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Notes on Malesian *Fabaceae* (*Leguminosae-Papilionoideae*) 15. Notes on *Indigofera*

F. Adema[1]

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Abstract Notes on some morphological features of *Indigofera* as well as taxonomic notes on several species are given. The recently described *I. erectifructa* is reduced to a synonym of *I. luzoniensis*.

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INTRODUCTION

Indigofera L. is a pantropical genus of c. 700 species (Lewis et al. 2005), of which 17 occur in the Flora Malesiana area. The genus comprises herbs, shrubs and small trees with simple or unifoliolate, trifoliolate or imparipinnate leaves and small flowers in axillary racemes. It is often easily recognised by its biramous hairs (T-shaped or balance hairs) and reddish flowers. Several species are or have been cultivated for the blue pigment indigo (Lemmens & Wessel-Riemen 1991).

For the Flora Malesiana area and adjacent Southeast Asia the genus was revised by De Kort & Thijsse (1984). Since that time only one new species for Malesia was described: *Indigofera erectifructa* Y.Endo, H.Ohashi & Madulid (2005). In the following sections a few notes on morphology and taxonomy for several species are given. Corrections to typifications proposed by De Kort & Thijsse will be discussed.

NOTES ON MORPHOLOGY

Emergences

Several types of emergences are briefly discussed by Schrire (1995) and Wilson & Rowe (2004). Apart from biramous and simple hairs, glandular hairs, colleters and pearl bodies are found. Schrire (1995) calls the latter two structures pearl bodies, Wilson & Rowe (2004) tend to call most structures emergences. In the species of *Indigofera* of the Flora Malesiana area hair-like, dark-coloured emergences are common on axial parts, in axils of stipules, leaves, stipellae, leaflets and bracts. In notes to the species I have called these structures colleters. Pearl bodies are present in several species, often they are club-shaped (clavate), on the lower surface of the leaflets of *I. glandulosa* and *I. trifoliata* they are rounded, disc-shaped and called glands. These 'glands' are according to Wilson & Rowe (2004) similar to the hollow hairs (cavitated trichomes) described by Prabhakar et al. (1985) and Vyay Kumar et al. (1986). The 'colleters' may be similar to the multiseriate, cylindrical hairs described by Vyay Kumar & Ramayya (1986).

[1] Netherlands Centre for Biodiversity Naturalis (section NHN), Leiden University, P.O. Box 9514, 2300 RA Leiden, The Netherlands;
e-mail: adema@nhn.leidenuniv.nl.

Tissue remnants

Pods of several species break off at or just before dehiscence leaving a parenchymatous tissue remnant or base. Schrire (1995: 201–203, pl. 15, f. 6d) calls this a unique feature of the tribe *Indigoferae* (pl. 15, f. 6d: persistent cup-like base remaining with calyx once pod valves are caducous), however, he does not use the character (or its loss) in his cladistic analysis. (The character was left out of the analysis because its homology with similar features in other genera is in doubt (pers. comm. Shrire).) In the species of *Indigofera* of the Flora Malesiana area this tissue remnant is present in: *I. arrecta* Hochst. ex A.Rich., *I. glandulosa* J.C.Wendl., *I. linifolia* (L.f.) Retz., *I. nigrescens* Kurz ex Prain and *I. trifoliata* L.

Development of hairs on ovaries

De Kort & Thijsse (1984) described several species with glabrous ovaries and hairy fruits. Closer inspection shows that ovaries of these species, especially older ones, have at least some hairs. The young pods are rather densely hairy, older pods may have less hairs. Probably hairs on ovaries develop late and pods may lose hairs on aging.

NOTES ON SPECIES

Indigofera arrecta Hochst. ex A.Rich.

Richard (1847: 184) described *I. arrecta* using as the base a Hochstetter name for a Schimper specimen. The protologue reads: "Indigofera arrecta Hochst., in pl. Schimp. Abyss., sect. III, no. 1923". He furthermore cites specimens collected by Guartin Dillon and Ant. Petit. Schrire (1998: 666) has taken the protologue as a kind of typification and gives *Schimper 1923* as the type with the holotype at P and isotypes at K, L, LE, MO, P. However, all the 'type specimens' seen by me bear a printed label with the number 1923b. Moreover, as Richard cites three collections, a lectotype should have been selected. As the Paris herbarium holds at least three duplicates of *Schimper 1923b* the holotype should be indicated more precisely. Here P 00569218 is selected from among the material labelled *Schimper 1923b* as lectotype of *Indigofera arrecta*.

Indigofera arrecta Hochst. ex A.Rich. (1847) 184. — Lectotype (Schrire, here designated): *Schimper III 1923b* (P 00569218; iso K, L, LE, MO, P), Ethiopia, Tigray Region, Adoa, Oct. 1842.

Indigofera colutea (Burm.f.) Merr.

Contrary to the statement by De Kort & Thijsse (1984: 115) biramous hairs in this species may have arms of unequal length. The biramous hairs of the upper surface of the leaflets are ± spreading, 0.4–0.6 mm long, with unequally long arms, those of the lower surface of the leaflets are appressed, 1.0–1.5 mm long, with equally long arms. The glandular hairs often differ in length within as well as amongst specimens. In the Flora Malesiana area they are fairly uniform, the longest hairs on twigs are 0.1–0.8 mm long and on pods 0.1–0.3 mm long. In Australia the longest hairs on twigs are similar to those of specimens of the Flora Malesiana area, but up to 1.1 mm long; in continental Asia they are 0.5–1.7 mm long; in Africa 0.6–2.5(–5) mm long. There the longest glandular hairs of specimens present in L are found in *Stolz 694* (4–5 mm) and *Tanner 3142* (3.5–4 mm). As these two specimens have pods with few endocarp spots they may belong to *I. zenkeri* Harms. The type specimen of *I. zenkeri* has glandular hairs up to 4 mm long.

Several specimens from the Lesser Sunda Islands (*Cinatti 108, Iboet 123, Jaag 417, Pleyte 93, Spanoghe s.n.*) have very few or no glandular hairs. Identification of such specimens by means of the key in De Kort & Thijsse (1984) may lead to *I. suffruticosa*.

Indigofera erectifructa Y.Endo, H.Ohashi & Madulid

In 2005 Endo et al. described a new species of *Indigofera* from Luzon: *I. erectifructa*. The fruits of this species are almost erect and therefore the authors made a comparison with erect-fruited species such as *I. galegoides* DC., *I. doachengensis* Y.Y.Fang & C.Z.Zheng and *I. densifructa* Y.Y.Fang & C.Z.Zheng (Endo et al. 2005). The unknown plants were clearly different from these species and a new species was described. Although the authors consulted the treatment by De Kort & Thijsse (1984) no comparison was made with species recorded for the Philippines. Amongst others De Kort & Thijsse's new species *I. luzoniensis* has ± erect fruits, called 'ascending' by De Kort & Thijsse (1984: 127). After receiving the type material of *I. erectifructa* on loan a careful analysis of the characters showed that the differences between *I. erectifructa* and *I. luzoniensis* are very small. Although the important seed character could not be assessed, due to the few pods available, I am convinced that *Nemoto et al. 10630*, the type of *I. erectifructa*, belongs to *I. luzoniensis*. The synonymy of *I. luzoniensis* becomes:

Indigofera luzoniensis de Kort & G.Thijsse (1984) 216. — Type: *BS 5043* (holo L; iso BO, K, P, US), Philippines, Luzon, Rizal Prov., Montalban.

Indigofera erectifructa Y.Endo, H.Ohashi & Madulid (2005) 261. — Type: *Nemoto et al. 10630* (holo TUS; iso TUS), Philippines, Luzon, Mountain Prov., Bontoc Town, near Talubi.

Indigofera glandulosa J.C.Wendl.

In 1798 Wendland described *I. glandulosa* with the German name 'Drüsige Indigo'. I asked Göttingen to search the Wendland collection for a specimen of his *I. glandulosa*, but I have not received any answer to this request. According to Sanjappa (1995) Wendland's herbarium in Hanover was destroyed.

In 1803 Willdenow described an *I. glandulosa* with the same German name, contributing the epithet to Roxburgh. In the Willdenow herbarium, sub nr. 13891, there is a specimen collected by Rottler sent to Willdenow by Klein, annotated in Rottler's handwriting with *Indigofera glandulosa* Roxb. This specimen was the base of Willdenow's *I. glandulosa* as the sheet also contains comments in Willdenow's handwriting.

As Wendland and Willdenow were describing the same species, indicating it with the same German name, I have selected the Rottler specimen from the Willdenow herbarium as the neotype of Wendland's *I. glandulosa*. The synonymy becomes:

Indigofera glandulosa J.C.Wendl. (1798) 55; de Kort & G.Thijsse (1984) 119. — *Indigofera glandulosa* Roxb. ex Willd. (1803) 1227; Roxb. (1832) 380; Wight & Arn. (1834) 199; Backer & Bakh.f. (1964) 590. — Neotype (here designated): *Rottler 750* (B, Hb. Willd.13891), India, 'Mirittapadu', 1794.

Indigofera hirsuta L.

In 1837 Blanco described *Indigofera angustifolia*. This species was renamed *Indigofera tinctoria* by Naves (1880). Both names are illegitimate. Merrill (1918) identified this plant as *Indigofera hirsuta* L. De Kort & Thijsse (1984) named Merrill's representative specimen *Spec. Blanc. 403* as the type of the names of Blanco and Naves. However, as no Blanco material of his *I. angustifolia* is known, they should have selected a neotype. As such I designate *Merrill Spec. Blanc 403*. In the synonymy of *I. hirsuta* it becomes:

Indigofera angustifolia Blanco (1837) 596, non L.; (1845) 403; (1879) 394; Merr. (1918) 79. — *Indigofera tinctoria* Náves (1880) t. 163, non L. — Neotype (here designated): *Merrill Spec. Blanc. 403* (L; iso BM, K, US), Philippines, Luzon, Pangasian Prov., Umingan.

Indigofera linifolia (L.f.) Retz.

In 1841 Spanoghe described a new species *Indigofera albicans* based on 'Hallia glauca Zipp.'. Zippelius wrote the name 'Hallia glauca' on labels of several specimens he collected in Timor. One of these specimens bears a Spanoghe label '*Indigofera albicans*', but lacks the indication that Zippelius collected it. As this specimen was seen and annotated by Spanoghe this collection (L 908.116-1306) is selected as the lectotype of *I. albicans* Span. In the synonymy of *I. linifolia* it should read:

Indigofera albicans Span. (1841) 190. — Lectotype (here designated): *Anon* (*Zippelius?) s.n.* (L, L 908.116-1306), Timor.

Indigofera tinctoria L.

In 1837 Blanco described *Indigofera tinctoria* Blanco, seemingly with no references to the earlier description of *I. tinctoria* by Linnaeus. According to Merrill (1918: 179) the Blanco species is identical with the Linnaean one. De Kort & Thijsse (1984: 136) followed Merrill (1918) and placed the Blanco name in the synonymy of *I. tinctoria* L. As the type of *I. tinctoria* Blanco they cited Merrill's representative specimen *Spec. Blanc. 826*. However, this cannot be the type. As no Blanco material of his *I. tinctoria* is known they should have selected a neotype. Here I select as neotype of *I. tinctoria* Blanco *Merrill Spec. Blanc 826*. In the synonymy of *I. tinctoria* L. this becomes:

Indigofera tinctoria L. (1753) 751

Indigofera tinctoria Blanco (1837) 591; (1845) 413; (1879) 499; Merr. (1918) 179. — Neotype (here designated): *Merrill Spec. Blanc 826* (L; iso BM, BO, K, US), Philippines, Luzon, Rizal Prov. Antipolo.

See for more complete synonymy De Kort & Thijsse (1984).

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