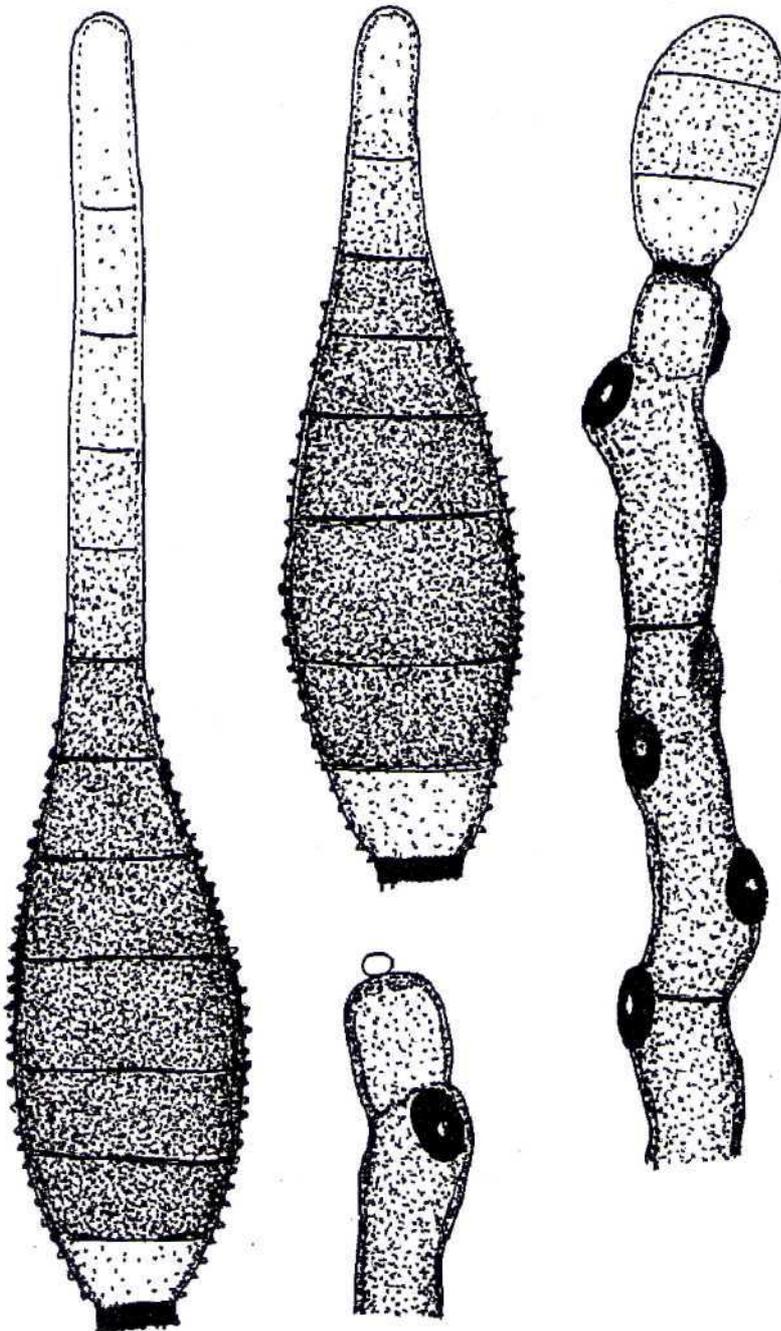




A JOURNAL ON TAXONOMIC BOTANY,
PLANT SOCIOLOGY AND ECOLOGY



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HERBARIUM BOGORIENSE, BIDANG BOTANI, PUSAT PENELITIAN BIOLOGI - LIPI,
BOGOR, INDONESIA

TWO NEW WILD SPECIES OF *AVERRHOA* (OXALIDACEAE) FROM INDONESIA

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ABSTRACT

RUGAYAH & SUNARTI, S. 2008. Two new wild species of *Averrhoa* (Oxalidaceae) from Indonesia. *Reinwardtia* 12(4):325 - 331.— Based on living collections cultivated in Bogor Botanical Gardens and several herbarium specimens kept in Herbarium Bogoriense, *Averrhoa dolichocarpa* Rugayah & Sunarti (from New Guinea) and *A. leucopetala* Rugayah & Sunarti (from North Sulawesi) are described as new species. They are compared with *A. carambola* L. and *A. bilimbi* L. the only other known species so far.

Keywords. *Averrhoa dolichocarpa*, *Averrhoa leucopetala*, Oxalidaceae, Indonesia.

ABSTRAK

RUGAYAH & SUNARTI, S. 2008. Dua jenis baru *Averrhoa* (Oxalidaceae) dari Indonesia. *Reinwardtia* 12(4): 325 - 331. — Berdasarkan koleksi hidup yang ada di Kebun Raya Bogor dan beberapa spesimen herbarium yang disimpan di Herbarium Bogoriense, dipertelakan dua jenis baru *Averrhoa dolichocarpa* Rugayah & Sunarti (dari Papua) dan *A. leucopetala* Rugayah & Sunarti (dari Sulawesi Utara). Keduanya diperbandingkan dengan dua jenis yang ada saat ini yaitu *A. carambola* L. dan *A. bilimbi* L.

Kata kunci. *Averrhoa dolichocarpa*, *Averrhoa leucopetala*, Oxalidaceae, Indonesia.

INTRODUCTION

Averrhoa carambola L. and *A. bilimbi* L. (Oxalidaceae) are two well known South-East Asian species, widely cultivated to be used as table fruits, spices or traditional medicine respectively. Several infraspecific taxa of these two species have been described by earlier authors (Koorders & Valetton, 1903; Kunth, 1930) who recognized *A. carambola* var. *angusticepala* Progel (from South America) and *A. carambola* f. *acida* Koorders & Valetton and *A. carambola* f. *dulcis* Koorders & Valetton (cultivars from Java) and *A. bilimbi* f. *papuana* Kunth (from Papua). Since no character could be found to distinguish these infraspecific taxa, most modern taxonomists (Backer & Bakhuizen v/d Brink Jr., 1963; Veldkamp 1971 Samson, 1992.) recognized only the two species based on morphological characters, such as the number of leaflets, position of the flowers, size of the corolla, the coherence petals, the shape of fruit, and the presence or absence of the seed aril.

In 1985, Dr. Elizabeth A. Widjaja and Hamzah of Herbarium Bogoriense brought a living plant of strange star apple fruit from Cycloops Nature Reserve, (New Guinea) to Bogor Botanic Gardens, Indonesia. In 2002, Mrs. Inggit Puji Astuti of Bogor Botanical Gardens also introduced a living plant of another star apple fruit from Gorontalo (N. Sulawesi)

to the Gardens. These living collections and other herbarium specimens kept in BO cannot be justifiably included in the two existing species, so that they are treated here as two distinct species.

Morphological observations on the four species of *Averrhoa* indicated that they differ from each other in many characters like leaves, inflorescence, flower and fruit (Table 1-3). From the tables it can be observed that in vegetative characters, *A. dolichocarpa* and *A. leucopetala* are more similar to *Averrhoa bilimbi* than to *A. carambola*. In their generative characters, however, *A. dolichocarpa* and *A. leucopetala* are closer to *A. carambola*.

Key to the species

- 1a. Leaflets 2 - 7 in pairs..... 2
- 1b. Leaflets 7 - 19 in pairs..... 3
- 2a. Leaves not crowded terminally, leaflets glabrous below; inflorescences 0paniculate, rachis elongate and much branching, up to 11 cm long, reddish purple; flowers purple; fruits without permanent sepal and not divided at apex, wings sharp and hard at ridges; aril thick *A. carambola*
- 2b. Leaves crowded terminally or near the top, leaflets pubescent below; inflorescences forming a small cluster of several flowers, less than 0.5 cm long, white; flowers white; fruits with permanent sepals and very shortly divided at apex, wings rounded at ridges; aril thin *A. leucopetala*

Table 1. Leaf characters of four species *A. carambola*, *A. leucopetala*, *A. dolichocarpa*, and *A. bilimbi*

Characters	<i>A. carambola</i>	<i>A. leucopetala</i>	<i>A. dolichocarpa</i>	<i>A. bilimbi</i>
Leaf arrangement	imparipinnate, sparsely arranged	imparipinnate, crowded at the stem apex	imparipinnate, crowded near the stem apex	imparipinnate, crowded at the stem apex
Leaf length	9 - 11.5 cm	3 - 13 cm	(15-) 24.5 - 59.5 cm	43 - 45.6 cm
Number of leaflets	2 - 4 pairs	4 - 7 pairs	7 - 13 pairs	14 - 19 pairs
Petiole length	2 - 2.5 cm	1.5 - 6 cm	(4 -) 7 - 16 cm	5 - 6 cm
Leaflets shape and size	ovate to broadly ovate, 8.3 - 8.5 x 2.1 - 5.2 cm	narrowly oblong (6.5-10.7 x 2.6 - 4.4 cm) to ovate, (0.8 - 4.8 x 0.5 - 3 cm	narrowly oblong (5.5 - 11 x 3 4.5 cm), to ovate (2 - 4.5 x 1.3 - 2.8 cm	oblong rarely narrowly ovate 4.3 - 8.5 x 2.6 - 4 cm
Leaflet surface	upper nearly glabrous (hairy at the midrib), sparsely short hairy beneath	upper glabrous (sparsely hairy at the midrib), beneath	upper glabrous (sparsely hairy at the midrib), densely curved & punctate hairy beneath	sparsely to densely hairy both side
Nerves	5 - 7 pairs,	4 - 12 pairs	(4) 5 - 10 pairs	7 pairs
Petiolules length	c. 3 mm	1 - 2 mm	c. 1.5 - 3 mm	c. 2 mm

3a. Leaflets densely covered with appressed straight hairs below, and hairy or nearly glabrous above; inflorescence fasciculate, with long rachises, 3 - 23 cm long, pendulous; petals reddish purple all over, 1.5 - 1.9 cm long, fruits terete, obscurely angular, sometimes with patches raised, depressed and/or grooved longitudinally near top.....*A. bilimbi*

3b. Leaflets densely covered with curved hairs below, and glabrous above; inflorescence forming a dense cluster crowded by many (more than 10) flowers, with short peduncle and rachises 1-2.5 cm long even when flower withered, not pendulous; petals white outside, upper side of lobes with a pattern of pinkish purple and white stripes except at white margins, 1 cm long; fruits star-shaped in cross section, with flat connecting valley, deeply divided into 5 lobes at top.....*A. dolichocarpa*

AVERRHOA CARAMBOLA L. (Fig. 1,5)

Sp. Pl. (1753) 428; Blume, Bijdr. (1825) 242. Blanco, Fl. Filip. (1837) 391; Miquel, Fl. Ind. Bat. 1 (1874) 133. Ridl. Fl. Mal. Pen. 1 (1922) 332; Heyne, Nutt Pl. (1927) 853. Back. & Bakh. v/d Brink, Fl. Java 1 (1963) 245; Veldkamp, Fl. Males. 1, 7 (1971) 175.

DISTRIBUTION. widely cultivated throughout Indonesia

SPECIMEN EXAMINED. Celebes: Z.W. Celebes, Lombasang; *H.A.B. Bunnemeijer 11218*; Culta: *S. Binnedijk 448 HB (A. carambola L. f. β acida)*; *Leg. Ign. sn VII. D. 53 (A. carambola L. f. β acida)*. Java: Semarang, Sendang near Gedangan, *J.B. Beumee 28103 β* ; Kedungjati, *J.B. Beumee 26154 β* ; Babakan, Kampung baru, *Soegandiredja 13*. Lesser Sunda Islands: Lombok, Rinjani, *Dr. J. Elbert 2055*; Moluccas: Sula, Eil Taliabu, kp. Tambona, *Hulstijn/Atje 101*. Ternate, Fitu, *Beguïn 1676*; Halmahera, Sosupu, kp. Todahe, *Nedi (Exp. De Haan) 253*. Philippine, Luzon: Province of Rizal, Bosoboso, *Ahern's 1972*; Tugueganav, *E. D. Merrill 195*; Batan Island, Albay, *C.B. Robinson 6267*; Island of Negros, Prov of Negros Oriental, Dumaguete (Cuernos Mts), *A.D.E. Elmer 9979*; Luzon, Pangasinan Province, Umingan, *Merrill Species Blancoanae 406*; Sumatra, Banka: *H.A.B. Bunnemeijer 1466*; Muntok, *Berkhout s.n. 5/8/1886*.

AVERRHOA BILIMBI L. (Fig. 2,6)

Sp. Pl. (1753) 428; Blanco, Fl. Filip (1837) 391; Miquel, Fl. Ind. Bat. 1, 1 (1859) 139; Ridl. Fl. Mal. Pen. 1 (1922) 331; Heyne, Nutt Pl. (1927) 852; Back. & Bakh. f/d Brink, Fl. Java 1 (1963) 246; Veldkamp, Fl. Males. 1, 7 (1971) 175.

Table 2. Flower characters of four species *A. carambola*, *A. leucopetala*, *A. dolichocarpa*, and *A. bilimbi*

Characters	<i>A. carambola</i>	<i>A. leucopetala</i>	<i>A. dolichocarpa</i>	<i>A. bilimbi</i>
Inflorescences	panicle often with densely crowded flower	cluster with several flowers	cluster with densely crowded flower	panicle fasciculate
Peduncle and rachis	4 cm long, reddish purple	1-1.5 cm long, green	1-2.5 cm long, brownish green	7.5 cm long, green
Pedicels	1.5 mm, glabrous, reddish purple	3 - 4 mm, hairy, pale green	3 - 5 mm, hairy, brownish green	5 - 6 mm, hairy, green
Position	usually axillary or along branchlets	cauliflorous, occasionally in axiller	cauliflorous	cauliflorous, becoming pendulous
Flower size	0.6 - 1.0 cm long, 0.7 cm in diam	0.6 - 0.7 cm long, 0.4 cm in diam.	0.8 - 1.0 cm long, 0.5 cm in diam.	1.3 - 1.6 cm long, 1.1 cm in diam
Sepal shape & size	3 ovate, 2 broadly oblong (4 - 4.5 mm x 2 - 2.2 mm), with obtusely acuminate or obliquely emarginated apex	3 ovate-oblong 2 lanceolate (6 - 7 x 2.5 - 3 mm), with obtuse apex.	3 ovate-oblong 2 lanceolate (6 - 8 x 2 - 4 mm), with slightly recurved apex	3 ovate, and 2 oblong (5 mm x 2.5 mm), with obtusely apex
Sepal surface	glabrous both side	glabrous inside, hairy out side	glabrous inside, hairy out side.	glabrous inside, hairy outside
Sepal Colour	whitish violet	pale green	lightly yellowish brown	greenish white or greenish red-purple
Petal shape & size	oblong-ovate, 6 x 3 mm	lanceolate, 6 - 10 x 2 - 3 mm	oblong-ovate, 6 - 11 x 2.5 - 3 mm	obovate, 15 x 3 - 4 mm
Petal surface	hairy only inside; gland hairs reddish -white transparant	slightly hairy only inside; gland hairs white transparant	glabrous	rarely hairy only out side; gland hairs white transparant.
Colour	middle part violate, margin whitish, inside the claw white	white	white outside, upper side of lobes with a pattern of pinkish purple and white stripes except at white margins	dark red or purple, in side the claw white
Filament (number, size)	5 long (3 mm); 5 short (2 mm), glabrous	varying in length, 3.5 - 7 mm long, glabrous	varying in length, 3 - 5 mm long, glabrous	10 (4.5 - 5 mm), sparsely hairy
Stylus (number, size) position	5, 3 mm long; pistil longer than stamen	5, 1-2 mm long; pistil shorter than stamen	5, 3.5 - 4.5 mm long; pistil longer than stamen	5, 3 mm long; pistil shorter than stamen & rarely longer

DISTRIBUTION: widely cultivated throughout Indonesia

SPESIMEN EXAMINED: Java P. Panaitan: Mt. Tenjo (N Peninsula), *J. van Boorsum Waalkes 261*; SW of Tg Parat *. van Boorsum Waalkes 681*; W Java, Bantarjaja Estate; 24 km S of Rangkasbitung, *P. Buwalda 2913*; Pekalongan, Tirto garden, *Dr. van Leeuwen-Reijnvaan 44*. Philippine: Luzon Islands, Prov. Sorsogon, Irosin (Mt. Bulusan), *A.D.E. Elmer 15122*; Mindanao, Prov. Agusan, Cabadbaran (Mt. Urdaneta) *A.D.E. Elmer 13999*; Leyte Island, Leyte Prov., Palo, *A.D.E. Elmer 7089*; Luzon, Prov.

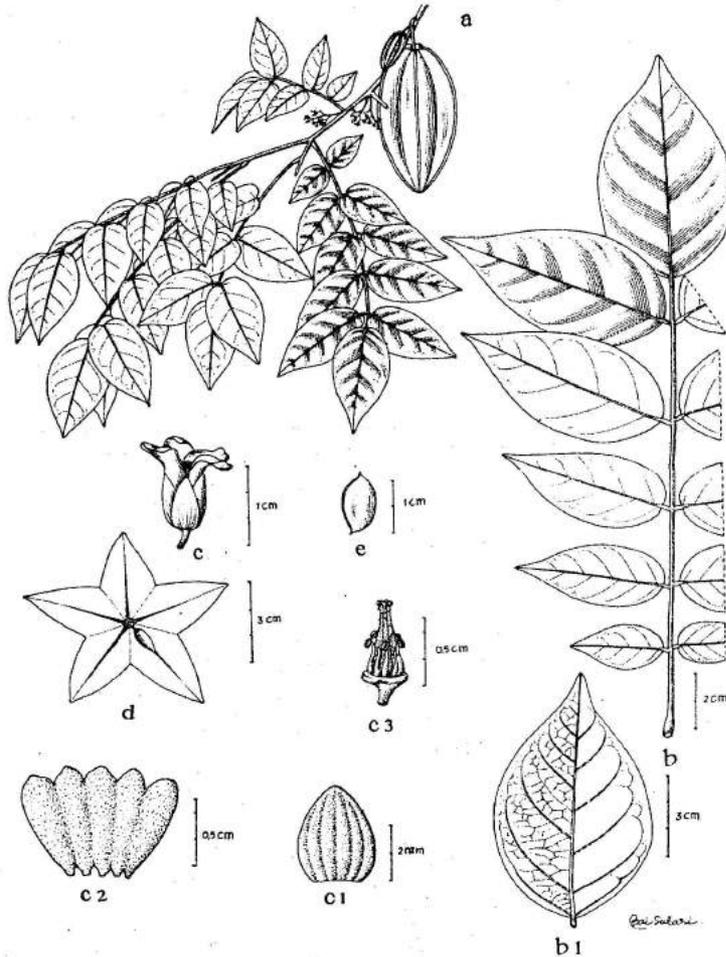
Batan, Lamao river, Mt. Mariveles, *T.E. Borden 2737*; Luzon, Prov. Rizal, Antiolo, *Species Blancoannae: Merrill 255*; S.O. Luzon, Prov. Camarines South, Nueva Caneres, *H. Hallier s.n. 24/6/1903*; Moluccas: Amboina, *C.B. Robinson 219*.

***Averrhoa leucopetala* Rugayah et Sunarti sp. nov.**
(Fig. 3,7)

Rami juniors 0 pubescentes, teretes. Folia imparipinata, 6 vel 7 jugata, petiola 2.5 vel 4.3 cm longi,

Table 3. Fruit characters of four species *A. carambola*, *A. leucopetala*, *A. dolichocarpa*, and *A. bilimbi*

Characters	<i>A. carambola</i>	<i>A. leucopetala</i>	<i>A. dolichocarpa</i>	<i>A. bilimbi</i>
Persistent calyx	absent	present	present	present
Shape	broadly oblong, deeply star-shaped in cross section; wings sharp at top and hard, not divided at apex, without persistent styles	oblong-ovate, star-shaped in cross section, wings rounded at ridge, shortly divided at apex, without persistent styles	narrowly oblong, deeply star-shaped in cross section with flat connecting valleys; deeply divided into lobe at apex with 5 persistent styles	narrowly oblong, shallowly star-shaped in cross section, not separate at apex, with 5 persistent styles
Size	up to 12.5 x 6 cm	(5-)9 - 11.5 x 2.4 - 3.7 cm	9 - 12.1 x 2.4 - 4.5 cm	up to 10 x 5 cm
Colour	immature: green, mature: dark yellow	immature: light green, mature yellowish green	immature: dark green, mature: yellow	immature and mature light green
Aril	very thick	thin	thin	Thin
Seed size	8 - 10 x 6 mm	c. 9 x 5 mm	7 - 13 x 5 mm	5 - 6 x 4 mm
Taste	sweet	sour	very sour	sour

Fig.1. *Averrhoa carambola* L. (a. Habit, b. Leaf, c. Flower, c1. Sepal, c2. Petal, c3. Sament & style, d. Cross section of fruit, e. Seed).

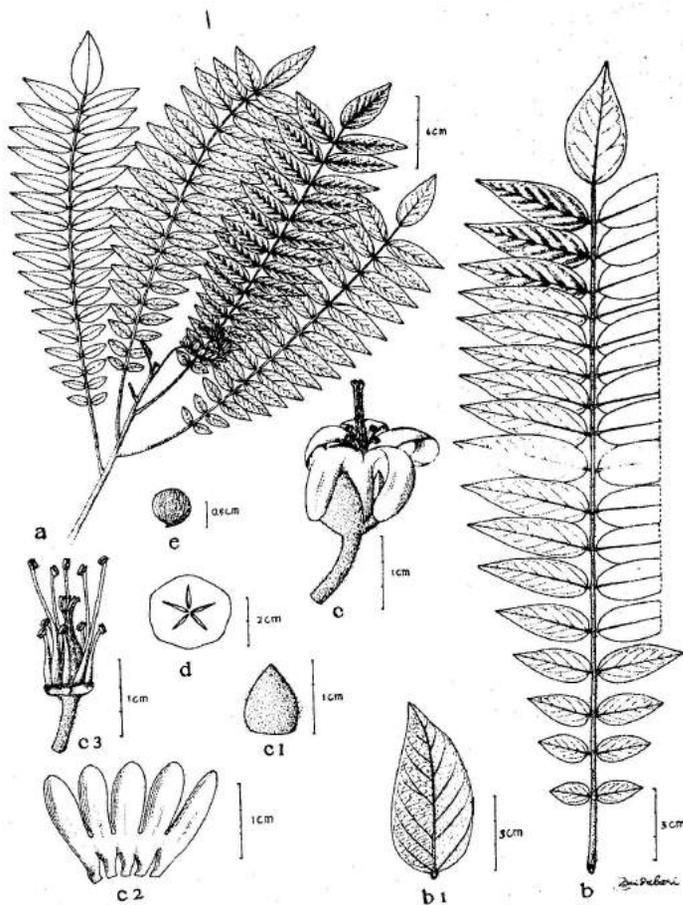


Fig.2. *Averrhoa bilimbi* L. (a. Habit, b. Leave, c. Flower, c1. Sepal, c2. Petal, c3. Sament & style, d. Cross section of fruit, e. Seed).

pubescentes, rachides pubescentes, 6 vel 8 cm longae, foliola longi-oblonga (7.3 x 2.9 cm) vel ovata (0.8 x 0.5 cm), acuminate apices, truncate basi, ab usque ad imum parvuscens, pubescentia, glaucescentia infra, glabrata supra, 5- vel 12-nervia, petioluli 1 - 1.5 mm longa, ad apicem longior, 5 vel 15 mm longi. 0Pedicelli 4 vel 5 mm longi, puberuli. Sepala 5, ovati-oblonga, obtusa, viridilutea, 6 vel 7 mm longa, 2.5 vel 3 mm lata, glabra supra, pubescentia infra. Petala lanceolata, rotundata apice, angustata basi, reflexa, coherentia in dimidio inferiore, 6 mm longa, 2.5 vel 3 mm lata, 1.5 vel 2 mm longa, alba, puberula supra, glabra infra. Stamina connata basi, glabra, ea antisepala 5, longior, 7 mm longa, ea antipetala 5, brevior, 4.5 mm longa, filamenta glabra; antherae subrotundata, ca. 1 mm longa. Ovarium quinqueangulatum, dense puberulum, 1 mm longum, quinqueloculatum. Styli 5, dense puberuli, 2 mm longi. Ovula 5 in quoque loculo. Fructus fusiformes quinqueangulares, 12.1 cm longi, 4.5 cm diametro, virides, puberuli, calyx persistens, sepala anguste oblonga, 7 mm longa, 3 mm lata. — TYPUS: Java. Bogor Botanical Gardens, introduce from Gorontalo, N.Sulawesi. Rugayah & Siti Sunarti no. 1556 (holo: BO)

Wild plant. Shrub up to 2 m tall. Leaves crowded near top of tree; petiole 1.5 - 6 cm long, pubescence;

rachis 3 - 13 cm long, pubescence; leaflets imparipinnate, 4 - 7 in pairs, becoming smaller from top down to bottom; narrowly oblong (7.3 x 2.9 cm) to ovate, (0.8 x 0.5 cm), acuminate at apex, truncate and subcordate at base, glabrous except on sparsely hairy midrib on upper surface, pubescent and glaucous on the lower surface, lateral nerves 4 - 12 in pairs; petiolules pubescent, lateral ones 1 - 2 mm long, terminal one longer, 2-5 mm long. Inflorescences cauliflory and sometimes axillary, forming small clusters of several flowers; peduncle and rachis green, less than 2 cm long; bracts subulate, 1 - 3 mm long, sparsely hairy, caduceous; pedicel 3 - 4 mm long, pubescent; sepals 5, ovate-oblong, obtuse at apex, 6 - 7 mm long, 2.5 - 3 mm broad, pale green, glabrous above, pubescent below; petals 5, white, coherent at lower part, lanceolate 6-10 mm long, 2 - 3 mm broad, rotundate at apex, the upper two fifth erect at first, after then reflexed and the erect part becoming as long as sepal, slightly hairy above, glabrous below with gland hairs white transparent; stamens connate at very base, glabrous, antisepala filaments 5, longer, 7 mm long, antipetala ones 5, shorter, 3.5 mm long; anthers subrotundate,

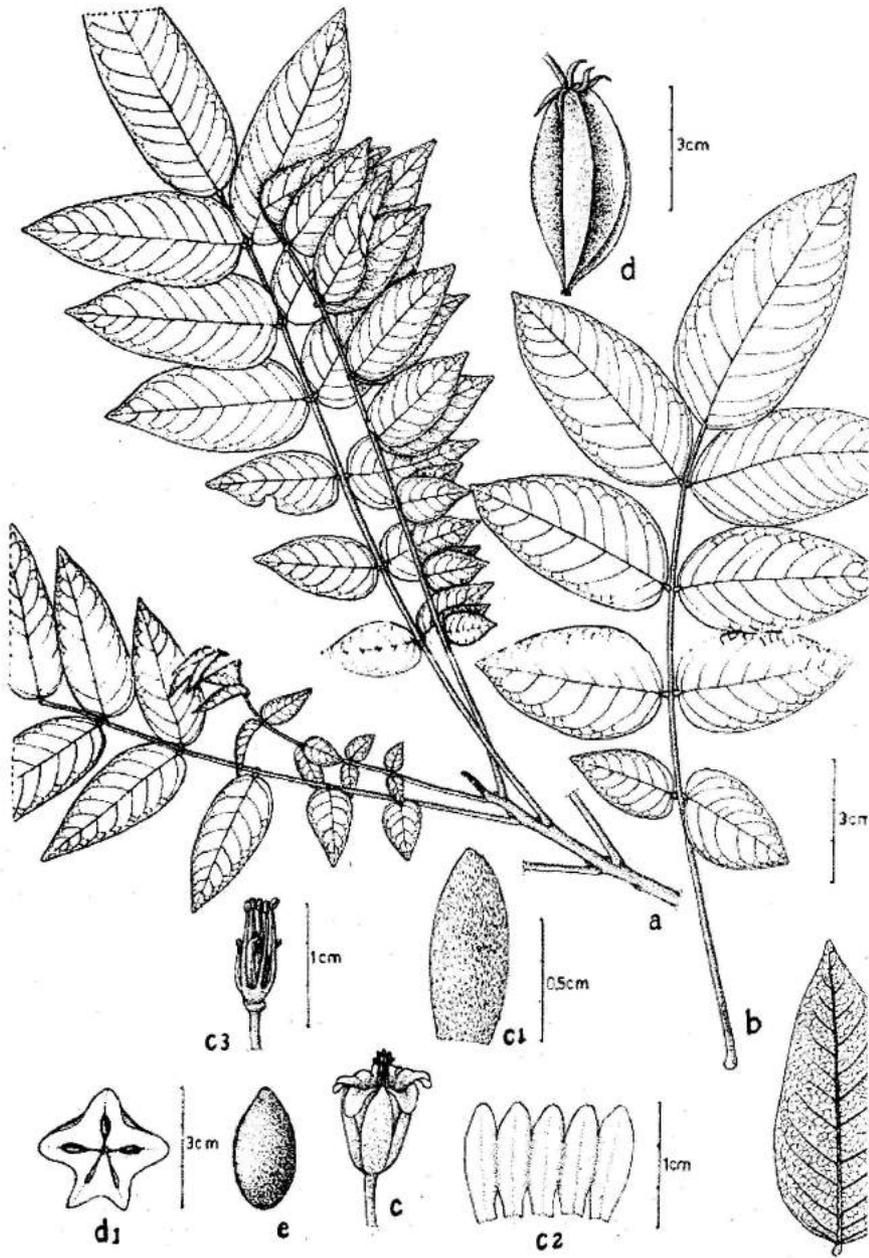


Fig.3. *Aerrhoa leucopetala* Rugayah & Sunarti (a. Habit, b. Leave, c. Flower, c1. Sepal, c2. Petal, c3. Sament & style, d. Fruits, d1. Cross section of fruit, e. Seed).

ca. 1 mm long; pistil shorter than stamen; ovary 5-angled, 5-celled, ca. 1 mm long, densely hairy; styles 5, free, ca. 2 mm long, densely hairy. Fruits fusiform, very shortly divided at top, 5-angled, with flat connecting valleys, wings rounded at ridge, (5)-9 – 11.5 cm long, 2.4 – 3.7 cm in diameter, light green changing to yellow, sour in test. Seeds 9 mm long, 5 mm broad, with thin transparent aril.

DISTRIBUTION: N. Sulawesi: Gorontalo: Tangale and Panua Nature Reserve.

SPECIMEN EXAMINED: North Sulawesi, Gorontalo: Panua Nature Reserve, 2002, Inggit Pudji Astuti

IP398 (living collection); Tangale Nature Reserve, 20/9/2002, Rugayah et al, 671

Aerrhoa dolichocarpa Rugayah et Sunarti
sp. nov. (Fig. 4,8)

Folia imparipinata, 9 vel 11 jugata, petiola 4.5 vel 6 cm longi, pubescentes, rhachides pubescentes, 27.5 vel 35 cm longa, foliola anguste oblonda (8.5 vel 10.7 cm longa, 3.2 vel 4.4 cm lata), ovata (1.5 vel 2.3 cm longa, 1 vel 1.6 cm lata), ab usque ad imum parvuscens, pubescentia, glaucescentia infra, glabrata supra, 7- vel 9-nervia, petioluli 1 vel 2 mm longa, ii ad apicem longior, 1.5

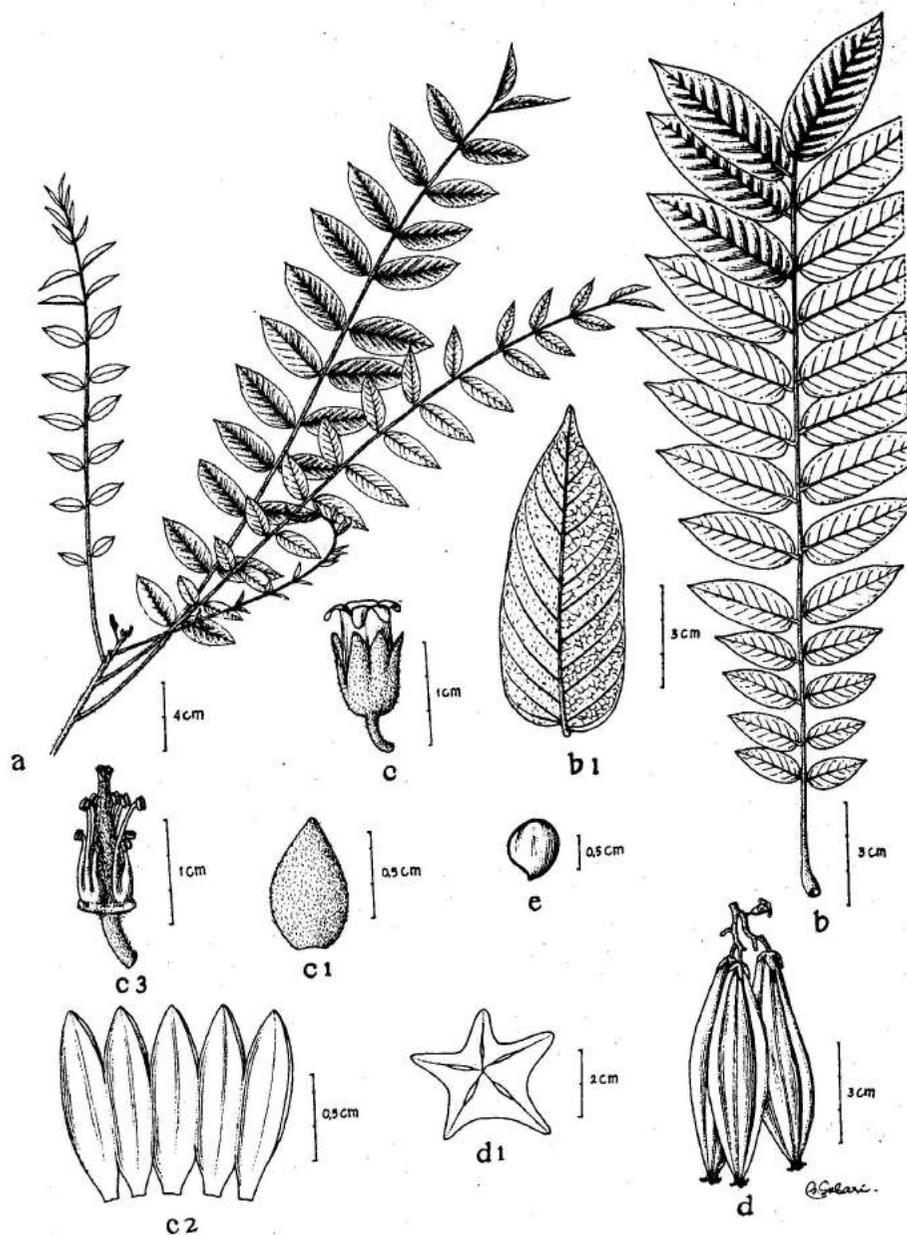


Fig. 4. *Averrhoa dolicocharpa* Rugayah & Sunarti (a. Habit, b. Leave, b1. Leaflet, c. Flower, c1. Sepal, c2. Petal, c3. Stament & style, d. Fruit, d1. Cross section of fruit, e. Seed).

vel 2.2 cm longi. Cymae cauliflorae, 2 vel 2.5 cm longae, 1 vel 2.5 cm latae, floribus 10 vel 30. Pedicelli 3 vel 5 mm longi, puberuli. Sepala 5, ovato-oblonga, acuta, leviter recurvata, laete lutei-brunnea, 6 vel 8 mm longa, 3 vel 4 mm lata, glabra supra, pubescentia infra. Petala 5, lanceolata, rotundata apice, cuneata basi, 11 mm longa, 3 mm lata, cohaerentia in medio, lobi (partes liberae apice) ovati-oblongi, recurvati, 6 mm longi, 2.5 vel 3 mm lati, ad margine albi, in centro rubric-purpurai, glabri utrinque. Stamina antisejala 5, longior, 6 mm longa, ea antipetala 5, brevior, 4 mm longa, filamenta glabra, connata basi, antherae subrotundata, 1 mm longa. Ovarium quinqueangulatum, sparsim pilosum, 4 mm longum, quinqueloculatum. Styli 5, glabri, 3.5 mm longi. Ovula 3 vel 5 in quoque loculo. Fructus fusiformes quinquanguli, 9 vel 11.5 cm longi, 2.4 vel 3.7 cm diametro,

lutei, calyx ad maturitatem fructus persistens, sepala oblonga vel anguste oblonga, 1 cm longa, 2 vel 3 mm lata. Semina orbicularia, complanata, 5 vel 7 mm longa, 5 vel 6 mm lata. — TYPUS: Java. Bogor Botanical Gardens, introduce from Yapen Island, Papua. *Fukuoka & Siti Sunarti no. 7* (holo: BO).

Wild plant. Small tree up to 8 m tall. Leaves crowded near top of tree; petiole (4-) 7-16 cm long, pubescent; rachis (15-) 24.5 - 59.5 cm long, pubescent; leaflets imparipinnate, 7 - 13 in pairs, becoming smaller from top down to bottom, narrowly oblong, (5.5 - 11 x 3 - 4.5 cm), to ovate (2 - 4.5 x 1.3 - 2.8 cm), acute and acuminate at apex, truncates and unequal at base, glabrous above except

on very scarcely hairy mid vein, densely curved hairy and punctuate below; midrib densely hairy, prominent on lower surface; lateral nerves 5–10 in pairs; petiolules pubescent, lateral ones 2 mm long, terminal ones longer, 1.5–3 mm long. Inflorescence cauliflory, forming dense clusters crowded by many (10–30 and more) flowers; rachis 1–2.5 cm long, up to 3 cm long even when flower withered, 1–2.5 cm broad; pedicels 3–5 mm long, pubescent. Sepals 5, ovate-oblong, acute, slightly recurved at apex, 6–8 mm long, 3–4 mm broad, lightly yellowish brown, glabrous above, pubescent below; petals 5, coherent at middle part, ovate-oblong, rotundate at apex, cuneate at base, 6–11 mm long, 2.5–3 mm broad, glabrous on both surfaces, recurved, white outside, upper side of lobes with a pattern of pinkish purple and white stripes except at white margins; stamens connate at very base, glabrous, antiseptala filaments 5, 5 mm long, antipetala ones 5, shorter, 3 mm long; anthers sub-rotundate, 1 mm long; pistil longer than stamens; ovary 5-angled, 5-celled, ca. 1.5 mm long, sparsely hairy; styles free, 5, ca. 5 mm long, glabrous. Fruits fusiform, distinctly divided at top, with styles, with flat connecting valleys, 9–12.1 cm long, 2.4–4.5 cm in diameter, dark green changing to yellow, very sour in test. Seeds 7–13 mm long, 5 mm broad, with thin transparent aril.

DISTRIBUTION. Papua: Cycloops Nature Reserve, Sepik river, Kaiser Willhelmsland (North Papua New Guinea).

SPECIMEN EXAMINED. New Guinea: Cagar Alam (Nature Reserve) Cycloops, 14 Dec. 1985, *Elizabeth A. Widjaja & Hamzah 2931*; Sepik River, 14 May 1929, *A.W. Herre 281*; Kaiser Willhelmsland ex Museo Botanico Berolinensis, 1887, *M Hollrung 709*

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Fig. 5. *Averrhoa carambola* L.



Fig. 6. *Averrhoa bilimbi* L.



Fig. 7. *Averrhoa leucopetala* Rugayah & Sunarti



Fig.8. *Averrhoa dolichocarpa* Rugayah & Sunarti

INSTRUCTION TO AUTHORS

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