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NEW DISTRIBUTION RECORDS OF SOME WILD CROP RELATIVES FROM INDIA

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NEW DISTRIBUTION RECORDS OF SOME WILD CROP RELATIVES FROM INDIA

K. Pradheep¹, R.S. Rathi², K. Joseph John³, S.M. Sultan⁴, B. Abraham⁵, Anjula Pandey⁶, E. Roshini Nayar⁷, S.P. Ahlawat⁸ & Rita Gupta⁹

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Doing field survey and collection of plant genetic resources in various parts of the country during the past seven years, the authors came across the natural distribution of a few wild relatives of crops in some Indian states, which were neither reported in the floristic literature (including eFlora of India 2014) nor in recent literature (e.g., Chakravarty 1982; Naithani 1990; Rao & Ellis 1995; Pullaiah & Chennaiah 1997; Kumar 2001; Murti 2001; Renner & Pandey 2013; Pradheep et al. 2014; Yadav et al. 2014). These plants were critically studied in natural habitats as well as in the herbarium. It is supplemented with the study of relevant literature, online herbaria of London (BM), Edinburgh (E), Kew (K), Paris (P) and Beijing (PE) including the type specimens. Herbarium vouchers were collected and deposited in the National Herbarium of Cultivated Plants (NHCP) at ICAR-

NBPGR, New Delhi/Thrissur.

1. *Cajanus scarabaeoides*

(L.) Thouars, Dict. Sci. Nat. 6: 617. 1817. Van der Maesen, Agric. Univ. Wageningen Pap. 85(4): 183. 1986 ("1985"). *Dolichos scarabaeoides* L., Sp. Pl. 2: 720. 1753. *Atylosia scarabaeoides* (L.) Benth., Baker in Fl. Brit. India 2: 215. 1879. [Family Fabaceae]. Fig. 1.

Creepers-climber supported by grasses and shrubs. Branches: woody at the base, striate, pubescent, up to 1.5m long. Stipules: small, ovate, hairy, caducous, stipels absent. Leaves: pinnately 3-foliolate; petioles 1.4–1.7 cm, terminal petiolule ~3mm long, leaflet coriaceous, glandular punctate below, pubescent on both surfaces, greyish green; terminal leaflet obovate-elliptic, 2–2.5 x 1–1.5 cm, apex obtuse, base cuneate; lateral leaflets (sub)sessile, smaller, obliquely obovate, 1.3–1.5 x 0.9–1.0 cm. Inflorescence: raceme, axillary, 1–6 flowered, peduncle 3–6 mm long. Flowers: yellow to cream-yellow. Calyx: campanulate, 5-lobed, lower one longest, upper ones incompletely connate, lobes linear-lanceolate. Corolla: ~1cm long, deciduous, standard obovate, wing petals narrowly elliptic, and keel curved at apex. Stamens: ~9mm long, anther dorsifixed. Ovary: densely white pubescent, ovules 6. Pods: oblong, 1.8–2.0 x 0.6 cm, leathery, densely villous, transversely constricted between seeds. Seeds: 3–6, greyish with black and cream mosaic, rectangular-rounded, ~4mm.

Specimen examined: 10/-21 (TCR-H-3144), Lakshadweep, Suheli-Cheriyakara, at sea level, 15.i.2009 (fruiting twig), coll. K. Joseph John & M. Unnikrishnan (Herbarium of ICAR-NBPGR Regional Station, Thrissur, Kerala).



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Flowering & Fruiting: September–November & October–February.

Distribution: World: Asia (Bangladesh, Bhutan, Cambodia, India, Indonesia, Japan, Laos, Malaysia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, Vietnam), Africa and Oceania; India (ILDIS World Database of Legumes 2015): Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Dadra-Nagar-Haveli, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Puducherry, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, West Bengal, and Lakshadweep (now); along fields, roadsides, grassy slopes, seashores from sea level to 1,500m altitudes.

Notes: Although a common species in mainland India, this wild relative of the pigeon pea was noticed for the first time in this group of Islands in the calcareous soils with very low humus and nitrogen. Though it is of rare occurrence (as only 10 plants could be observed within the radius of 1km²), the third author observed its prolific fruit bearing.

2. *Cucumis javanicus*

(Miq.) Ghebretinsae & Thulin, Novon 17(2): 177. 2007. *Karivia javanica* Miq., Fl. Ned. Ind. 1(1): 661. 1856. *Melothria javanica* (Miq.) Cogn. in Monogr. Phan. 3: 625. 1881. *Mukia javanicus* (Miq.) C.Jeffrey, Hooker's Icon. Pl. 37: t. 3661. 1969. *Melothria assamica* Chakrav., J. Bombay Nat. Hist. Soc. 50(4): 897.1952. *M. assamica* var. *scabra* Chakrav., J. Bombay. Nat. Hist. Soc. 50(4): 898. 1952. [Family Cucurbitaceae]. Fig. 1; Images 1A & 2.

Annual scandent monoecious herbs. Stems and branches: slender, scabrous, hairy. Tendril: simple, slender, hispid. Leaves: petiole shortly hispid with hairs curved downwards, 4.5–5.5 cm long, lamina ovate-hastate, suborbicular in outline, 5.5–6 cm diam., usually 3(-5) lobed up to two third deep, median lobe ovate-triangular, both surfaces shortly hairy, denser on the veins below, margin remotely dentate, base cordate, apex obtuse or acuminate. Male and female flowers in different leaf axils. Male flowers: 2–4, fasciculate, ~1.5x2.0 cm, pedicel very short; calyx tube, ~2mm long, sepal subulate, ~1.5cm long, petal yellow, ovate, stamen inserted on calyx tube, anthers c. 1.5mm. Female flowers: 2-4, ~1.5x2.5 cm, sepal and petal as in male, ovary ellipsoid. Fruiting pedicel ~4mm long. Fruits: red, oblong, 1.2–1.4 cm long, juicy, with thin pericarp. Seeds: ~15, obovate, whitish, compressed, with a broad 2-grooved margin.

Specimen examined : 1468 [NHCP21204], Meghalaya,

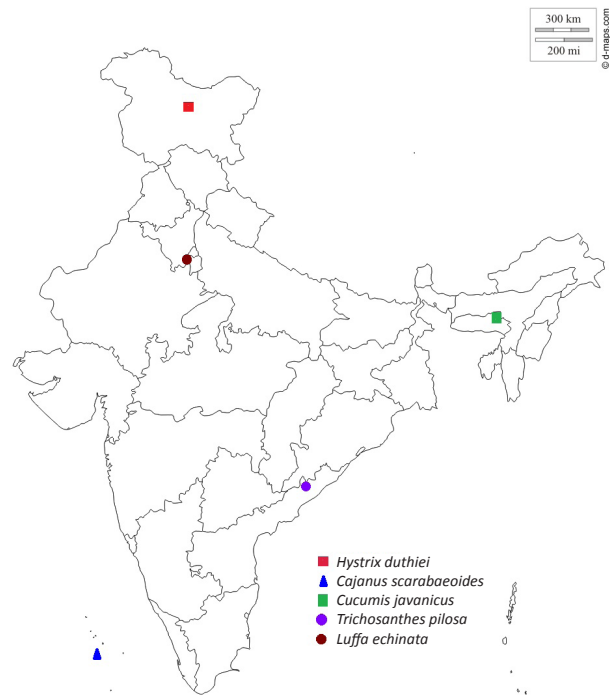


Figure 1. Map showing new distribution record for *Cajanus scarabaeoides*, *Cucumis javanicus*, *Hystrix duthiei*, *Luffa echinata*, and *Trichosanthes pilosa* (original map from d-maps.com)

Ri-Bhoi District, Umiam, 25°40'828"N & 91°54'055"E elevation at 939m, 31.vii.2013 (part of leaf), coll. K. Pradheep & R.S. Rathi (National Herbarium of Cultivated Plants, ICAR-NBPGR, New Delhi).

Flowering & Fruiting: April–July & July–October.

Distribution: World: India, Bangladesh, Myanmar, China, Taiwan, Thailand, Indonesia, Malaysia, Philippines; India: Assam, Meghalaya (now); occasional in open forests, scrub edges, grasslands on mountain slopes at 500–1,500 m.

Notes: It is distinguished from the nearest species *C. maderaspatanus* L. by fruits being oblong (vs. globose in *C. maderaspatanus*), fruit coat not thickened (vs. thickened) and seeds indistinctly scrobiculate and marginate. Though morphologically very different from cucumber and muskmelon, all these have been placed by molecular taxonomists (e.g., Ghebretinsae et al. 2007) under the section *Cucumis*.

3. *Hystrix duthiei*

(Stapf ex Hook.f.) Bor in Indian Forester 66: 544. 1940 & Grasses Burma, Ceylon, India & Pakistan 677. 1960. *Asperella duthiei* Stapf ex Hook.f., Fl. Brit. India 7: 375. 1897 [Family Poaceae]. Fig. 1; Image 1B & 3.

Perennial. Culms: 50–80 cm long, 3–4 - noded. Leaf sheath: glabrous, ligule eciliate, truncate. Leaf blade:

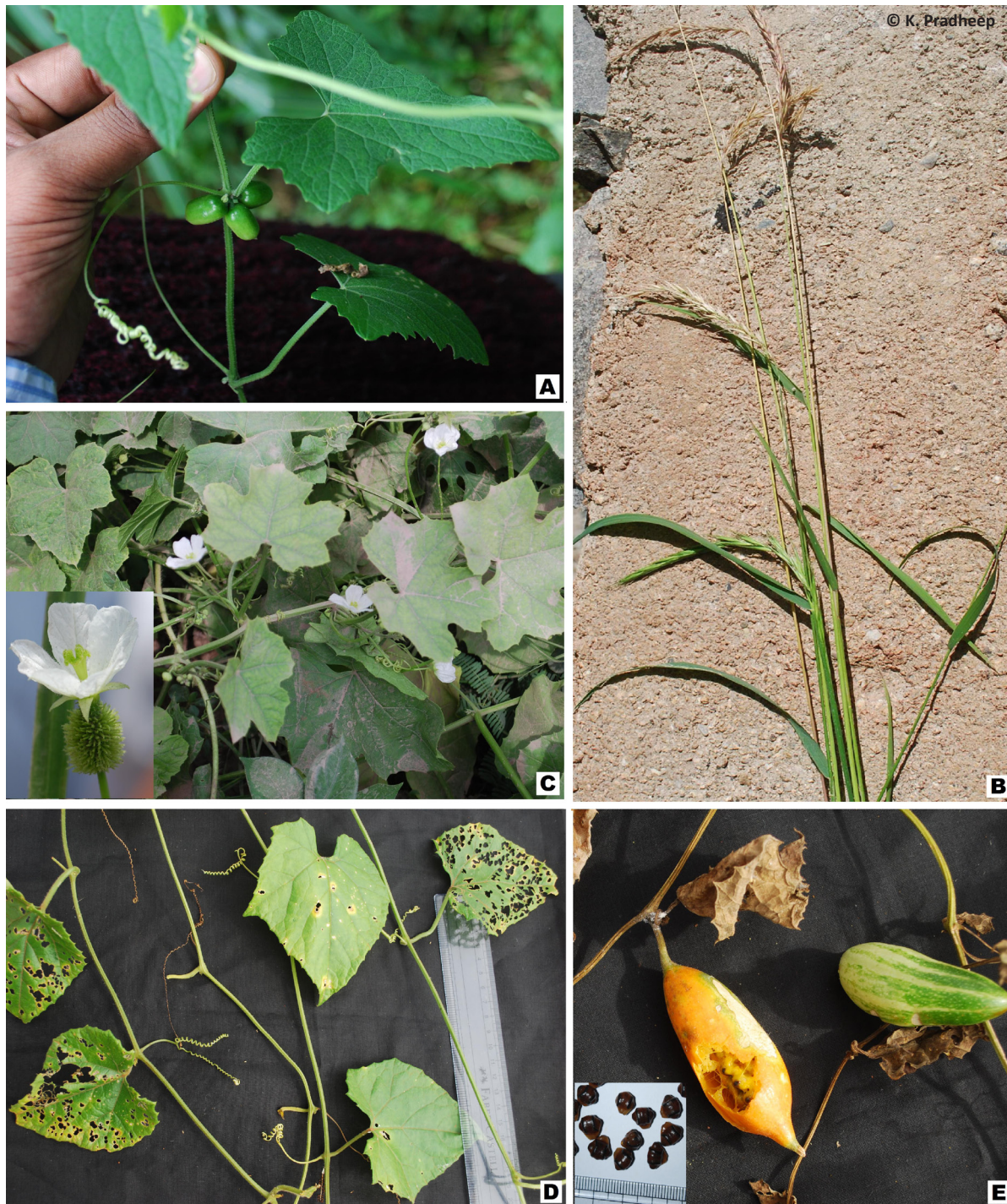


Image 1. New plant distributions in Indian states

A - *Cucumis javanicus* in Umiam, Meghalaya; **B - *Hystrix duthiei*** in Silmo, Jammu & Kashmir; **C - *Luffa echinata*** in Nasirbas, Haryana (inset: female flower); **D & E - *Trichosanthes pilosa*** in Norumothy, Andhra Pradesh (twig, fruit, inset: seeds)

15–20 cm long, 1.2–1.5 cm wide, glabrous, scabrid, apex attenuate. Inflorescence: a spike, slender, 15–20 cm long, rachis puberulent, spikelet packing broadside to rachis, lax. Spikelets: 2 per node, 1.5–2 cm long, lanceolate, compressed, breaking up at maturity; florets 2–4 per

spikelet with fewer number at rachis apex, disarticulating below each fertile floret; rachilla pubescent. Glume: persistent, similar, shorter than spikelet, lower glume lanceolate, apex awned, 3.5–4 mm long, upper glume ~ 5mm long. Fertile lemma: oblong-lanceolate, ~ 1cm

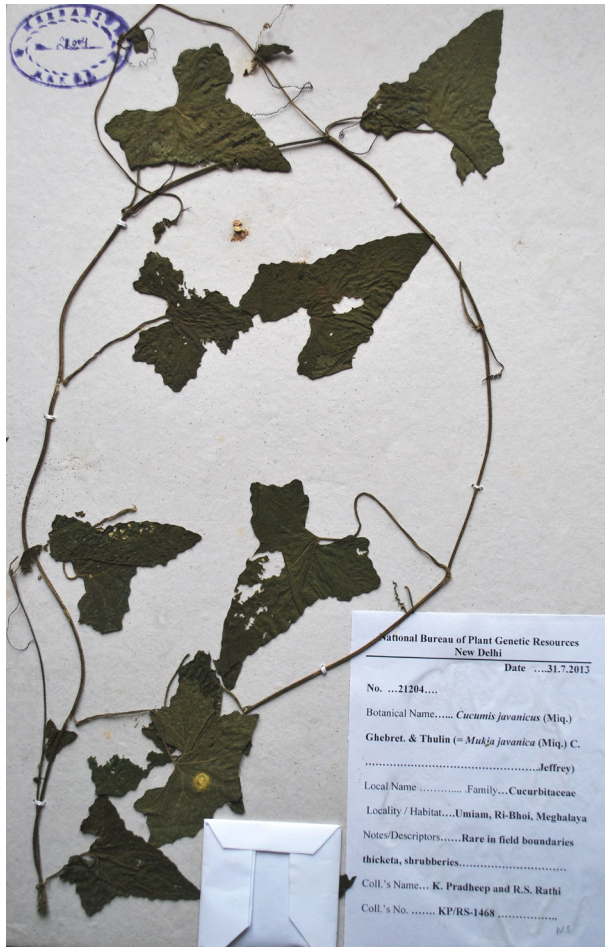


Image 2. Herbarium specimen of *Cucumis javanicus* in NHCP, New Delhi

long (excluding awn), puberulous, 5-veined, apex acute, 1-awned, awn ~2 cm long, a little curved. Palea: almost equals lemma. Anthers: 3, yellow. Stigmas: 2. Fruit: a caryopsis with adherent pericarp.

Specimen examined: 1680 [NHCP22156], Jammu & Kashmir, Kargil District, Silmo (near Batalik), 34°37'724"N & 76°19'599"E, elevation at 3,172m, 05.ix.2015, K. Pradheep & S.M. Sultan (National Herbarium of Cultivated Plants, ICAR-NBPGR, New Delhi).

Flowering & Flowering: May–August & September.

Distribution: India, Nepal, China, Korea and Japan; India: Himachal Pradesh (Bor 1960), Uttarakhand, and Jammu & Kashmir (now). Forest margins, thickets, along water courses, at ~3200m altitude.

Notes: Joseph Dalton Hooker in Flora of British India, gave its locality of occurrence as 'Tihri-Garwhal' [Tehri-Garwhal] based on J.F. Duthie's collection. In K, another specimen of this species, J.F. Duthie s.n. [K000032442], annotated as "Jamu Valley, plentiful under the shade of trees and near water" is available, indicating presence in



Image 3. Herbarium specimen of *Hystrix duthiei* in NHCP, New Delhi

Jammu Valley. This, however, was not noticed in later works. Authors too could observe this species exactly in the habitat mentioned above, but could hardly find 25 plants in collected locality. As grouped under the tribe Triticeae, it forms a distant relative of wheat and barley, along with the species in allied genera *Elymus* and *Leymus*. Zhang et al. (2009) suggested transferring *H. duthiei* into the genus *Leymus* within the tribe Triticeae owing to its similar C-banding pattern with those of *Leymus*.

4. *Luffa echinata*

Roxb. Fl. Ind. 3: 716. 1832. Clarke in Fl. Brit. India 2: 615. 1879. Chakravarty in Rec. Bot. Surv. Ind. 17(1): 77. 1959. Chakravarty in Fasc. Fl. India 11: 71–72. 1982. *L. echinata* var. *longistyla* C.B. Clarke, Fl. Brit. India 2: 615. 1879. [Family Cucurbitaceae]. Fig. 1; Images 1C, 4 & 5.

Annual dioecious climber. Stem: sulcate, almost glabrous, smooth. Tendril: bifid, puberulous or glabrous. Leaf: petiole stout, puberulous, up to 15cm long; lamina 8–9 x 9–10 cm, reniform-suborbicular in outline, obscurely 5-lobed, apex short acute, scabrous, margin irregularly



Image 4. Herbarium specimen of *Luffa echinata* (female plant) in NHCP, New Delhi

denticulate. Male inflorescence: paired in leaf axil, one 1-flowered and early in flowering, the other a 6–10 flowered raceme; raceme 12–15 cm long, bracteate, bract small, flower white, ~2.5cm across, pedicel 0.7–1 cm long. Calyx tube: hairy, villous, 3–4 mm long, lobes lanceolate. Petals: obovate, 1–1.1 cm long, hairy, obtuse. Stamens: triadelphous, 1 with single anther, 2 with 2 anthers each. Female flower: solitary, pedicel 4–5 cm long; calyx lobe 7–8 mm long, hairy, persistent; petals as in male; ovary ovoid-ellipsoid, densely bristly, bristle ciliate, style 3-cleft, divisions 2-parted. Fruits and seeds not seen.

Specimen examined: 2223 [NHCP22211], Haryana, Mewat District, Ferozepur Jhirka Tehsil, Nasirbas, 27°55'536"N & 76°54'481"E, elevation at 195m, 23.viii.2015 (fruiting twigs- female and male), coll. K. Pradheep (National Herbarium of Cultivated Plants, ICAR-NBPGR, New Delhi).

Flowering & Fruiting: August–September & September–October.

Distribution: World: Tropical Africa



Image 5. Herbarium specimen of *Luffa echinata* (male plant) in NHCP, New Delhi

(Chad, Ethiopia, Somalia, Sudan, Mali, Mauritania, Niger, Nigeria, Cameroon), Pakistan, Nepal, Bangladesh and India; India (Renner & Pandey 2013): Assam, Bihar, Gujarat, Himachal Pradesh, Madhya Pradesh, Maharashtra, Uttar Pradesh, Uttarakhand, Tamil Nadu, West Bengal, Haryana (now); occasionally along dump heaps along roadsides.

Notes: This relative of ridge and sponge gourds was specifically found over dump heaps. It is the only species with white-flowers in this genus occurring in India.

5. *Trichosanthes pilosa*

Lour., Fl. Cochinch. 2: 588. 1790. *T. ovigera* Blume, Bijdr. Fl. Ned. Ind. 15: 934. 1826. *T. himalensis* C.B. Clarke, in Fl. Brit. India 2: 608. 1879. [Family Cucurbitaceae]. Fig. 1; Images 1D,E & 6.

Perennial dioecious climber to ~5m long. Stem: woody near base, ~2cm diam., deeply grooved, young twig sulcate, pubescent. Probract: absent. Tendril: stout, 2-fid, sulcate, puberulent. Leaf: petiole 4–6 cm long, striate, densely pubescent; lamina chartaceous, cordate in outline, almost simple with subtle projections, two



Image 6. Herbarium specimen of *Trichosanthes pilosa* (female plant) in NHCP, New Delhi

on either side, shortly villose beneath especially along nerves, basal sinus ~2.5cm deep, apex short-acute, margin denticulate. Male inflorescence and flowers not seen. Fruiting pedicel: 1.5–1.7 cm long, puberulent. Fruit: oblong, 6–6.5 x 2.5–3 cm, smooth, base rounded, apex acute, braked, beak ~4mm; immature one with 7–8 irregular white-stripes arising from distal end over dark green background, which turns orange-red on ripening, exocarp leathery, pulp yellowish-orange. Seeds: sub-quadrangular, c. 8x8x3.5 mm, emarginate, 3-loculed with lateral ones empty, thick near middle.

Specimen examined : 2112 [NHCP22158], Andhra Pradesh, Visakhapatnam District, Gangaraju Madugula Mandal, Norumothly, 18°05'272"N & 82°28'679"E, elevation at 1,000m, 01.xi.2015 (fruiting twig), coll. K. Pradheep & B. Abraham (National Herbarium of Cultivated Plants, ICAR-NBPGR, New Delhi).

Flowering & Fruiting: May–September & September–December.

Distribution: World: South, East and Southeast Asia, Oceania; India: Andaman & Nicobar Islands, Arunachal

Pradesh, Assam, Meghalaya, Nagaland, Sikkim, Tripura, West Bengal, and Andhra Pradesh (now); thickets along valleys, open forests on mountain slopes; at 700–2,500 m altitude.

Notes: Extended distribution of this distant relative of snake gourd westwards into the Eastern Ghats region is of phytogeographic significance. Authors could observe only two plants (one female and one juvenile) in open forest areas, climbing over a Lauraceous member. It is a polymorphic species showing wide variation in pubescence, leaf shape and fruit size; however seeds remain more or less tumid and subquadrangular. Collected specimen showed more or less cordate outline with no lobation and reduced pubescence.

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