



Morphotaxonomic study of *Desmodium* Desv., (Fabaceae) from the Bhandara District (Maharashtra State) India

J. V. Gadpayale¹, S. R. Somkuwar² and A. A. Chaturvedi³

¹Department of Botany, S. N. Mor College of Art, Commerce and Smt. G. D. Saraf Science College, Tumsar (M.S.), India- 441 912.

²Department of Botany, Dr. Ambedkar College Deekshabhoomi, Nagpur- 440 010.

³P.G.T. Department of Botany, University Campus, RTM University, Nagpur- 440 033.
gadpayale_jv@yahoo.co.in

Abstract:-

The present article serves the Morphotaxonomic studies of *Desmodium* Desv., (Fabaceae) from the Bhandara District (Maharashtra State) India. It is an attempt to make a comprehensive account having details on updated botanical names and choosing of specific morphological characters for accurate and easy identification of nine species of *Desmodium* of which *D. heterophyllum* (Willd.) DC., first time reported for Eastern Maharashtra. Artificial identification key was reframed so as to identify currently recognized *Desmodium* species in Bhandara district which is applicable for morphometric analysis for understanding the phenetic relationships among the species of *Desmodium*

Keywords: Morphotaxonomic, *Desmodium*, Bhandara District

Introduction:-

The *Desmodium* Desv., genus (Fabaceae, subfamily Papilionoideae; Ohashi, 2014) is included in the tribe Desmodieae and comprises about 524-530 species, with greater diversity in Southeast Asia, Mexico and South America (Ohashi - 2014). The genus *Desmodium* Desv., (Fabaceae) mostly distributed in subtropical and tropical regions. Hyde *et al.* (2012) report the distribution of 450 species of *Desmodium* in warm regions, especially in East Asia, Brazil and Mexico. A Williams (1983) state, South-east Asia is a centre of legume diversity while Schubert (1980) considers Mexico and Brazil as the centers of diversity of *Desmodium*.

The genus *Desmodium* can be recognized by uni- or tri-foliolate leaves, simple raceme or panicle inflorescence and distinctly jointed pods. The systematics of the genus *Desmodium* is confusing and not yet resolved completely. For example, several species of *Desmodium* have been transferred to the genera *Dendrolobium*, *Hylodesmum*, *Lespedeza* and *Phyllodium*, and some species of other genera such as *Hedysarum* and *Uraria* are still included to *Desmodium* (Puhua *et al.* 2010). Ohashi and Mill (2000) based on morphological characteristics, proposed to split 14 species out of *Desmodium* and placed them in the newly described genus *Hylodesmum*.

Several taxonomic treatments on the genus *Desmodium* were carried out based on morphological characters (Liu and Chang 1962, Ohashi 1973, Pedley and Rudd 1996, Shaheen 2008). In Hooker's "Flora of British India" (1879, 1999 (reprint)) 49 species of *Desmodium* were recorded while Flora of Maharashtra (Singh N. P. and Karthikeyan S., 2000) reports 18 species of this genus.

The previous taxonomic reports on Bhandara district doesn't give any clear information about the number of species occurring in the present Bhandara district alone. The purpose of this publication is to make available an updated list of





Desmodium species examined thus far in present study area and reframed the identification keys to avoid the difficulty in identification of *Desmodium* species.

Materials and Methods:-

Intensive and extensive field explorations were made all over Bhandara district (MS), India. Repeated collection trips during different seasons were essential to get the taxa both in reproductive and vegetative phases. All relevant data about the plants have been recorded in a field book. Photographs were taken, and collected a sufficient number of plants based on the population, for making herbarium specimens. Herbarium specimens were prepared following the wet method (Fosberg and Sachet, 1965). All the specimens are identified with the help of relevant literature and floras. The herbarium and photographs of specimens are deposited in PGT Department of Botany RTM Nagpur University, Nagpur.

Artificial key for identification of *Desmodium* species occurs in Bhandara district.

- 1a. Herbs, Leaves unifoliate, flowers slightly exerted ***D. ritchiei***
- 1b. Plants not as above 2
 - 2a. Shrubs, leaflets fulvous hairy ***D. velutinum***
 - 2b. Shrubs, leaflets not fulvous hairy 3
- 3a. Stipules foliaceous, auriculate ***D. dichotomum***
- 3b. Stipules not as above 4
 - 4a. Leaflet apex truncate or emarginate ***D. triflorum***
 - 4b. Leaflet apex acute or not as above 5
- 5a. Leaflets vary in length with 2-3 cm long petiole ***D. heterophyllum***
- 5b. Leaflets not vary in length, petiole not as above 6
 - 6a. Bracts teretes, pods longer than broad.....***D. gangeticum***
 - 6b. Bracts and pods not as above 7
- 7a. Pods deeply constricted between seeds; joints dehiscent....***D. heterocarpon***
- 7b. Pods scarcely constricted between seeds; joints indehiscent.....8
 - 8a. Flowers pinkish; concealing ***D. pulchellum***
 - 8b. Flowers whitish or bluish; not concealing ***D. laxiflorum***

Taxonomic treatment of *Desmodium* species found in Bhandara district -

1. *Desmodium dichotomum* (Willdenow) Candolle, Prodr. 2:336. 1825. van Meeuwen in Reinwardtia 6:248. 1962 Sanj. Legumes of India 152. 1991. *Hedysarum dichotomum* Willdenow, Sp. Pl. 3: 1180. 1802; *Desmodium diffusum* (Willdenow) DC. Prodr. 2:336. 1825; Baker in Hook. f. Fl. Brit. India 2: 169. 1876; Cooke, Fl. Pres. Bombay 1:377.1958 (Repr.).





Subshrubs or diffuse herbs, 20–80 cm tall. Stems adpressed long straight hairy and spreading hooked hairy. Leaves 3-foliolate, sometimes 1-foliolate near base of stem; petiole 1.5–3.5 cm, hairy; leaflet blade elliptic or ovate to broadly elliptic or broadly ovate, 1.5–7 X 1–6 cm, abaxially densely adpressed hairy, adaxially with sparse adpressed hairs, intermixed with sparse hooked hairs. Racemes terminal or axillary or usually panicles, 5–45 cm, hooked hairy, laxly flowered, 2- or 3- flowered at each node. Pedicel 2–5 mm. Calyx 4-lobed, ca. as long as tube; upper lobes 2-toothed. Corolla purple to violet, ca. 3 mm; standard obovate or broadly obovate, base shortly clawed; wings and keel wholly shortly clawed at base. Ovary densely pubescent, 5- or 6-ovuled. Legume narrowly oblong, 1–1.8 cm X 2.5–3 mm, densely hooked hairy, 5- or 6-jointed, both sutures shallowly constricted between articles.

Fl. Jun– Aug, Fr. Sep–Oct.

Distribution- Common, throughout the district as a weed in cultivated fields, along road sides and in forest undergrowth.

2. *Desmodium gangeticum* (L.) DC. Prodr. 2:327. 1825; Baker in Hook. f. Fl. Brit. India 2: 168. 1876; (incl. var. *maculatum* (L.) Baker); Cooke, Fl. Pres. Bombay 1:379.1958 (Repr.). van Meeuwen in Reinwardtia 6:249. 1962 Sanj. Legumes of India 153. 1991. *Hedysarum gangeticum* L. Sp. Pl. 2: 746. 1753; *Desmodium cavaleriei* H. Leveille.

Shrubs, erect or nearly so, to 1 m tall, much branched, pilose. Leaves 1-foliolate, variable in shape and size; petiole 1– 2 cm; blade narrowly elliptic-ovate, sometimes ovate or lanceolate, 3–13 X 2–7 cm, abaxially sparsely gray villous, adaxially glabrous except for hairy mid-vein, base rounded, apex acute. Racemes terminal and axillary or sometimes panicles, 10–30 cm, 2–6-flowered at each node. Pedicel 2–5 mm, hairy. Calyx ca. 2 mm, 4-lobed; lobes slightly longer than tube. Corolla green-white, 3–4 mm; standard obovate; wings oblong, base auriculate, shortly clawed; keel narrowly obovate, not auriculate. Ovary hairy. Legume linear, slightly curved, 1.2–2 X ca. 0.25 cm, lower suture deeply undulate, upper suture slightly constricted between seeds, hooked pubescent, 6–8-jointed.

Fl. Apr–Aug, Fr. Aug–Sep.

Distribution – Common throughout in the undergrowth of forests and in shaded spots along road sides.

3. *Desmodium heterocarpon* (L.) DC. Prodr. 2:327. 1825; van Meeuwen in Reinwardtia 6:251. 1962 Sanj. Legumes of India 154. 1991. *Hedysarum heterocarpon* L. Sp. Pl. 747.1753. *Desmodium polycarpon* (Poir.) DC. Prodr. 2:334. 1835; Baker in Hook. f. Fl. Brit. India 2: 168. 1876; (incl. var. *maculatum* (L.) Baker); Cooke, Fl. Pres. Bombay 1:379.1958 (Repr.).

An erect or suberect, slender, 30–150 cm tall, much branched from base of stem, appressed-pubescent undershrub. Leaves 3- foliolate; terminal leaflet blade elliptic, narrowly elliptic, or broadly obovate, 1.8-5.2X1.0-2.2 cm, abaxially white adpressed pubescent, adaxially glabrous, base obtuse, apex rounded or obtuse, emarginate, mucronate; petiole 1.0–2.0 cm, slightly pubescent. Racemes terminal or axillary, 2.4–7.2 cm; rachis with white, spreading, hooked hairs or yellowish or





white, straight, appressed hairs, densely flowered. Pedicel 3–4 mm. Calyx 1.5–2 mm, 4-lobed; upper lobes slightly 2-toothed at apex. Corolla purple, purplered, or white, 5 mm; standard obovate-oblong, shortly clawed; wings obovate, auriculate, clawed; keel extremely curved, apex obtuse. Pods 1.0–1.6 cm X 0.3–0.4 cm, linear-oblong, densely pubescent, 5–8 jointed articles quadrate.

Fls and Frs: October- December.

Distribution – Frequently occurs in forest.

4. *Desmodium heterophyllum* (Willdenow) DC. Prodr. 2:334. 1835; Baker in Hook. f. Fl. Brit. India 2: 173. 1876; van Meeuwen in Reinwardtia 6:251. 1962 Sanj. Legumes of India 155. 1991. *Hedysarum heterophyllum* Willdenow, Sp. Pl. 3, 2:1201. 1803.

Herbs, prostrate or ascending, 10– 70 cm tall. Young parts spreading pubescent. Leaves 3-foliolate, often intermixed with 1-foliolate leaves on lower part; petiole 0.5–1.5 cm; terminal leaflet blade broadly elliptic or broadly elliptic-obovate, 1–3 X 0.8–1.5 cm, base obtuse, apex rounded or nearly truncate, often emarginate. Flowers solitary or binate in leaf axils or 2 or 3 scattered on rachis. Pedicel 1–2.5 cm. Calyx 5-parted; upper 2 lobes deeply incised near base, villous and minutely hooked hairy. Corolla purple-red to white, ca. 5 mm; standard broadly obovate; wings obovate or narrowly elliptic, shortly auriculate; keel slightly curved, shortly clawed. Stamens diadelphous, Ovary adpressed pubescent. Legume narrowly oblong, straight or curved, 1.2–1.8 cm X ca. 3 mm, lower suture deeply undulate, upper suture straight, 3–5-jointed, flat; articles broadly oblong or quadrate, 3.5–4 mm, glabrescent, reticulate veined.

Fl. and Fr. Jul–Oct.

Distribution – Rare or Occasional in shady places (Chandpur, Sonogaon and Golewadi)

5. *Desmodium laxiflorum* DC. in Ann. Sci. Nat Paris 1, 4:100. 1825; Baker in Hook. f. Fl. Brit. India 2: 164. 1878; Cooke, Fl. Pres. Bombay 1:376.1958 (Repr.). van Meeuwen in Reinwardtia 6:252. 1962 Sanj. Legumes of India 156. 1991.

Subshrubs or shrubs, erect, 30–120 cm tall. Young branchlets with adpressed and minute hooked hairs. Leaves 3-foliolate; petiole 1.5–4 cm; terminal leaflet blade ovate or ovateelliptic, 9–19 X 3–8 cm, abaxially densely yellow sericeous, adaxially sparsely adpressed hairy, lateral veins 9–12, apex shortly acuminate. Racemes terminal and axillary, often 2 axillary, to 28 cm; rachis pubescent intermixed with minute hooked hairs, 2–7-flowered, fascicled. Pedicel 5–10 mm, densely hairy as rachis. Calyx densely villous; upper lobes entire or nearly so at apex. Corolla white to violet, 4–7 mm; standard broadly obovate or orbicular; wings auriculate and clawed; keel clawed. Legume linear, 2–6 cm, with dense, minute, hooked hairs, 4– 12-jointed, both sutures nearly not constricted between articles; articles oblong.

Fl. Aug–Oct, Fr. Oct–Nov.

Distribution – Common throughout district in the undergrowth of forests.





6. *Desmodium pulchellum* (L.) Bth. in Fl. Hongk. 83 1861; Baker in Hook. f. Fl. Brit India 2:162. 1876; Cooke, Fl. Pres. Bombay 1:376. 1958 (Repr.ed.); van Meeuwen in Reinwardtia 6:256. 1962; Sanj. Legumes of India 160. 1991. *Hedysarum pulchellum* L. Sp. Pl. 747. 1753.

Under shrubs. Leaflets 4.5- 10.0 X 2.4 – 5.0 cm, elliptic- ovate, downy tomentose beneath, apex obtuse or subacute, base rounded or subcordate. Flowers white or yellow, in axillary or terminal racemes; bracts 12-40, orbicular, leafy. Pods indented, 2- jointed, pubescent.

Fl. and Fr. March – December.

Distribution – Occasional as undergrowth in forests.

7. *Desmodium ritchiei* Sanj. In Bull. Bot. Surv. India 22:229. (1980) 1982 and Legumes of India 160. 1991. *D. rotundifolium* Baker in Hook. f. Fl. Brit. India 2:172. 1876 non DC. 1825; Cooke, Fl. Pres. Bombay 1:381.1958 (Repr.) p.p. *Desmodiastrum racemosum* (Bth.) Pramanik and Thoth. var. *rotundifolium* (Dalz. ex Prain) Pramanik and Thoth. in. J. Ind. Bot. Soc. 65:378. 1987.

Herbs, 15- 45 cm high. Leaflets 1.2-2.5 X 1.2- 2.5cm, appressedly pubescent beneath. Flowers pink, in terminal and axillary racemes. Pods falcate, lower suture slightly indented; joints 3-6.

Fl. and Fr. September – December.

Distribution – Common throughout in forests.

8. *Desmodium triflorum* (L.) DC. Prodr. 2: 334. 1825; Baker in Hook. f. Fl. Brit India 2:173. 1876; Cooke, Fl. Pres. Bombay 1:378. 1958 (Repr.ed.); van Meeuwen in Reinwardtia 6:261. 1962; Sanj. Legumes of India 163. 1991. *Hedysarum triflorum* L. Sp. Pl. 749. 1753.

Herbs, perennial, prostrate, 10–50 cm tall, spreading pubescent. Leaves 3-foliolate; petiole ca. 5 mm; terminal leaflet blade obcordate, obtriangular, or obovate, 2.5–10 X 2.5–10 mm, base cuneate, apex truncate, slightly emarginate. Flowers solitary or 2 or 3 in leaf axils. Pedicel 3–8 mm, elongated to 1.3 cm at fruiting. Calyx densely villous, 5-parted; lobes narrowly lanceolate, longer than tube. Corolla purple-red, nearly as long as calyx; standard obcordate, base attenuate, long clawed; wings elliptic, shortly clawed; keel slightly falcate, longer than wings, curved, long clawed. Stamens diadelphous. Legume narrowly oblong, slightly falcate, flat, 5–12 X ca. 2.5 mm, lower suture undulate, upper suture straight, 3–5-jointed; articles nearly quadrate, with short, hooked hairs, reticulate veined.

Fl. and Fr. Jun– Oct.

Distribution – Common throughout.

9. *Desmodium velutinum* (Willd.) DC. Prodr. 2:328. 1825. van Meeuwen in Reinwardtia 6:264. 1962. Sanj. Legumes of India 165. 1991. *Hedysarum velutinum* Willdenow, Sp. Pl. 3: 117. 1803. *Desmodium latifolium* (Roxb.)DC. Prodr.





2:327. 1825; Baker in Hook. f. Fl. Brit. India 2: 168. 1876; Cooke, Fl. Pres. Bombay 1:380.1958 (Repr.).

Under shrubs, 60 to 120 cm tall, fulvous pubescent. Leaves 1-foliolate, rarely intermixed with 3-foliolate leaves; leaflets 4.5-13.6 x 2.8- 10.6 cm, broadly ovate or suborbicular, scabridly hairy above, densely so beneath, fulvous-ciliate on margins, petiole 1.5–1.8 cm, densely yellow velutinous. Inflorescences terminal and axillary, racemose or paniculate, 10-30 cm long, terminal ones often broadly paniculate, 2–5-flowered at each node; bracts subulate or lanceolate, 2.5–12 x 0.3–0.7 mm. Pedicel 1.5 mm. Calyx 2–3 mm, 4-lobed. Corolla purple or pink, 3–5 mm; standard

obovate- orbicular; wings narrowly elliptic, auriculate; keel narrow, not auriculate. Pods 1.2-

2.5 cm long, 3-6 jointed, densely pubescent, apiculate.

Fls and Frs: August–November.

Distribution – Occasional in the forest undergrowth, rarely along river banks and road sides.

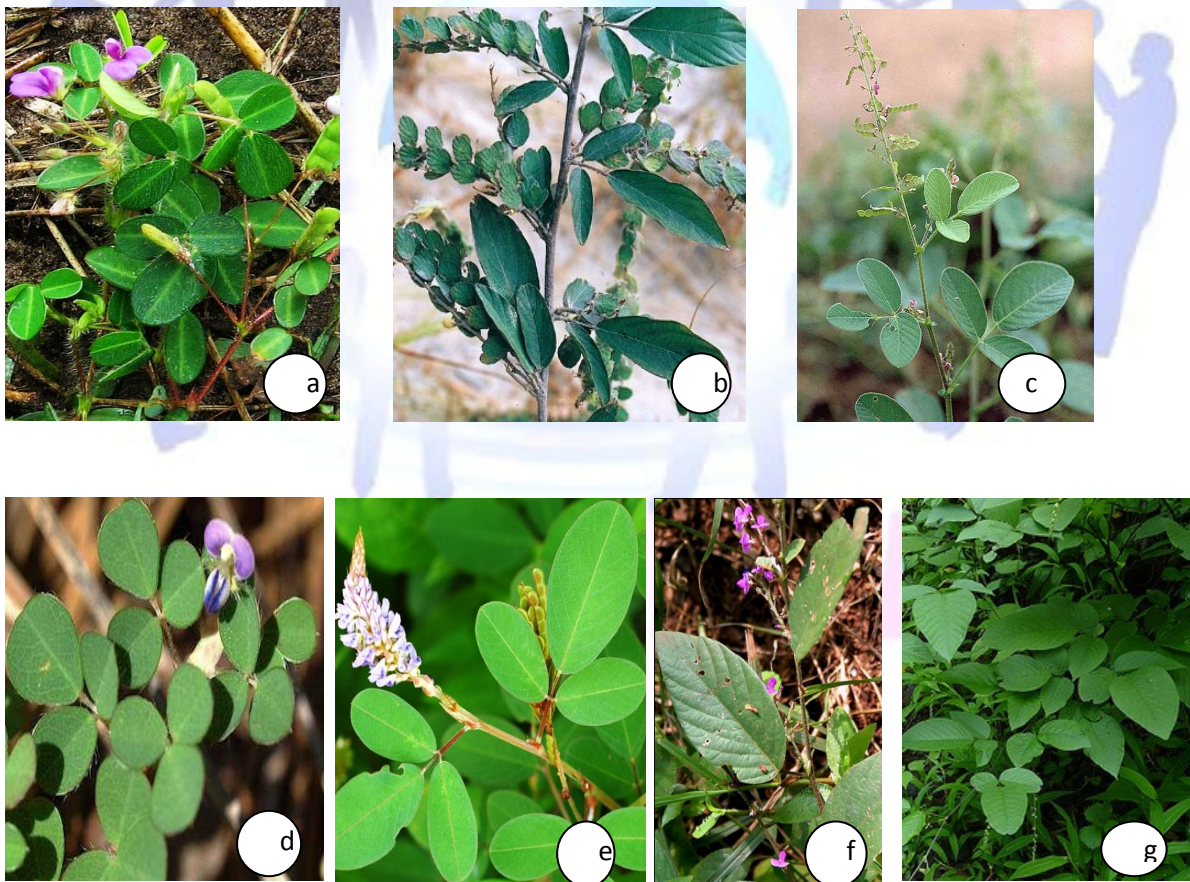


Image Illustration:- a) *Desmodium heterophyllum* (Willd.) DC. b) *Desmodium pulchellum* (L.) Bth. c) *Desmodium dichotomum* (Willd.) DC. d) *Desmodium triflorum* (L.) DC. e) *Desmodium heterocarpon* (L.) DC. f) *Desmodium gangeticum* (L.) DC. g) *Desmodium laxiflorum* DC.



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