruit globose or ellipsoid, with smooth surface or covered with tomentose hairs, calyx persistent or not. Seed of *Licuala* basally attached, endosperm homogenous.

Distribution: Bangladesh, North - East India, Myanmar, the Andaman Island, Thailand, Cambodia, Laos, Vietnam, South China, the Malay Peninsula, Sumatra, Borneo, Java, Lesser Sunda Island, Celebes, the Philippines, Moluccas Island, westwards to New Guinea, the Solomon Island, Vanuatu, and Queensland (Australia).

In Sumatera: Aceh: Mount Ranai, Pulau Tujuh, Mount Leuser; North Sumatra: Belawan, Sibolangit, Pabahan; West Sumatra: Sijunjung, Teoko; Riau:
Indragiri, Tiga Pulu Mountain, Tanjung Pinang, Singkep Archipelago, Siantan Island, Natuna Island; Jambi: Kerinci, Muara Tebo. Sungai Air Hitam, Muaro Bungo, Sungai Manan, Sungai Penuh, Pasir Mayang; Bengkulu: Kaur Tengah Enggano Island; South Sumatra: Banyu Asin, Batang Serangan, Lematang Ulu, Muara Dua, Sleman, Kampung Berak, Kepahiang, South Costal Area; Lampung: Mandau.

Ecology: *Licuala* is mostly found as the undergrowth plant in Dipterocarpaceae lowland forest. *L. spinosa* the most widespread species, occurs in forest on the lowland fringe of mangrove. *L. paludosa* is common in peat swamp forest.

In Malay Peninsula *Licuala* the number is 41 species and mostly found are forest floor plants and mostly endemic in Malay Peninsula (32 species). 7 species in Malay Peninsula found in Sumatra, namely *L. ferruginea, L. kunstleri, L. longipes, L. malajana, L. paludosa, L. peltata*, and *L. spinosa*. 
Fig 1. Distribution of the Sumatran Species of *Licuala*

1. *L. alternata*   
2. *L. ferruginea*   
3. *L. ferruginoides*   
4. *L. kunstleri*   
5. *L. longipes*   
6. *L. malayana*   
7. *L. minor*   
8. *L. mugeana*   
9. *L. natunaensis*   
10. *L. paludosa*   
11. *L. peltata*   
12. *L. pumila*   
13. *L. posthumusti*   
14. *L. spinosa*
Key Identified to The Sumatran Species of *Licuala*

1. a. Petiole less than 30 cm long, inflorescence unbranched.............7. *Licuala minor*
   
b. Petiole more than 50 cm long, inflorescence branched..........................2

2. a. Flower large, more than 14 mm long, fruit ellipsoid.............11. *Licuala peltata*
   
b. Flower small, less than 10 mm long, fruit globose - ovoid..........................3

3. a. Ovary hairy.............................................................................4
   
b. Ovary glabrous..............................................................................6

4. a. Fruit glabrous, when young green, rachilla covered with golden brown hairs
   ..........................................................5. *Licuala longipes*
   
b. Fruit hairy, when young pink, rachilla covered with ferruginous hairs
   ........................................................................................................5

5. a. Flower more than 7 mm long, calyx cyathiform .............3. *Licuala ferruginoides*
   
b. Flower less than 5 mm long, calyx vase shaped............2. *Licuala ferruginea*

6. a. Corolla glabrous.......................................................................7
   
b. Corolla hairy..................................................................................9

7. a. Peduncle glabrous, ovary cylindrical..............................8. *Licuala mogeana*
   
b. Peduncle hairy, ovary turbinate..................................................8
8. a. Flower solitary or in group of 2 or 3, sessile, calyx glabrous.

10. *Licuala patudosa*

b. Flower solitary, floral stalks 0.5 mm, calyx covered with brown simple hairs

12. *Licuala posthumusiti*

9. a. Partial inflorescence usually consist of two divaricate, staminal ring linear.

13. *Licuala pumila*

b. Inflorescence not consist of two divaricate, staminal ring truncate,...

10

10. a Prophyll tubular.

11. a. Spines approximately occur on the whole length of petiole, peduncular bract present, flower sessile.

14. *Licuala spinosa*

b. Spines approximately occur on the lower half of petiole, peduncular bract absent, flower with 1 mm stalk.

4. *Licuala kunstleri*

12. a. Calyx vase shape, corolla glabrous.

9. *Licuala naturaensis*

b. Calyx cylindrical, corolla hairy.

13. a. Calyx hairy, ovary fusiform

6. *Licuala malajana*

b. Calyx glabrous, ovary cylindrical.

1. *Licuala alternata*
SPECIES DESCRIPTION
(Alphabetically arranged)

1. Licuala alternata Andam spec. nov.  

*Palma caespitiosa inflorescentia in 1 rare alternatus, floribus solitariis*

*sessilibus, calice urceolate, 3 x 5 mm, glabrossa, lobis trilobate, corolla 4.5 x 4 mm, anulo staminale 1.5 mm, stylo filiforme, 1.6 longo. Typus: de Wilde and de Wilde Duffjjes, 21341, (Holotypus BO!).*

Acaulescent palm. Petiole c. 36 cm long, 8.2 mm wide near base, 4 mm wide toward apex; spines small size, dense, approximately along lower half of petiole; frond orbicular, c. 85 cm in wide, segment 5, with split to give window, about equal in size, lateral margin straight, lateral segment 4-5 costulate, 20 x 8 - 7 cm, central segment entire, sessile, larger than lateral segment, 20 costulate, 25 x 20 cm.

Inflorescence patent, longer than leaves, c. 58 cm long, branched to first order, rachilla alternate. Flowers solitary, sessile; calyx urn shaped, 3 x 5 mm, base thickened, apex trilobed, glabrous; corolla thick, 4.5 x 4 mm, apex truncate, covered with golden brown hairs; staminal ring 1.5 mm high, filament 0.5 mm; anther reniform, 0.7 mm long; ovary cylindrical, glabrous, apex truncate, 1.9 x 2.4 mm, style filiform, 1.6 mm long. Fruit globose, 8.3 x 6.4 mm, glabrous; seed globose, 6 mm across.

Field note: Stemless palm, leaves c. 80 cm tall. Inflorescence c. 70 cm tall.

Distribution: Aceh

Habitat: Secunder forest
Fig. 2. _L. alternata_ (after W.J.J.O. de Wilde & B.E.E. de Wilde Duyffes 21341)
a. inflorescence  b. flower  c. androecium  d. ovary  e. fruit dissected
Scala bar 1 mm for b-e.
Specimen examined: Aceh, Gm. Leuser Natural Park, alt. 50 - 1100m, 10 August 1991, W.J.J.O. de Wilde & B.E.E. de Wilde Duyffes 21341 (holotype BO!)

The epithet refer to the inflorescent in first order of branch bearing the rachilla alternate.

2. Licuala ferruginea Becc.  


Vernacular name: Lipau Talang (Palembang)

Solitary palm, acaulescent. Leaves 10 - 15 in crown; palmate, Petiole more than 100 cm, diameter c.10 - 20 mm near base, c. 3 - 10 mm wide towards apex, spines along lower half of petiole, spines narrowly triangular. Frond orbicular, medium to large size, c. 75 - 100 cm, segments c. 8 - 25, lateral margin straight; lateral segment 2 - 5 costulate, c. 50 - 100 x 5 - 10 cm; central segment entire, sessile, 7 - 16 costulate, 65 - 120 x 10 - 30 cm.

Inflorescence erect to patent, shorter than leaves. c. 40 - 150 cm long; branched to second order with 4 - 6 first order branches; peduncle c. 12 - 27 cm, densely covered with caducous ferruginous stellate hairs; prophyll tubular with fibrous
apex; rachilla to 25 - 30 long and 1 – 5.2 mm wide, densely covered with ferrugineous hairs. Flowers solitary, sessile; calyx vase shaped, c. 3.2 x 5 mm, base thickened, chartaceous above, apex trilobed to splitting irregularly, densely covered with simple ferruginous hairs; corolla deltoid (lobes) c. 4 x 4 mm, thick, apex obtuse, densely covered with golden brown hairs; staminal ring truncate, filament short, filiform, 0.4 – 0.6 mm long, anthers reniform with rounded or retuse apex, c. 0.9 mm long; ovary cylindrical, covered with golden brown hairs, apex truncate, 1.3 x 1.9 mm, style filiform, 1 – 1.5 mm long. Fruit globose to ovoid, c. 10 x 6 mm, covered with golden brown hairs, immature fruit pink; seed globose to ovoid c. 6 - 8 mm across.

Field note: Large stemless Licuala, with 4 partial inflorescence each with 4-5 rachilla, immature fruit of this species is pink.

Distributions: Sumatra, Singapore and Peninsular Malaysia.

Habitat: Ridge top on sand stone primary forest and hill Dipterocarp forest.

Specimens examined: West Sumatra, Sijunjung, Muaro Kulampi Gn. Putih, alt. 300 m, 28 February 1974, Dransfield and Moge 3984, 3962. Riau, Indragiri, 18 April 1939, Buwalda 6599; Tanjung Pinang, s.d. Teysmanns 285; Singkep Arc. Sp. Barve, alt 40 m, 8 August 1919, Bunnemeijer 7387. Jambi, Kerinci, Kampung penetai, road to Sungai Penuh, alt. 500 m, 22 July 1972, Dransfield 2631; between Muaro Tebo and Muaro Tembesi, alt. 80 m, 4 August 1972, Dransfield, 2761; Pasir Mayang, alt 100 -300 m, 5 February 1982, Vreken Buijs 1. South Sumatra, Bojong Lincir, Banyu Asin, alt. 15 m, 20 August 20, Thorenaar 60; 22 October 1931, Endert 1107; 21 December 1915, Grasshoff 882; s.d.; Jacobs 738.
L. ferruginea is closely related to L. ferruginoides which has rusty tomentose inflorescence and flowers, its young fruit is pink. L ferruginea differs from L. ferruginoides in size of flowers. L. ferruginoides has larger flowers, up to 7 mm long, L. ferruginea has flower with less than 5 mm.

3. Licuala ferruginoides Becc.  
(Holotype: Ridley 9044. East Sumatra, Siak (K).

Palm, acaulescent. Petiole more than 150 cm, diameter c.3.3 – 8.6 mm near base, c. 3.1 – 4.4 mm wide towards apex, spines less than half of petiole, spines like claws, smaller than L. ferruginea. Frond orbicular, medium size, c. 40 - 75 cm, segments c. 8. Lateral segment 3 - 6 costulate, 37 - 39 x 6 cm with lateral margins straight, central segment entire, sessile, 5 - 7 costulate, 40 x 6 cm.

Inflorescence erect, shorter than leaves, c. 80 - 100 cm long; branched to second order with 1 or 2 branches; peduncle c. 10 - 27 cm. covered with caducous ferruginous stellate hairs; rachilla to 20 - 30 mm long and 1.5 - 5 mm wide, densely covered with ferruginous hairs. Flowers solitary, sessile; calyx cyathiform companulate, c. 2.1 x 3.7 mm, base flattish, chartaceous above, divided, to about the middle, into 3, very broadly, semi ovate, densely covered with simple ferruginous hairs; corolla triangular c. 4 x 7.4 mm, thick, apex obtuse, densely covered with golden brown hairs, staminal ring membranous, truncate, filament short, filiform, c.0.6
mm long, anthers reniform with rounded or retuse apex, c. 0.9 mm long; ovary cylindrical, covered with golden brown hairs, style filiform, c. 1.8 mm long. Fruit globose to ovoid, c. 10.5 x 6.8 mm, covered with golden brown hairs; seed globose to ovoid c. 8 mm across.

Distribution: Endemic in Sumatra, known only from one specimen

Specimen examined: South Sumatra, Oostkust, Batang Serangan, Oerbosch, 11 October 1923, Jocherns 3197.


Solitary palm, acaulescent to stemmed. Petiole 1.75 m, 10 – 12.7 mm wide near base, 5.5 mm toward apex; spines approximately along lower half of petiole, triangular, reflexed, largest and dense near base; frond orbicular c. 98 cm in wide, segment 21, lateral margin slightly curved, lateral segment 3 - 10 costulate, 30 - 35 x 4.5 - 5 cm, central segment entire, sessile, 10 costulate, 56 x 15 cm.

Inflorescence erect, shorter than leaves, simple rachilla bearing 3 branches, covered with golden brown stellate hairs, prophyll tubular, 18 x 1.3 cm, covered with
brown hairs, rachis bract lanceolate, covered with brown hairs, peduncular bract absent. Flowers solitary, prominent, 1 mm long floral stalks, calyx obconical, 2.5 x 3 mm, covered with golden brown hairs, base thickened, apex truncate; corolla thick, 4 x 2.8 mm lobes pointed at apex, 2.1 x 2.5 mm, covered with golden hairs, staminal ring 1.3 mm high, filament subulate, 0.5 mm long, anthers reniform. 0.7 mm long; ovary glabrous, cylindrical, apex rounded, 1.5 x 1.6 mm, style filiform, 1.5 mm long.

Fruit globose, c. 7 mm across.

Distribution: Sumatra, Malay Peninsula, Peninsular Thailand

Habitat: Top dipterocarp forest

Specimen examined: Jambi, Kerinci, Kampung Penetai, road to Sungai Penuh, alt. 400 m, 21 July 1972, Dransfield 2612.

5. Licuala longipes Griff. Fig. 3 k-m


Solitary palm, large, stem 1 m or taller. Leaves c. 10 - 24 in crown; petiole c. 2 -2.8 m long, c. 25 mm wide near base, 10 mm wide at apex; spines regularly
spaced, along lower half or more of petiole; frond c. 150 cm wide, peltate, orbicular, thick, segment c. 20 - 25, lateral margin straight; lateral segment with 2 - 4 costulate, 68 - 95 x 6 - 8 cm; central segment entire, sessile, 15 costulate, 89 x 16 cm.

Inflorescence erect, shorter than leaves, c. 50 cm long, branched to second order, bearing 4 - 7 first order branch; peduncle c. 25 cm long c. 15 mm wide at base, peduncle bracts absent; rachis somewhat rigid, sinous, bending at primary branches; rachis bract tubular, flattened, coriaceous, covered with caducous stellate hairs; first order branches 6 - 15, bearing rather compact secondary branches; rachillae 15 cm long, 1.5 mm wide, covered with scattered simple hairs. Flower solitary, sessile; calyx cylindrical, 3 x 3 mm, base flattened, thickened, apex splitting into 3 bifid lobes, covered with scattered simple silvery hairs; corolla 4.7 x 2.5 mm, thick, densely covered with golden brown hairs, lobes 2 x 2.5 mm, apex acuminate; staminal ring undulate, 0.5 mm, filament filiform, 0.5 mm long, anther 0.6 mm long; ovary densely covered with golden brown hairs, cylindrical, truncate at apex, 1.3 x 1.5 mm, style filiform, 1.3 mm long. Fruit globose, 9 mm across; seed globose, 7 mm across.

Distribution: South East Sumatra, South West Peninsular Malaysia

Habitat: Lowland Dipterocarp forest.

Specimen examined: Jambi, Muaro Bungo, Pasir Mayang, 28 November 1986, Torquebiau 1009 (Biot); dusun Pemuyin, 01 April 1984, Laumonier 6329 (Biot).
Fig 3. a-d. *L. ferruginea* (after Jacob 238) a. flower b. androecium c. ovary d. fruit dissected; e-g *L. ferruginoides* (after Jochens 3197) e. flower f. androecium h. ovary; h-j *L. kunstleri* (after Dransfield 2612) h. flower i. androecium j. ovary; k-m *L. longipes* (after Laumonier 6329) k. flower l. androecium n. ovary; Scala bar 1 mm for all.

Vernacular name: Serdang burung, Kina-kina (Enggano)

Solitary and acaulescent palm. Petioles 182 cm long, 8.2 mm wide near base, 4.2 mm wide toward apex, spines approximately lower half of petiole, triangular and spaced; frond orbicular, lateral segment 4 - 5 costulate, 45 - 47 x 6 - 4 cm with lateral margin straight, central segment entire, sessile, 4 costulate, 52 x 7.5 cm

Inflorescence patent, shorter than leaves, branched to second order bearing 5 - 8 first order branches, peduncle c. 12 cm long, 6 mm wide, prophyll c. 10.5 x 1.5 cm, peduncular bract absent; rachis bract tubular, covered with caducous stellate hairs. Flowers solitary, sessile, calyx cylindrical, 2 x 2.5 mm, base flattened, covered with brown hairs, apex truncate; corolla c. 4.5 x 2 mm, thick, covered with golden brown hairs, lobes 2 x 2.5 mm, apex acute; staminal ring undulate, 0.5 mm high, filament subulate, 0.5 mm long; anther 0.7 mm long; ovary glabrous, fusiform, 1.7 x 1 mm, apex tapered; style filiform, 1.7 mm long. Fruit globose, 13.2 x 10.1 mm; seed globose, 7 mm across.
Distributions: Sumatra, Peninsular Thailand and Peninsular Malaysia

Habitat: Lowland hill forest

Specimen examined: Bengkulu, Enggano, Bua-Bua, alt. 100 m, 1 June 1936, Lutherham 3974.

7. Licuala minor Andam spec. nov.  

*Palma parva solitaria inflorescentia patenti vel pendula, inflorescentii spica, floribus solitariis sessilibus, calyce urceolate 1.7 x 2 mm, corolla 3 x 2.7 mm, lobis acutis 1.2 x 1.7 mm, truncate staminale, ovario glabro. Typus Bunnemeijer 6047, (Holotypus BO!)

Plant apparently 45 cm tall, stemless. Leaves 10 in crown, petiole c. 26 - 30 cm long, c. 2.2 mm wide near base, c. 1.1 mm wide toward apex, spines approximately along half of petiole, very small, reflexed. Frond, 20 - 30 in wide, peltate to orbicular, segment 7 - 9 , lateral segment 3 - 4 costulate, 9 - 10 x 1 - 2 cm, lateral margin straight, central segment entire, sessile, 5 costulate, 16 x 2.5 cm.

Inflorescence patent to pendulous, approximately same long than leaves, unbranched, tubular. Flowers solitary, sessile; calyx urceolate, 1.7 x 2 mm, covered with simple hairs, corolla thick, 3 x 2.7 mm, covered with silver hairs, lobes acute, 1.2 x 1.7 mm; staminal ring truncate, filament subulate, c. 0.2 mm long, anthers c. 0.5 mm long; ovary glabrous, turbinate; style filiform, 1.2 mm long. Young fruit globose, smooth, c. 2.5 mm across.
Distribution: Aceh, known only from one specimen

Specimen examined: Aceh, Poeleo Toedjoeh, alt. 50 m, 23 May 1919,

*Bunnemaijer* 6047. (Holotype BO!)  

The epithet refers the small plant among the specimens.

8. *Licuala mogeana* Andam spec. nov.  

_Inflorescentia L. ferruginea similes sed calyce, corolla et ovario glabrosa,

*stylo filiformo, 1.2 mm longo. Typus: Mogeia 2991, (Holotype BO!)

Clustering palm. Leaves 7 in crown, petiole c. 120 cm long, 5.7 mm wide near base, 3.9 mm toward apex; no spine, smooth; frond orbicular, c. 1 m in wide, segment c. 16 with about equal in size, lateral segment 2 - 3 costulate, 55 - 57 x 3 - 4 cm, with slightly curved lateral margins, central segment 4 costulate, 61 x 4 cm, devided into 2 lobes.

Inflorescence erect, branched to first order with 3 first order branches, peduncle c. 20 cm long, 2.7 mm wide. Flowers solitary, sessile; calyx vase shape, c. 2 x 1.8 mm with 3 pointed lobes, glabrous; corolla c. 2 x 4 mm, glabrous, thick, lobes c. 2.3 x 1.5 mm, apex pointed; staminal ring truncate, filament subulate, c. 0.5 mm long, anther 0.7 mm long; ovary cylindrical, apex truncate, c. 3 x 2 mm, style filiform, 1.2 mm long. Fruit unknown.
Fig. 4. *L. minor* (after Bunnemeijer 6047)  

a. inflorescence  
b. flower  
c. androecium  
d. ovary  
Scala bar 1 mm for a-c.
Field note: in clump, up to 1.5 m tall. Leaves 7 in crown, the leafsheaths of the old leaves still remain on the stem, petiole up to 120 cm long, blade c. 1 m in diameter, leaflets 16.

Distribution: Natuna Island

Habitat: Forest floor

Specimen examined: Riau, Natuna, West Bunguran, Sungai Segeram, alt. 0 m, 06 September 1981, Moea 2991. (Holotype BO!)

The epithet refers to Dr. J.P. Moea, who collected this specimen.
Fig 5. *L. mogeana* (after Moge 2991). a. inflorescence  b. flower
c. androecium  d. ovary  Scala bar 1 mm for b-d.

*L. egregia* inflorescentia similes, calyce urceolate, 1.6 x 2.5 mm, apice truncate, glabroussa, staminodiale truncate, ovario cylindricale, glabroussa, stylo filiforme 1.5 mm longo. Typus: *Moge* 2951. (Holotype BO!)

Larger palm, stem up 1 m tall. Petiole c. 150 cm long, 6.9 mm wide near base, 5.9 mm wide toward apex; no spine, smooth; frond orbicular, c. 1 m in wide, segment c. 10, about equal in size, lateral margin slightly curved, lateral segment 2 costulate, 53 x 5 cm, central segment splitting into 2 about equal lobes, 2 costulate, 60 x 5 cm.

Inflorescence patent, shorter than leaves, c. 50 cm long, branched to first bearing 3 first order branches, glabrous, peduncular bract present, prophyll tubular. Flowers solitary, sessile; calyx urceolate, 1.6 x 2.5 mm, glabrous, apex truncate; corolla 4.3 x 2 mm, thick, glabrous, lobes 2 x 2.6 mm, apex acute; staminal ring truncate, filament filiform, 0.5 mm long; anther 0.7 mm long; ovary glabrous, cylindrical, 1.5 x 1 mm apex truncate; style filiform, 1.5 mm long. Fruit globose, smooth, 7.1 mm across; seed globose, 6.8 mm across.

Note: Stem up to 1 m tall, petiole up to 1.5 m long, no spine. Blade c. 1 m in diameter, leaflet c. 10. Inflorescence c. 50 m long

Distribution: Natuna Island

Habitat: Pandan forest, behind the mangrove

Specimen examined: Riau, Natuna, West Bunguran, Sungai Segeram, alt. 5 m, 27 August 1981, *Moge* 2951. (Holotype BO!)
Fig 6. *L. natunaensis* (after Moge 2951) a. inflorescence  b. flower  c. androecium  d. ovary  Scala bar 1 mm for b-d.
Inflorescence the species like that inflorescence *L. egeria* in the Malay Peninsula


*Fig. 8 e-g*


*L. amplifrons* Miq. J. Bot. Neerlandaise 1: 12 (1861). Type: *Diepenhorst* 2100, Sumatera, West Sumatra, Tekou (Holotype BO!; Isotype Fl)  


Clustering palm, stem below 8 cm with whitish upward, 5 m tall or more and 5 - 7 cm diameter. Leaves 8 - 9 in crown; palmate, Petiole c. 80 - 120 cm, diameter c.5 - 10 mm near base, c. 3 - 8 mm wide towards apex, spines along lower half of petiole,
narrowly triangular and patent to reflexed. Frond peltate to orbicular, 80 - 130 cm, segments c. 6 - 10, lateral segment 2 - 6 costulate, 37 - 80 x 3 - 10 cm; central segment divided into two lobes, 7 - 9 costulate, 45 - 75 x 8 - 12 cm.

Inflorescence erect to patent, longer than leaves, c. 100 - 150 cm long; branched to second order, bearing 5 - 6 first order branches; peduncle c. 18 - 30 cm, prophyl tubular, 23 - 26 cm, coriaceous, densely covered with stellate caducous ferruginous hairs; rachis somewhat rigid, not sinuous, densely covered with scattered brown hairs. Flowers solitary to group of 2 - 3, sessile; calyx urceolate to cyathiform c. 1.5 x 2.5 mm, glabrous, apex neatly lobed with 3 pointed to bifid lobes, lobed half of the calyx; corolla thick, 2.5 x 2 mm, glabrous, striate, lobe acute; staminal ring 0.5 mm, truncate, filament subulate, 0.4 mm long, anthers c. 0.5 mm long; ovary turbinate, glabrous, apex truncate, 1 x 1 mm, style filiform, 1 mm long. Fruit globose, c. 8 x 3.5 mm, glabrous; seed globose, 5.7 mm across.

Field note: Clustering palm, stem below to 8 cm, upward 5 m tall or more. Inflorescence to 2.5 m long with 8 partial inflorescence, 7 - 9 rachillae. Flowers white, and fragrant.

Distribution: Sumatra, Borneo, The Malay Peninsula, Indo-China.

Habitat: Peat swamp forest.

Specimens examined: West Sumatra, Pariaman, Tekoe, s.d. Diepenhorst 2100. Jambi, Sungai Air Hitam, Suaka Margasatwa Borbak, E. coast, alt. 2 m, 12 July 1972, Dransfield 2554. South Sumatra, Palembang, Banyu Asin, alt 20 m, 26 September 1915, Grasshoff 630.


Solitary palm, petiole 170 cm, spines along nearly whole length of petiole, irregularly spaced, waxy and scaly indumentum. Frond large, peltate, orbicular, 100 x 172 cm, segment c. 15, lateral margin straight; lateral segment 5 - 7 costulate.

Inflorescence patent, longer than leaves, 2.75 m long, 11.1 mm wide, densely caducous stellate hairs. Flowers solitary, large, 15 - 16 mm, on prominent floral stalks c. 1.5 - 3 x 1 mm, bud ellipsoid, 12 - 15 x 5 - 6 mm; calyx cyathiform, 7 x 4 mm, densely covered with golden hairs, base cuneate, thickened, apex truncate with 3 short acuminate lobes, chartaceous; corolla 10 x 7 mm, thick, covered with simple pale brown hairs, lobes 6 x 5 mm, apex acute; staminal ring lacking, filament equal, 4 mm long, thick, narrowly triangular, flattened; anthers linear sagittate, 3.2 x 1.3 mm; ovary cylindrical, truncate at apex, 2 x 2.1 mm, densely covered with silvery hairs, style filiform, 8.5 mm long. Fruit ellipsoid, 14 - 18 x 8 - 11 mm, glabrous. Seed ellipsoid, 10 x 8 mm.

Distributions: Andaman Island, India, Bangladesh, Sumatra, North Peninsular Malaysia Myanmar, and Thailand.

Habitat: Moist deciduous forest.
Specimen examined: West Sumatra, Pariaman, Tekoe, sd. Diepenhorst 300.

*L. peltata* characteristic which larger flowers (more than 14 mm long) and androecium lacking a staminal ring. Other species have small flowers, less than 14 mm long.

12. *Licuala posthumusii* Andam spec. nov.  

*Inflorescentia erecto in 1 ordinem ramificanti vel 2 ramis et 3 ramis primaries, floribus solitariis, calyce 4 x 2 mm, pubescent, corolla 4.2 x 2 mm, glabrossa, staminale 0.4 mm, ovario turbinate, glabrossa, stylo filiforme, 0.7 mm longo. Typus: Posthumus 768 (Holotype BO!).*

Petiole 105 cm long, 8.7 wide near base, 5.3 mm wide toward apex; spines approximately lower half of petiole, small size, claw shaped, rarely density; frond orbicular, c. 75 cm wide, segment 20 about equal in size, lateral segment 3 costulate, 54 x 5.4 cm with slightly curved lateral margin, central segment divided into 2 lobes, 3 costulate, 54 x 4 cm.

Inflorescence erect, branched to first and second order with 3 branches, peduncle c. 18 cm long, covered with velotinus golden brown hairs, peduncular barct absent, prophyll tubular, rachilla 5 - 8 cm long, covered with velotinous golden brown hairs.. Flowers solitary, 0.5 mm long floral stalk; calyx vase shaped, 4 x 2 mm, with 3 pointed lobes, covered with brown simple hairs; corolla 4.2 x 2 mm, thick, glabrous, lobes c. 2.5 x 1.5 mm, apex pointed; staminal ring 0.4 mm high, filament subulate, 0.5
mm long, anthers c. 0.9 mm long, ovary turbinate, apex truncate, 0.7 mm, glabrous, style filiform, 1 mm long. Fruit unknown.

Distribution: Jambi

Specimen examined: Jambi, S. Manan, alt. 180 m, 25 August 1925,

Posthumus 768. (Holotype BO!)

13. Licuala pumila Reinw.


L. gracilis Bl. in Roem et Schult, Syst. Veg 7: 1303 (1830); Blume, Rumphia 2: 44 (1836); Mart., Hist. Nat. Palm 3: 238 & 318 (1849). Type: Blume s.n. Java. Banten (L)

Vernacular name: Sardang upol, Serdang ayam, Serde, Pallas. (Palembang)

Solitary palm, acaulescent or short stem up to 2 m long, about to 3 cm wide. Frond large, orbicular, radiately parted, 6 - 8 (5 - 7) or more up to 18, lateral segment 3 - 4 costulate, 40 - 80 x 3.5 - 10 cm with variable lobes central segment entire, sessile, 5 - 8 costulate, 35 - 85 x 3 - 18 cm; petioles usually longer than the blade, spines along less half of petiole, little and turn, dense near at central of blade.
Inflorescence shorter than leaves, 40 - 55 cm long with only 2 - 3 branch, floriferous branchlets; rachis strongly flattened and more or less striate, glabrescent, or sometime slightly puberulous, partial inflorescence usually consist of two divaricate. flowers irregularly, solitary, calyx companiculate orceolate, 1.2 x 2.5 mm, very slightly 3 toothed, glabrous; corolla coriaceous, triangular, thick, 2 x 2.5 mm, glabrous, apex acute, striate externally, deeply sculptured inside; staminal ring membranous, filament subulate, anthers 0.5 mm long, blunt; ovary turbinate, 1 x 1.5 mm, glabrous, sculptured above; style subulate, 1.2 mm long. Fruit globose to oblong, 7 - 10 mm, smooth; seed globose, 6 - 8 mm.

Field note: Solitary, stem to 30 cm, covered in brown rotting sheats. Inflorescence to 40 cm, branches arching down, flowers cream, fruit green.

Distributions: Sumatra, Java

Habitat: Ridge top hill of Dipterocarp forest to lowland Dipterocarp forests

Specimens examined: Jambi, between Muara Tebo and Muara Tembesi, alt. 80 m, 4 August 1972, Dransfield 2762; Kampung Penetai, road to Sungai Penuh, alt. 300 m, 22 July 1972, Dransfield 2616. South Sumatra, Palembang, Lematang Ulu, alt. 150 m, 20 February 1915, Grashoof 200; Moera Doea, alt 250 m, 30 May 1915, Grashoof 396; Dusun Sleman Enim, Tanjung Agung, alt. 120 m, 10 March 1970, Dransfield & Saerudin 2402, 241; Kerang Berak, alt. 100 m, 20 February 1971, Dransfield 1268; Kepahiang, near Tjurup, alt. 800 m, 12 February 1971, Dransfield 1229. Bengkulu, Kaur tengah, Taman Nasional Bukit Barisan Selatan, alt. 400 m, 18 November 1995, A. Keim 16; areal HPPH PT Bengkulu Taman Raya
S.O.K. Mandau, 28 September 1930, E. Polak 131

The typical of this species consist of only 2, divaricate, rather robust, floriferous branchlets.

14. *Licuala spinosa* Wurmb.                                                     Fig. 9

Verh. Bat. Genootsch. 2: 474 (1780); Thunb., Kongl. Vetenskaps Nya Handlingar
3:287 (1782); Roxb., Fl. Indica 2: 181 (1832); Mart., Hist. Nat. Palm. ed. 1: 235
(1838); Griff., Calcutta J. Nat. Hist. 5: 321 (1844); Mart., Hist. Nat. Palm. ed. 2:
235 (1849); Griff., Palms of British India 119 (1850); Becc., in Hook. f., Fl. Brit. India
6:431 (1892); Ridl., Mat. Fl. Mal. Pen. 2: 160 (1907); Becc. Webbia 5: 24 & 47
(1933); Furtado, Gard. Bull. Straits. Settlement 11: 67 (1940); Saw in

Vernacular name: Lipau asu

Clustering palm, stems to 2 m or more tall. Leaves c. 15 - 17 in crown,
petioles 1.5-3 m long, 10 - 20 mm wide near base, 5 - 10 m wide at apex, spines along
approximately whole length of petiole, narrowly triangular, patent to reflexed and
largest near base, frond peltate orbicular, c. 80 x 120 cm, segment c. 17 - 21, all about
the same size, lateral segments 2 - 6 costulate, 40 - 73 x 4 - 7.5 cm, central segment
entire, 7 - 10 costulate, 42 - 75 x 5 - 13 cm.
Fig. 7. *L. posthumusii* (after *Posthumus* 768)  

a. inflorescence  
b. flower  
c. androecium  
d. ovary  
Scala bar 1 mm for b-d.
Fig. 8. a-d *L. malayana* (after Lutherhams 3974) a. flower  b. androecium  
c. ovary  d. fruit dissected; e-g *L. paludosa* (after Grasshoff 630) e. flower  
androecium  g. ovary; h-j *L. peltata* (after Diepenhorst 300)  h. flower 
androecium  j. ovary;  k-n *L. pumila* (after Dransfield 2616)  k. flower 
androecium  m. ovary  n. fruit dissected  Scala bar 1 mm for all
Inflorescence erect to patent, longer than leaves, extending beyond crown, 1.8 - 2.5 m long, branched to second order, bearing 7 - 10 first order branches; peduncle c. 80-120 cm long, 7 - 12 mm across basally, densely covered with stellate caducous ferruginous hairs; peduncular bracts present; prophyll tubular, 20 cm or more long, coriaceous, flattened, covered with stellate caducous ferruginous hairs, rachis somewhat rigid, not sinuous, rachis bracts mouth splitting neatly in a few lobes; rachilla unornamented, c. 20 - 30 cm long, c. 1.8 - 2 mm wide, covered with scattered simple brown hairs. Flowers solitary in group 2 - 3, sessile; bud c. 3 x 2.5 mm; calyx cylindrical to cyathiform, c. 3 x 2 mm, base thickened, flattened, apex neatly trilobed, acuminate, lobed to about half of calyx length, covered with scattered patent hairs; corolla c. 3 x 2 mm, thick, densely covered with simple hairs, glabrescent toward base, lobe acute c. 1.5 x 2 m; filament subulate, c. 0.3 m long, anthers c. 0.6 mm long; ovary glabrous, turbinate, apex truncate, 0.6 x 1 mm, style filiform, 1.2 - 1.4 mm long. Fruit globose, c. 6.3 x 8.3 mm, glabrous; seed globose, c. 5 mm across.

Distribution: Andaman and Nicobar Island, Thailand, Vietnam, Peninsular Malaysia, Sumatra, Java, Borneo, the Philippines.

Habitat: Lowland alluvial, peat and mangrove swamp forest and primary forest

Specimens examined: North Sumatra, Belawan, Deli, alt. 1 m, 24 December 1914, Lorzin 3464; Sibolangit Botanical Garden, alt. 500 m, 25 September 1927, Lorzin 12087; Pabalan, s.d., Lorzin, s.n. Riau, Pulau Siantan, Tanjung Suka, alt 2 m, 3 April 1928, van Steenis 994; Tiga Puluh Mountains, Bukit Karampal Area, alt
100 m, 15 November 1988, Burley, Tukirn et al 1492. South Sumatra, East Coast, June 1925, Jochen 1; September 1930, Polak 120.

Fig. 9. *L. spinosa* (after Lorzing 12087)  

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<tr>
<th>a</th>
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<tr>
<td>flower</td>
<td>androecium</td>
<td>ovary</td>
<td>fruit dissected</td>
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Scala bar 1 mm for all
15. Licuala sp 1

Petiole c. 45 cm long, 8.7 mm wide near base, 4.2 mm toward apex, grooved, spines irreguarly in space and size, approximately half of petiole. Frond peltate-orbicular, c. 25 - 30 cm in wide, segment 8, lateral segment 4 - 3 costulate, 20 - 24 x 2 - 2.5 cm, lateral margin straight, central segment entire, sessile, 6 costulate, 30 - 32 x 6.5 - 7 cm.

Inflorescence erect, shorter than leaves 3.7 - 8.5 mm in wide, with 2 order branching bearing 2 - 3 first order branches with 8, 10, 14, rachilla, covered with brown hairs, prophyll lanceolate. Flowers unknown. Fruit globose, smooth, 5 mm across; seed globose 3.5 mm across.

Specimen examined: Aceh, Ga. Ranai, Poeloe Toedjoeh, alt. 700 m. 19 May 1919, Bunnemeijer 5828.

16. Licuala sp 2

Petiole c. 71 cm long, 6.4 mm wide near base, 4.4 mm wide toward apex; spines irregular in shape and size, approximately all along of petiole; frond orbicular, c. 85 cm in wide, segment 22, about equal in size, lateral margin straight, lateral segment 3 costulate, 31 x 2 - 3 cm, central segment splitting into 2 about equal lobes, 3 costulate, 45 x 3 cm.

Inflorescence patent, shorter than leaves, c. 70 cm long, branched to first bearing 3 first order branches, glabrous. Flowers unknown, fruit unknown.

Distribution: Natuna Island
Habitat: Heath forest

Specimen examined: Riau, Natuna, West Bunguran, Panjang, alt. 10 m, 26 August 1981, Moge 2931.

This species closely related to L. stongenis, which the species endemic in Gunong Stong, Kelantan in Peninsular Malaysia.
Fig. 10. *Licuala* sp 1. (after Bunnemeijer 5828)
Fig 11. *Licuala* sp 2. (after *Mogea* 2931)
CONCLUSION

Based on a study of morphological characters of the genus *Licuala* in Sumatra, 14 species are recognized. Nine species were previously known: *L. ferruginea*, *L. ferruginoides*, *L. kunstleri*, *L. longipes*, *L. malajana*, *L. paludosa*, *L. peltata*, *L. pumila* and *L. spinosa*. Five new species are described: *L. alternata*, *L. minor*, *L. mogeana*, *L. natunaensis*, and *L. posthumusii*. Two species incompletely known.
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