

*Pinanga* consists of about 120 species, occurring from the Himalayas and south China to New Guinea, with the greatest diversity in the wet areas of the Sunda Shelf and very poorly represented in Papuasia (Uhl & Dransfield 1987). In Indonesia, the genus is represented by about 40 species, at least 14 of which are endemic.

*Pinanga* is found throughout Java, from sea level to montane forests, but the taxonomy of Javanese *Pinanga* has been interpreted variously in the botanical literature. Scheffer (1876) recorded three species on the island, i.e. *P. javana* (Fig. 1), *P. kuhlii* and *P. coronata*. Beccari (1886) added *P. noxa* of Blume to the Javanese list. In contrast, Koorders (1911) mentioned that Java has only two species, i.e. *P. javana* and *P. kuhlii*, while he considered *P. coronata* to be synonymous with *P. kuhlii*. According to Backer & Bakhuizen van den Brink, Jr. (1968), *Pinanga* is represented by only one taxon in Java, namely *P. coronata* (Blume ex Mart.) Blume. *Pinanga globulifera* (non Blume) Merr., *P. kuhlii* Blume and *P. noxa* Blume were all cited as synonyms. In their note, they mentioned that the poorly known *P. javana* Blume may be conspecific with *P. coronata*. However, there was no detailed taxonomic justification for the reduction in the number of species.

On the island of Bali, Dransfield and Mogege collected an unidentified species of *Pinanga* in 1973; this was recently referred to by Whitten (1994) and Whitten et al. (1996) but was not studied in detail. The Balinese taxon is described herein as new.

#### ***Pinanga* Blume**

Blume, Bull. Sci. Phys. Nat. Néerl. 1: 65. 1838. Lectotype: *Pinanga coronata* (Blume ex Mart.) Blume.

*Cladosperma* Griff., Not. Plant. Asiaticas 3: 165. 1851. Type: *C. paradoxa* (Griff.) Griff. (*Areca paradoxa* Griff.) (= *Pinanga paradoxa* (Griff.) Scheff.).

*Ophiria* Becc., Ann. Jard. Bot. Buit. 2: 128. 1885. Type species: *O. paradoxa* (Griff.) Becc. (*Areca paradoxa* Griff.) (= *Pinanga paradoxa* (Griff.) Scheff.).

*Pseudopinanga* Burret, Notizb. Bot. Gart. Berlin-Dahlem 13: 188. 1936. Type: *P. insignis* (Becc.) Burret (= *Pinanga insignis* Becc.)

#### **Description of the genus based on Javanese and Balinese material**

Small to robust, solitary or clustered, erect, unarmed, pleonanthic, monoecious palms. Stem slender to moderate, with elongate internodes and conspicuous leaf scars. Leaves pinnate; sheaths tubular, forming a well defined crownshaft; petiole

present, adaxially rounded or channelled, abaxially rounded, glabrous or variously indumentose; leaflets with one to several folds, regularly to irregularly arranged, acute, acuminate, or lobed, the lobes corresponding to the folds, the apical leaflets almost always lobed, blade occasionally mottled, sometimes paler beneath, often with a wide variety of scales and hairs, transverse veinlets usually obscure. Inflorescence infraxillary, usually rapidly becoming pendulous, occasionally erect, protogynous, branching to 1 order only; peduncle short, dorsiventrally flattened, glabrous or tomentose in bud, quickly splitting to expose the flowers; peduncular bracts absent; rachis bracts triangular, inconspicuous; rachillae bearing spirally or distichously arranged triads throughout their length; floral bracteoles minute. Staminate flower asymmetrical, sessile; calyx cupular with 3 triangular lobes; petals 3, triangular, joined briefly basally, valvate in bud, much exceeding the calyx lobes; stamens 12–68; filaments short, anthers linear; pistillode absent. Pistillate flower usually globose, symmetrical, much smaller than the staminate; sepals 3, membranous, striate, imbricate, distinct; petals 3, distinct, imbricate, membranous; staminodes absent; gynoecium unilocular, uniovulate, globose, stigma often brightly colored (reddish to orange). Fruit globose or ellipsoidal, orange to black, stigmatic remains apical; epicarp smooth, shiny, mesocarp thin, fleshy, endocarp of longitudinal fibers, usually adhering to the seed, becoming free at the basal only, fruit without a solid beak. Seed conforming to the fruit shape, basally attached; endosperm deeply ruminant; embryo basal or lateral near the base.

#### **Key to *Pinanga* in Java and Bali**

1. a. Small clustering palm . . . . . *P. coronata*
- b. Robust solitary palm . . . . . 2
2. a. Crownshaft purplish-green, covered with silvery indumentum; leaflets 35–45; inflorescence silvery indumentose at the base and verruculose; rachillae 20–30, spirally arranged on the rachis; fruit obovoid . . . *P. arinasae*
- b. Crownshaft brownish-green, covered with scaly brown indumentum; leaflets 10–15, inflorescence glabrous; rachillae 8–14, arranged distichously and alternate on the rachis; fruit ovoid to ellipsoid . . . . . *P. javana*

#### ***Pinanga arinasae* J. R. Witono, sp. nov.**

*P. javanae* affinis sed caudice solitario, vaginis foliorum sublepidotis, frondibus pinnatisectis, segmentis utroque latere 35–45 lineare-lanceolatis acuminatis, inflorescentiis lepidotis et verruculosis, ramis (20–30) spiralibus, fructibus obovoideis.

Typus: INDONESIA. Bali, Bedugul, Bukit Tapak, 1973, *Dransfield et al. JD3512* (holotypus BO; isotypi BH, K, L).

Robust, solitary palm. Stem erect, 12–15 cm diam., 10–12 m tall, medium brown to gray brownish; internodes 10–25 cm, scars to 3 cm. Crownshaft slightly swollen, 130–180 cm long, 14.0–17.5 cm diam., yellow when young and purplish green when adult, covered with silvery indumentum. Leaves 7–10 in the crown, pinnate, whole leaf 250–330 × 240 cm; leaf-sheath to 110 cm, inside white and smooth, petiole 16–40 cm, deeply oblique, convex abaxially, silvery indumentose below; rachis to 215 cm, silvery indumentose below, concave then flattened adaxially, convex abaxially, terete near the apex; leaflets 35–45 on each side of rachis, entire, regularly arranged, linear to lanceolate, basal leaflets 50–58 × 1.0–1.8 cm, ribs 2, middle leaflets 90–120 × 4–5 cm, ribs 2, apical leaflets 30–48 × 0.6–3 cm, ribs 2–4, indumentose on lower ribs, the surfaces discoloured, upper dark green, lower pale green when fresh, on drying becoming pale brown on lower surface and dark brown on upper surface. Inflorescence infrafoliar, arcuate, eventually pendulous, branched to one order only, silvery indumentose at the base and verruculose, 50–55 cm long, base very stiff; prophyll pale yellow distally and greenish yellow near base when fresh, brownish yellow when dry, papery, smooth, 37 × 8 cm; peduncle erect, flattened, 11–18 × 1.6–2.5 cm, rachis 18–27 × 1 cm, rachillae 20–30, spirally arranged on the rachis; rachillae bearing 16–28 triads on each side, basal rachillae longer than apical rachillae. Staminate flowers sessile, calyx with 3 subulate sepals, 7 × 3.5 mm; corolla with 3 petals, longer than sepals, ovate, 10 × 6 mm; stamens 45–68, pale yellow, 2–4 × 0.3–0.5 mm. Pistillate flowers sessile; calyx cup-shaped, pale yellow, 4 mm diam. with 3 triangular imbricate orbicular sepals, lobes 5.5–6 × 4 mm, ciliate at margins, striate, apex mucronate; corolla with 3 cucullate free rounded, orbicular, ciliate pale yellow petals, similar to sepals in size, striate, apex mucronate-obtuse; ovary rounded, 3 × 2 mm. Fruit obovoid, 12–17 × 8–12 mm. Young fruit green, mature fruit red blackish. Seed obovoid, deeply ruminant. (Figs. 2, 3, 7, 8)

**DISTRIBUTION:** Endemic to Bali at Bukit Tapak near Eka Karya Botanic Garden. We did not find this species in nearby Bukit Lesung and Bukit Pohen. A long time ago, *P. arinasae* was probably present there, but the habitat is now highly degraded.

**SPECIMENS EXAMINED:** BALI. Bukit Tapak, Apr 1973, *Dransfield JD3512* (Holotype BO); sterile,

Mar 1992 *Afriastini 163* (BO); seedling, May 1998 *Witono 74* (BO); flower, May 1998 *Witono 75* (BO).

**ECOLOGY:** Occurring on a very steep hill slope on rocky outcrops in *Casuarina* and *Engelhardtia* forest at altitudes of 1100–1400 m above sea level.

**LOCAL NAMES:** *Nyabah*, *jabah* or *pinang jawa*.

**USES:** A highly ornamental palm, popular with local people near the botanic garden. Young fruits are used as a substitute for betel nut (*Areca catechu*), young leaves (cabbage or *umbut*) can be eaten. Stems are used for traditional cremation ceremonies (“*ngaben*”), and leaf-sheaths are used for making a “*cukup*” (a Balinese umbrella).

This handsome “pinang” is named for Mr. I.B.K. Arinasa who assisted us in the field. *Pinanga arinasae* is closely related to the single-stemmed *P. javana* from Java, *P. insignis* from the Philippines and to *P. punicea* from Papua and Maluku. The major differences between *P. arinasae* and the above mentioned species are presented in Table 1.

**2. *Pinanga javana*** Blume, Bull. Sci. Phys. Nat. Néerl. 1: 65. 1838 and Rumphia 2: 81. 1839. Type: Java, *Blume s.n.* (holotype L!).

Robust, solitary palm. Stem erect, 4–10 m tall, 10–15 cm diam., internodes to 10–30 cm, stem surface green brownish, smooth, slightly fissured longitudinally. Crownshaft elongate, 150–200 cm long, 25 cm diam., swollen, purplish brown, with brown scales. Leaves 10 in crown, pinnate; whole leaf (including leaf-sheath, petiole, and rachis) 250–300 cm with silvery indumentum on petiole and rachis, very massive; leaf-sheath to 100 cm; petiole to 30 cm, concave adaxially, convex abaxially; rachis 3 cm diam.; leaflets 10–15 on each side of rachis, regularly arranged, slightly arcuate, elongate linear-lanceolate, falcate-sigmoid, equidistant, basal leaflets 65–95 × 1–6 cm, ribs 1–3, middle leaflets 70–115 × 2.7 cm, ribs 1–3, apical leaflets 19–55 × 1.5–7.5 cm, ribs 2–7. Inflorescence infrafoliar, hand-like, spreading pendulous, 40–50 cm long, peduncle erect at base, flattened, 9–16 cm long, 0.8–1.5 cm thick; prophyll not known; rachillae 8–13, arranged distichously alternate, at the base 23–35 cm with 19–21 triads, at the apex 18–27 cm with 15–17 triads, peduncle, rachis, and rachillae green when young, pinkish red with age. Triads distichous, alternate. Pistillate flower (calyx and corolla) cream, ovary green; calyx cup-shaped, sepals 3, imbricate, broadly orbicular, 6–8 × 4–4.5 mm, smooth, thick at the middle, thin at side, with ciliate margins, apex mucronate; corolla with 3 cucullate rounded ciliate petals, 4–6 × 3–4 mm, apex mucronate-obtuse. Fruit ovoid to ellipsoid, 20–26 × 11–14 mm, pale pinkish yellow when