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TWO NEW SPECIES OF *ORMOSIA* (*LEGUMINOSAE – PAPILIONOIDEAE*, *SOPHOREAE*) FROM MESOAMERICA

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Two new species of *Ormosia* (*Leguminosae – Papilionoideae*, *Sophoreae*) are described: *Ormosia carinata* N.Zamora and *Ormosia intermedia* N.Zamora.

Keywords. Costa Rica, *Leguminosae*, Mexico, new species, trees.

INTRODUCTION

Ormosia Jacks. is a tropical genus, comprising around 100–130 species, about half of which are American and the rest eastern Asian to northeastern Australian (Rudd, 1965; Polhill, 1981; Lewis *et al.*, 2005). In the Mesoamerican region about 10 species are known, including the ones described here. This genus belongs to the tribe *Sophoreae* and is characterized by its habit (mainly trees); leaves imparipinnate with opposite or subopposite leaflets; calyx lobes well formed, clearly imbricate; style incurved, with a terminal or introrse (sometimes bilobed) stigma; and seed with a hard testa, often red, black or bicoloured (Rudd, 1965; Polhill, 1981).

While preparing the treatment of *Leguminosae* for the 'Manual de Plantas de Costa Rica' project, two new species of *Ormosia* were found in the Mesoamerican region. They are described below.

Ormosia carinata N.Zamora, **sp. nov. Fig. 1**.
O. panamensis Benth. similis sed floribus albis majoribusque, carina longitudinali prominenti prope suturam dorsalem in quaque valva fructuum, valvis crassioribusque. – Type: México, Veracruz, Mpio. San Andrés Tuxtla, Estación Biológica Los Tuxtlas, Cerro Lázaro Cárdenas, between 18°34′ and 18°36′N, 95°04′ and 95°09′W, 400 m, 6 v 1986 (fl), *Sinaca & Chigo* 699 (holo K!; iso CAS!, MEXU, MO!, NY!).

Tree 13–30 m tall; bark of the trunk smooth and brown-yellowish (fide *Sinaca* 699); twigs lenticellate, pale-brown to brown-yellowish sericeous pubescent or glabrous; stipules very small. *Leaves* pinnate; petiole 4–6 cm long, glabrous or sparsely sericeous; rachis 4–13.5 cm long, glabrous or sparsely sericeous, stipels absent, petiolule 7–11 mm long, sericeous. *Leaflets* (3–)5–9(–11), opposite, elliptic to lanceolate-elliptic, glabrous with a very fine reticulation above, dense yellowish

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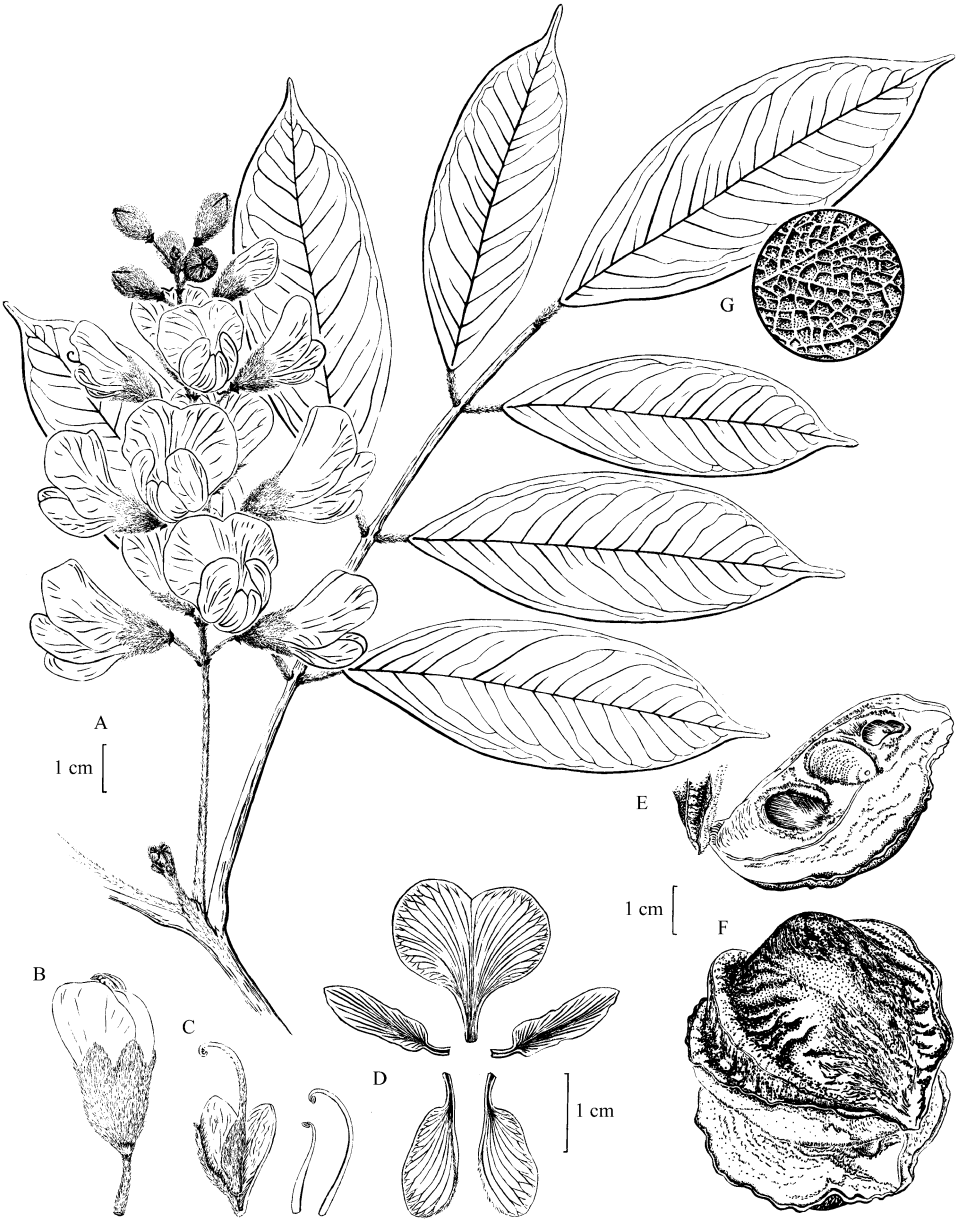

FIG. 1. *Ormosia carinata* N.Zamora. A, habit; B, flower; C, gynoecium; D, stamens; petals (standard, wings and keel); E, fruit shape and dehiscence; F, valve, showing septate seeds; G, leaflet reticulation. A–D, G from *Sinaca & Chigo* 699, E–F from *Sinaca* 356. Drawn by Claudia Aragón.

sericeous pubescent beneath; base obtuse, apex acuminate to acute; secondary veins 7–12 pairs, flat on both sides, costa slightly raised beneath. *Inflorescence* racemose, axillary; peduncle 2–8 cm long, dense yellowish or yellowish-brown sericeous, rachis (1.5–)4–9 cm long; bracts 1–2 mm long, pubescent; bracteoles 1 mm long, pubescent. *Flowers* white, 20–22 mm long; pedicel 6–13 mm long, dense golden-brown sericeous. Flower bud oblong to obovate, 12 × 6–7 mm, dense golden-brown sericeous. *Calyx* campanulate; tube 7–10 × 7–10 mm, densely yellowish-brown sericeous outside, glabrous with purplish markings inside; lobes triangular, 3–5 × 3–5 mm, sericeous on both sides. Standard blade 20–22 × 18–20 mm, wide obovate or suborbiculate, obcordate and nervate, with an apical green patch; wing 15–18 × 4–5 mm, oblong-lunate, nervate; keel 17–20 × 6–8 mm, oblong, nervate. *Stamens* 10, free, unequal, filaments 12–20 mm long, glabrous, flattened towards the base and curved towards the tip, anthers versatile. *Ovary* 6 × 3–4 mm, falcate or falciform, sericeous pubescent only on the margins; stipite 1–2 mm long; style 11–12 mm long, sparsely sericeous and inflexed; stigma bilobate laterally; ovules 3–4, ovoid. *Fruit* dehiscent, globose to ovoid and laterally compressed, greenish to green-yellowish (fide *Sinaca* 208, 357), 4.7–7.7 × 4–5.2 × 3–3.3 cm, woody, each valve with a longitudinal and prominent carina, c.5–11 mm high and c.10–17 mm from the dorsal margin, valves 10–17 mm thick. *Seeds* oblong, 1–3, separated by septa, 17 × 13 × 6–7 mm, red, ellipsoid.

Distribution. Southeastern Mexico: Veracruz and Oaxaca States.

Habitat. Most collections come from Los Tuxtlas Biological Station, Veracruz; the vegetation is moist evergreen forest. Associated taxa are *Dialium guianense* (Aubl.) Sandwith, *Licania hypoleuca* Benth., *Eschweilera* Mart. ex DC., *Symphonia globulifera* L.f., *Byrsonima* Rich. ex Kunth and *Elaeagia* Wedd. (fide *Wendt et al.* 4324). Altitude range 250–600 m.

Phenology. Flowering in March and May. Fruiting in August and December.

Additional specimens examined. MEXICO. **Veracruz**: Mpio. San Andrés Tuxtla. Estación Biológica Los Tuxtlas, Cerro Lázaro Cárdenas, Lote 71, between 18°34′ and 18°36′N, 95°04′ and 95°09′W, 600 m, 9 viii 1985 (fr), *Sinaca* 187 (CAS!, K!, MO!); ibid., 350 m, 17 viii 1985 (fr), *Sinaca* 208 (CAS!, K!, MO!); ibid., 450 m, 12 xii 1985 (fr), *Sinaca* 356 (CAS!, K!, MO!); ibid., 450 m, 12 xii 1985 (fr), *Sinaca* 357 (CAS!, K!, MO!); ibid., 400 m, 6 v 1986 (fl), *Sinaca & Chigo* 699 (CAS!, K!, MO!); ibid., 400 m, 6 v 1986 (fl), *Sinaca & Chigo* 700 (CAS!, MO!); ibid., 560 m, 6 v 1986 (fl), *Sinaca & Chigo* 701 (CAS!, K!, MO!); ibid., 560 m, 6 v 1986 (fl), *Sinaca & Chigo* 702 (CAS!, K!, MO!); ibid., 450 m, 10 xii 1986 (fr), *Sinaca* 1141 (CAS); ibid., 500 m, 22 v 1986 (fl), *Ibarra & Sinaca* 2870 (CAS!, K!, MO!); Mpio. Mecayapan, Los Tuxtlas range, very steep slopes adjacent to the sharp ridge ascending Volcán Santa Marta, 500 m, 18 v 1986 (fl), *La Frankie* 1324 (CAS!); Mpio. Jesús Carranza, Lomas al S del Pob. 2 (3 km al S del entronque de la terracería La Laguna-Sarabia con el camino del N. al Pob. 2), 17°12′N, 94°39′W, 250 m, 12 iii 1984 (fl), *Wendt et al.* 4324 (CAS!, MO!), other collections of the same tree 3253, 3493, 4174 and 4191, fide *Wendt* 4324. **Oaxaca**: Mpio. Matías Romero, c.11 km en línea recta al E del Aserradero Río Escondido, al S del Arroyo Agua Azul, sitito del inventario

"El Cocuyo" de Vicente Sánchez, casi límite con Mpio. Sta. María Chimalapa; pendiente Este y filo, selva alta perennifolia, 17°07′16″N, 94°38′29″W, 250 m, 14 iv 1986 (fl), *Hernández & Sánchez* No. U-11 (CAS!, MO!).

Ormosia carinata is the second known species of *Ormosia* sect. *Ormosia* series *Panamenses* (Rudd, 1965), unique among the American species in possessing septae between the seeds, a character also found in some Asiatic species (Rudd, 1965). Specimens of this species have formerly been misidentified as *O. panamensis* but there are clear differences between them (Table 1).

The concept adopted here for *Ormosia panamensis* is strictly based on the type collection, *Seemann* s.n. (K!), and the type collection of *Ormosia stipitata* Schery, *White* 306 (MO!), the latter clearly a synonym of *O. panamensis*.

Some collections (*Robles* 1964 (fl) (INB!), *Marín & Marín* 501 (fr) (CR!, INB!), *Aguilar* 5406 (fr) (INB!)) have been identified as *Ormosia panamensis*, but they do not entirely agree with that species and require further study. *Rivera* 1372 (fr) (CR!, INB!), *Rivera & Schamm* 1264 (fl) (INB!), and *Herrera* 1946 (fl) (CR!) are the only known collections in Costa Rica that fit the *Ormosia panamensis* species concept.

Ormosia carinata is known only from a restricted area in the Mexican states of Veracruz and Oaxaca, while *O. panamensis* is here considered to be restricted to Costa Rica and Panama. Nevertheless, some Floras (e.g. Crowder, 2001) report *O. panamensis* for Nicaragua and Guatemala. The author has not been able to see collections from these countries but because the specific limits of *O. panamensis* have been misunderstood the presence of this taxon in Nicaragua and Guatemala is doubtful, or at least has not been confirmed.

Ormosia intermedia N.Zamora, **sp. nov. Fig. 2**.
O. flava (Ducke) Rudd et *O. grandiflora* (Tul.) Rudd affinis sed foliolis (1–)3–5(–7)-juga; semina nigra. – Type: Costa Rica, Heredia, Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, elevation about 100 m, near loop trail, 1050 m S, 29 ix 1980 (fl), *Hammel* 9625 (holo MO!; iso CAS!, DUKE!, K!, NY!).

Tree 15–35 m tall; trunk straight and cylindric, bark brown-yellowish with numerous conspicuous and suberose lenticels; twigs glabrous and green; stipules not seen. *Leaves* pinnate; petiole 2–5 cm long, glabrous; rachis 3–11 cm long, glabrous, stipels 2 mm long, present only on seedlings, petiolule 3–9 mm long, glabrous. *Leaflets* (1–)3–5(–7), opposite, elliptic, 5.7–17 × (2.1–)2.8–7 cm, glabrous on both sides, base attenuate or obtuse, apex acuminate or acute; secondary veins 3–7 pairs, ascendent and slightly impressed beneath, tertiary veins forming a conspicuous reticulum. *Inflorescence* a terminal or axillary panicle, 10–15 cm long, the axes shortly pubescent; bracts and bracteoles c.0.5 mm long, deciduous. *Flowers* green-yellow and internal petals with reddish margins (fide *Vargas* 495), yellow with red markings (fide *Hammel* 9625), greenish-yellowish, 13–17 mm long; pedicel 4–6 mm long, dense sericeous pubescent. Flower bud oblong, 8–10 × 5 mm, sparsely sericeous. *Calyx*

TABLE 1. Differential characters of *Ormosia carinata* and *O. panamensis*. Measurements for *Ormosia panamensis* were taken from Rudd (1965) and Woodson & Schery (1943), and additional data from *Rivera* 1372 (fr) (CR!, INB!); *Rivera & Schamm* 1264 (fl) (INB!), and *Herrera* 1946 (fl) (CR!)

Character	*Ormosia carinata*	*Ormosia panamensis*
Flower colour	White	Lilac or lavender
Flower length (mm)	20–22	15(–20?)
Pedicel length (mm)	6–13	5–6
Calyx tube and lobes (mm)	7–10 and 3–5	5 and 4–5
Filament length (mm)	12–20	9–15
Ovary pubescence	Sparse sericeous only on the margins	Entirely densely pubescent
Ovary stipite length (mm)	Up to 2	Up to 4
Fruit size (cm)	4.7–7.7 × 4–5.2 × 3–3.3	3–7 × 3–5 × 2
Fruit shape	Globose to ovoid and laterally compressed with a longitudinal and prominent carina	Suborbicular and flattened with an alate margin
Fruit surface	Smooth to more or less smooth	Wrinkled or verrucose
Fruit stipite length (mm)	5–7	10–15
Fruit apex	Obtuse to acute and more or less straight	Curved and very sharp acute (acumen 5–7 mm long)

campanulate; tube 5–7 × 5–6 mm, shortly pubescent outside and sericeous inside; lobes 3 × 2.5–3 mm, triangular, shortly pubescent outside, dense sericeous inside. Standard blade greenish-yellowish, 12–13 × 12–13 mm, orbicular, base slightly attenuate with a notch at both sides, apex emarginate, glabrous; wing greenish-yellowish, wine-red at the apex on dorsal side, 11–12 × 4–5 mm, oblong, auriculate and unguiculate at the base; keel greenish-yellowish, 13–15 × 5–5.5 mm, oblong, auriculate and unguiculate at the base. *Stamens* 10, free, unequal, filaments 9–11 mm long, flattened towards the base and glabrous, anthers sub-basifixed, 1.5 mm long, oblong. *Ovary* 6 × 2 mm, oblong, dense sericeous; stipe 2–2.5 mm long; style 6 mm; stigma capitate; ovules 4. *Fruit* dehiscent, oblong and linear, bright red, reddish-brown, reddish-green or green when mature, becoming strongly swollen around the seeds and strongly constricted between them, 3.6–7.2 × 1.4–1.7 × 1.3–1.5 cm, valve thin coriaceous. *Seeds* 1–5, globose, 13 × 12 mm, black and shiny.

Distribution. Northeastern Costa Rica.

Habitat. Tropical wet forest, mainly on hilly terrain. Altitude range 10–100 m.

Phenology. Flowering in January and August. Fruiting in September and November.

Additional specimens examined. COSTA RICA. **Heredia**: Finca La Selva, the OTS Field Station on the Río Puerto Viejo just E of its junction with the Río Sarapiquí, near loop trail, 1050 m S,

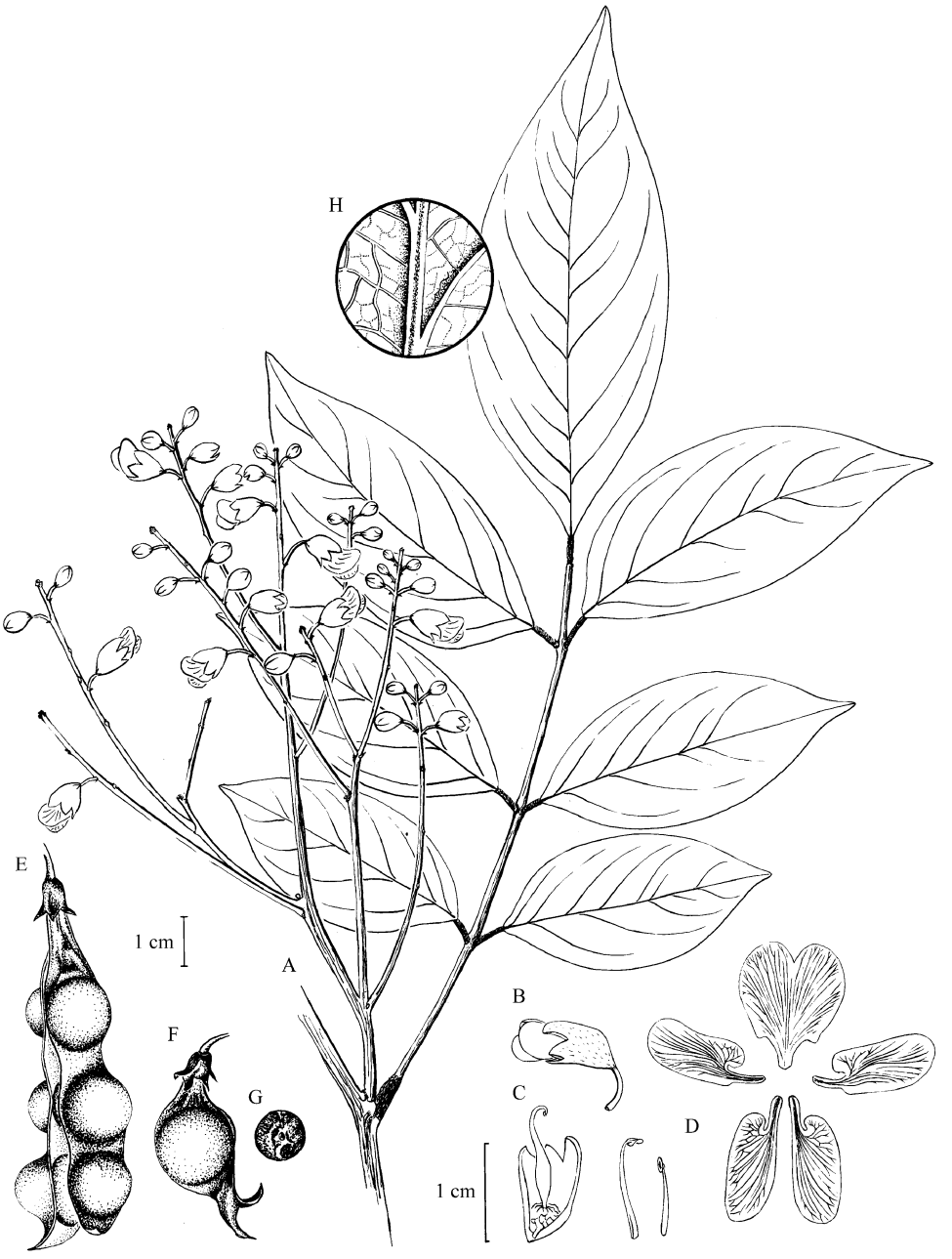

FIG. 2. *Ormosia intermedia* N.Zamora. A, habit; B, flower; C, gynoecium; D, stamens; petals (standard, wings and keel); E, 3-seeded fruit; F, single-seeded fruit; G, seed; H, leaflet undersurface venation. A–D, H from *Hammel* 9625, E–G from *Araya* 207. Drawn by Claudia Aragón.

10°26′N, 84°01′W, 100 m, 16 xi 1980 (fr), *Hammel* 10493 (DUKE!); ibid., seedling, 23 x 1991, *Hammel et al.* 18374 (INB!, MO!); Sarapiquí, Llanura de San Carlos, Los Arbolitos al norte de Puerto Viejo, 4 km aguas arriba de la unión de los Ríos Toro y Sarapiquí, 10°38′30″N, 84°00′15″W, 20 m, 9 iii 1993 (fr), *Araya* 207 (CR!, INB!, MO!). **Alajuela**: Cantón de San Carlos, Llanura de San Carlos, Pital, Boca Tapada, Finca Aserradero San Jorge, 10°44′54″N, 84°10′07″W, 100 m, 21 i 1996 (fl), *Zamora & Zeledón* 2366 (CR!, INB!, K!, MO!). **Limón**: Southwestern-most ridge of Cerro Coronel, NW-facing slope, just S of the Río Colorado, premontane wet forest on low hills, 10°40′N, 8°39′30″W, 10–80 m, 17–18 ix 1986 (fr), *Davidse & Herrera* 31369 (CR!, INB!, MEXU, MO!).

With its glabrous leaves and seeds of one colour this species belongs to *Ormosia* sect. *Unicolores* Amsh. Within this section it is quite similar to the South American species *Ormosia falva* by being black-seeded and having greenish-yellowish flowers with red markings. Vegetatively, *Ormosia intermedia* is similar to *O. grandiflora*, sharing more or less the same number of leaflets and a general vegetative appearance. However, there are some important differences between them (Table 2).

The inflorescence and flower structures of these three species are also similar. However, the flower colour in *Ormosia grandiflora* is uncertain because, according to Rudd (1965), different collectors reported variously dark purple, pale lilac and greenish-yellow flowers. The delimitation of *Ormosia grandiflora* is still not very clear and a careful study is needed. Rudd (1965) also noted that the species of *Ormosia* sect. *Unicolores* are vegetatively very similar. Table 2 shows how some of these species are similar and the differences between them. *Ormosia intermedia* is the

TABLE 2. Differential characters of *Ormosia intermedia*, *O. flava* and *O. grandiflora*. Measurements and data for *Ormosia falva* and *Ormosia grandiflora* were taken from Rudd (1965)

Character	*Ormosia intermedia*	*Ormosia flava*	*Ormosia grandiflora*
Number of leaflets	(1–)3–5(–7)	5–11	(1–)3–5
Leaflet shape	Elliptic	Oblong-elliptic to elliptic	Ovate, obovate or elliptic
Flower colour	Green-yellow, yellow, or greenish-yellowish, with red markings	Yellow, with a red spot	Not certain
Fruit shape	Strongly swollen around seeds and strongly constricted between them	Slightly constricted between the seeds	Slightly constricted between the seeds
Number of seeds	1–5	1–3	1(–2)
Seed colour	Bright black	Bright black	Bright red
Habit	Tree (15–35 m)	Tree (35 m)	Shrub or small tree (< 10 m)
Distribution	Northern Costa Rica	Amazon basin in Peru and Brazil	Surinam and lower Amazon basin of Brazil

second known species with black seeds in the neotropics although in Asia there are several black-seeded species (Rudd, 1965).

Geographically, *Ormosia intermedia* is isolated from the rest of the species of the section, except for *O. macrocalyx* Ducke which is widespread from Mexico to the Amazon basin of Brazil. An extensive survey of the specimens from relevant international herbaria (BM, K, MO, NY, US, etc.) did not uncover any records of *Ormosia flava* or *O. grandiflora* outside of central South America.

Rudd (1965) used the seed colour as an important character for her definition of the sections. However, a molecular systematic study might help to elucidate the value of this taxonomic character in *Ormosia*.

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