A new species of *Miliusa* (Annonaceae) from the Western Ghats of Karnataka, India

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Within Magnoliales, Annonaceae is the most species-rich family (Chatrou et al. 2012). *Miliusa* Leschenault ex De Candolle (1832: 213) is placed in tribe Miliusae, subfamily Malmeoideae, according to the recent infrafamilial classification (Chatrou et al. 2012). Chaowasku et al. (2014) provided insights into the evolutionary relationships of tribe Miliusae, and Chaowasku & Keßler (2013) reconstructed the phylogeny of *Miliusa* with four well-supported clades. *Miliusa* is distributed across the Austro-Malesian region with most species exhibiting a restricted distribution to certain areas (Mols & Kessler 2003). Species known from India exhibit a high degree of endemism (Kundu 2006).

Hooker & Thomson (1855), Hooker (1872), King (1893) and Gamble (1915) included the genus in their respective taxonomic studies of the flora of British India. Mitra (1993) enumerated 14 species of this genus from India (of which almost half are endemic) showing a disjunct distribution across the country with most species being restricted to northeast India, the Andaman Islands or the Western Ghats. Only two species [*Miliusa tomentosa* ( Roxburgh: 1795: 31. t. 35.) Sinclair (1955: 378) and *M. velutina* ( Dunal) Hooker & Thomson (1855: 151)] show a wider distribution in India (Mitra 1993). With the addition of recently described taxa [*M. codonantha* Chaowasku (2013: 101), *M. gokhalaei* Ratheesh et al. (in Narayanan et al. 2012: 26), *M. tirunelvelica* Murugan et al. (2004: 102), *M. velutina* var. *deviyarina* Rajendran et al. (2003: 220), *M. wayanadica* Sujanapal et al. in Narayanan et al. (2010: 64)], the total number of species in India has increased to 19 species and one variety (Turner 2015). In their recently updated work, Nayar et al. (2014) mention 11 species of *Miliusa* from the Western Ghats biodiversity hotspot in India.

During regular explorations around Kudremukh national park, some interesting specimens superficially resembling *Miliusa wightiana* Hooker & Thomson (1855: 149) were encountered and subsequently collected. A critical examination and comparison of the specimens along with a thorough literature review revealed that the specimens are distinct with respect to multiple morphological characters from the known species of *Miliusa* from the Indian subcontinent and the species is therefore described anew. A complete taxonomic description along with an illustration and additional ecological notes are provided here.

*Miliusa malnadense* Page & Nerlekar, sp. nov., Figs. 1 & 2

This species can be distinguished by the presence of pubescent young branches, coppery red young leaves, inner petals glabrous outside, apices and margins densely puberulous inside and purple coloured, carpels elongated, curved and pubescent throughout its length, ovoid-oblong stigma and globose monocarps.

**Type:**—INDIA. Karnataka: Chikkmagaluru district, Kudremukh National Park, 13.131633 N 75.280404 E, 1450 m, 18 November 2013, (with flowers), Page 102 (holotype MH!, isotype JCB!, FRLH!).

Small evergreen trees, 3–5 m; bark grayish brown, branches terete, lenticelled and pubescent when young. Leaves simple, alternate, 5.0–11.5 × 1.5–3.5 cm, oblong to lanceolate, bases slightly unequal, cuneate or rounded, apices acute to acuminate, petioles 2–3 mm, pubescent in young leaves, glabrous when mature; young leaves coppery red; margins entire, ciliate at least in young leaves; midrib and nerves rusty tomentose on the abaxial surface and sparsely so on the adaxial surface; 8–9 pairs of secondary nerves, prominent beneath and faintly looping. Flowers axillary and solitary, bisexual; pedicels 2.5–3.0 cm, glabrous; bracts 3, minute, triangular, ca. 0.5 mm, 2 basal and one just above them, ovate-lanceolate, densely tomentose; sepals 3, each 1.0 mm, triangular, acute, ciliate, reflexed; petals 6 (3+3), outer 3 reduced, sepaloid, ovate, 1.0 mm, alternate to sepals; inner 3 elliptic-lanceolate, acute, purple with faint maroon streaks inside, c. 2.0 × 1.5 cm, tightly appressed at base, veins 7, glabrous outside, apices and margins densely puberulous, basal saccate portion glabrous inside, recurved along
margins; torus ovoid; stamens numerous, paired, in ca. 5 whorls, ca. 1 × 1 mm, intermixed with numerous ca. 0.5 mm long hairs that are present on the torus; staminodes absent; connectives, not extending at apex, obtuse at top; anthers extrose; carpels up to 10, elongated, curved, pubescent throughout the outer ovary wall, ca. 2 mm, with 1–2 ovules; styles short or absent; stigmas ovoid to oblong, slightly tilted, with viscous exudates. Fruiting pedicel terete, 3 cm; monocarps 6–10, each up to 10 mm across, globose, glabrous, mucronate; stipes 8–10 mm long; seeds one or two (ripe fruits not found).

A NEW SPECIES OF MILIUSA FROM INDIA

Phenology: — Flowering and fruiting seen from November to May.

Etymology: — The specific epithet “malnadense” refers to the Kartanaka part of the Western Ghats from Shimoga to Kodagu which is the currently known distribution range of this species.

Distribution and associated species: — *Miliusa malnadense* is so far known only from the Kudremukh national park in the Western Ghats mountain range which is one of the global biodiversity hotspots (Myers et al. 2000). *Miliusa malnadense* is probably restricted to forests at elevations above 1000 m in the Shola-Grassland ecosystem that harbor significant proportion of endemic taxa (Robin & Nandini 2012). Associated species observed in the type locality were species of the genus *Ochlandra* Thwaites, *Lasianthus* Jack, *Cinnamomum* Schaeffer, *Myristica dactyloides* Gaertner, *Euonymus indicus* B.Heyne ex Wall. and *Schefflera microcarpa* (C.B.Clarke) Gamble. Conservation status — Data Deficient.

Interrelationships and critical notes: — *Miliusa malnadense* resembles *M. tirunelvelica* and *M. wightiana* in having long glabrous pedicels, the shape of the corolla and the ciliate sepals and outer petals. It differs from both taxa in characters listed in Table 1. We speculate that *M. malnadense* belongs to the *M. campanulata* Pierre (1881: 41) group based on the tightly appressed nature of the inner petals (Chaowasku & Kessler 2013). *Miliusa tirunelvelica* and *M. wightiana* are not known to occur at the type locality of the new species.

**TABLE 1.** Distinguishing characters of *M. malnadense* and other closely related species

<table>
<thead>
<tr>
<th>characters</th>
<th><em>M. malnadense</em></th>
<th><em>M. wightiana</em></th>
<th><em>M. tirunelvelica</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>branches</td>
<td>pubescent, at least in the younger stages</td>
<td>glabrous, striate</td>
<td>pilose</td>
</tr>
<tr>
<td>leaf shape, size and colour</td>
<td>oblong to lanceolate, 5.0–11.5 × 1.5–3.5 cm, coppery red when young</td>
<td>narrowly oblong to lanceolate, 4.5–9.5 × 1.5–5.0 cm, green when young</td>
<td>elliptic to lanceolate, 4.0–9.0 × 1.0–2.5 cm, green when young</td>
</tr>
<tr>
<td>leaf margin</td>
<td>ciliate</td>
<td>glabrous</td>
<td>ciliate</td>
</tr>
<tr>
<td>pedicel</td>
<td>2.5–3.0 cm, glabrous</td>
<td>1.5–2.5 cm, glabrous</td>
<td>1.5–4.0 cm, sparsely pilose</td>
</tr>
<tr>
<td>sepal and outer petal</td>
<td>ciliate</td>
<td>ciliate</td>
<td>sparsely pubescent</td>
</tr>
<tr>
<td>inner petal</td>
<td>glabrous outside, apices and margins densely puberulous inside, purple with maroon streaks inside</td>
<td>puberulous outside, pink or greenish</td>
<td>sparsely pubescent outside, glabrous inside. Pink with white tinge</td>
</tr>
<tr>
<td>anthers</td>
<td>0.5–1.0 mm long</td>
<td>1.0 mm long</td>
<td>1.5 mm long</td>
</tr>
<tr>
<td>carpels</td>
<td>elongated, curved, pubescent throughout length of outer ovary wall</td>
<td>oblong, glabrous</td>
<td>oblong/falcate, pubescent only at base</td>
</tr>
<tr>
<td>stigma</td>
<td>ovoid-oblong</td>
<td>oblong</td>
<td>obconical</td>
</tr>
<tr>
<td>monocarps</td>
<td>globose, apex mucronate, up to 1 cm across</td>
<td>pisiform, oblong, 1 cm across, apex apiculate or mucronate</td>
<td>oblong, 1.0–1.5 × 0.8–1.0 cm, apex obtuse</td>
</tr>
</tbody>
</table>

Although Mitra (1993) described the carpel of *M. wightiana* as ‘pubescent with straight hairs’, authentic sources like Hooker & Thomson 1855 (protologue), Hooker (1872), Gamble (1915) and King (1893) in addition to personal field observations confirms that the carpel is glabrous in this species. It is possible that the specimens collected as *M. wightiana* from the Shimoga district of the same state [(KFP 6838 (JCBI)] may be *M. malnadense*, but due to inadequate evidence from the herbarium sheet, we cannot strongly ascertain its identity.

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