

Taxonomic status of *Dimeria veldkampii* (Andropogoneae: Poaceae)

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Abstract: *Dimeria veldkampii* Kiran Raj & Sivad. is shown to be conspecific with *D. woodrowii* Stapf as the range of morphological variations are continuous. Hence, it is subsumed under *D. woodrowii*.

Keywords: Conspecific, *Dimeria woodrowii*, Lateritic plateau, Range of variation.

Introduction

Dimeria R.Br., one of the dominant genera of the family Poaceae on lateritic plateaus, comprises of c. 64 species in the world mostly distributed in tropical regions of Asia (Clayton *et al.*, 2006; Mabberley, 2017). More than 50% taxa (37 species) of this genus are reported from Peninsular India (Ravi *et al.*, 2001; Kiran Raj, 2008; Gosavi *et al.*, 2016) of which *Dimeria woodrowii* Stapf is endemic to northern parts of Western Ghats (Nayar *et al.*, 2014; Singh *et al.*, 2015) especially along the low elevation lateritic plateaus. It is considered to be a highly evolved species and hence has been kept in a separate section, *viz.* sect. *Annulares* (Bor, 1952). The coiling of racemes to form circinate hoop is a unique character in tribe *Andropogoneae*. Subsequently, Kiran Raj and Sivadasan (2008) added one more species, *D. veldkampii* Kiran Raj & Sivad. to this section. From *D. woodrowii*, it was differentiated based on characters such as, peduncles straight at maturity, rachis loosely rolled to form ringlet, racemes not articulated with peduncle,

callus densely hairy and c. 0.3 mm long, glumes wingless or minutely winged at apex, awn with well differentiated basal column (Kiran Raj & Sivadasan, 2008). So far, this *D. veldkampii* is known from only two localities (Kiran Raj & Sivadasan, 2008; Dileep & Nair, 2015).

As a part of taxonomic and distributional study of the endemic herbaceous plants on lateritic plateaus of northern Western Ghats and Konkan, different populations of *D. woodrowii* have been studied to understand its range of morphological variations, microhabitat preferences, phenology and ecological adaptations. Study has shown that *D. woodrowii* shows wide range of morphological variations in forming circinate coiling, bending at first node, level of enclosing racemes in spathe-like sheath at maturity, hairiness, wing on upper glumes and awn length. Studies based on different populations revealed, *D. veldkampii* Kiran Raj & Sivad. as conspecific with *D. woodrowii*. Details of range of morphological variations of *D. woodrowii* and comparison of *D. veldkampii* with *D. woodrowii* based on protologues are given in **Table 1**. It shows that distinguishing characters of *D. veldkampii* are within the variations of *D. woodrowii*.

Dimeria woodrowii Stapf, Hooker's Icon. Pl. 24: t. 2312. 1894; Hook.f., Fl. Brit. India 7: 104. 1896; Blatt. & McCann, Bombay Grass. 8. 1935; T.Cooke, Fl. Bombay 3: 462. 1958 (Repr. ed.): Bor, Grasses Burma, Ceylon, India & Pakistan 144. 1960; B.G.Kulk., Fl. Sindhurg 513. 1988; S.M.Almeida, Fl. Sawantwadi 2: 125. 1990; Laxmin. in Sharma *et al.*, Fl. Maharashtra, Monocot. 470. 1996; S.Moulik,

Table 1. Range of morphological variations in *D. woodrowii* and its comparison with *D. veldkampii*

Character	<i>D. veldkampii</i> (From protologue)	<i>D. woodrowii</i> (From protologue)	Field/morphological observations in different populations of <i>D. woodrowii</i>
Peduncles	Straight	Bends at maturity	Bending of peduncles is a highly variable character. On single individual, bent and straight peduncles were observed
Racemes	Single or double ringlets, loosely rolled racemes	Tightly rolled, form raceme globule	Varies from single to repeatedly roll and loosely to tightly rolled racemes. Observed from moist to dry climatic condition and young to old raceme (Fig. 1d-j)
Raceme groups	Fully emerge out from spathe-like sheath	Enclosed in spathe-like sheath at maturity	Enclosed to fully emerge from spathe-like sheath at maturity (Fig. 1d-j)
Callus	c. 0.3 mm, densely bearded	c. 0.1 mm, hairy	Within a single raceme, callus showed variation in size (0.1–0.3 mm) and hairiness pattern (Fig. 1k,l)
Spikelets	Coriaceous, acuminate to aristate at apex, yellowish	Coriaceous	Coriaceous, acute at apex. Turn reddish in less water exposed areas and early blooming plants, while yellow in moist area and late blooming plants. In some individuals, on same plant one raceme can be seen with reddish brown and other with yellowish brown colour (Fig. 1d)
Glumes	Dorsally keeled throughout, hairy toward keeled apex; upper glume with or without minute wing on back	Dorsally rounded at base, keeled at apex, hairy along sides below; upper glume with a broad wing at apex	Range in variation of keel, wing and hairs within single raceme (Fig. 2i). On single raceme, glumes with or without wing as well as glabrous to hairy on back. Generally glumes of the upper spikelets of the raceme are without keel or wing
Awns	0.8–1.2 cm long awn with a well differentiated basal column	Not mentioned	0.2–1.4 cm long awn. Upper spikelet of the raceme with long awn and distinct column while basal spikelet with reduced awn without column (Fig. 1k)
Disarticulation of spikelets	Early disarticulation of the spikelets, <i>i.e.</i> tachychorous	Not mentioned	Single to double coiled racemes show bradychorous to tachychorous dispersal depending on varying degrees of moist or dry climate condition (Fig. 1d-j)

Grasses & Bamboos India 1: 285. 1997; Potdar *et al.*, Grasses Maharashtra 127. 2012. *Type*: INDIA, Rutnagherry district, South of Bombay, *s.d.*, *Woodrow s.n.* (holo K000245772 digital image!)

Dimeria veldkampii Kiran Raj & Sivad., Novon 18: 18(2). 2008; Dileep & Nair, Int. J. Advanced Res. 3: 658. 2015 *syn. nov.* *Type*: INDIA, Goa, North Goa district, Taleigao, c. 50 m, 27.10.2003, *M.S. Kiran Raj* 81073 (holo CALI digital image!; iso MH, MO).

Annuals. Culms c. 15 cm tall, erect, slender, nodes bearded; upper nodes geniculate or straight,

internodes glabrous. Leaf sheath 2–6 mm long, sub-terete, glabrous; ligules c. 1 mm long, membranous; leaf blades linear, acuminate, 2–5 × 0.1–0.4 cm, bulbous based hairs on both surfaces. Peduncles 2.5–5 cm long, glabrous, straight to bend at maturity; racemes usually 2-digitate to sub-digitate; 2–6 cm long, enclosed to fully emerge out from spathe-like sheath, singly to repeatedly rolled, loosely to tightly coiled to form hoop rachis smooth and glabrous, trigonous. Spikelets 3–4 × 1.3–1.5 mm, obovate to oblong, pedicelled, awned; pedicels 0.5–1 mm long; callus 0.1–0.3 mm long, sparsely to densely hairy; lower glume 2.5–3

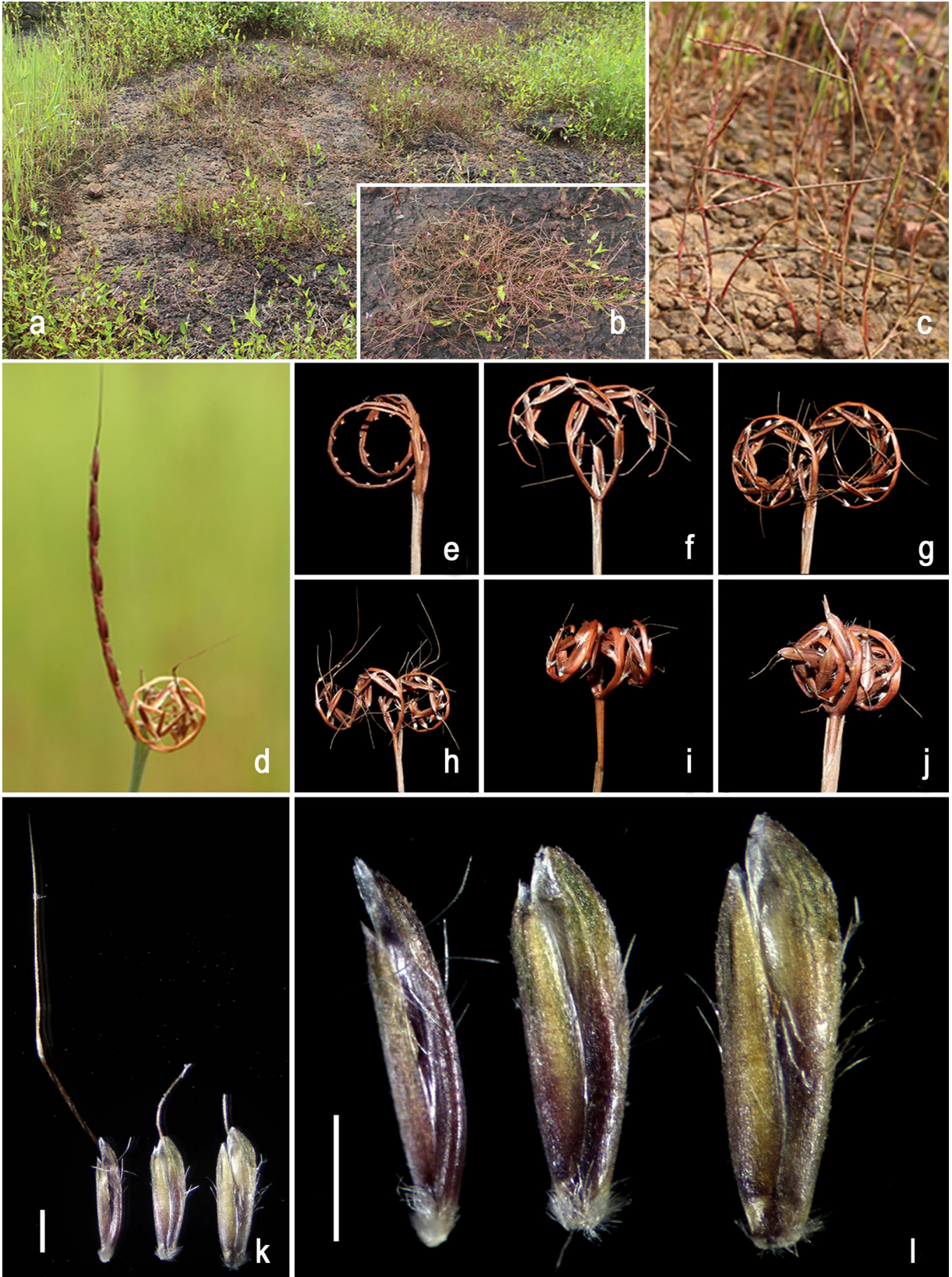


Fig. 1. Microhabitat, habit and diversity of circinate hoops in *D. woodrowii* Stapf: **a.** A view of microhabitat of *D. woodrowii*; **b.** Microhabitat—Close up view; **c.** Habit of *D. woodrowii* in its microhabitat (bends at first node); **d–j.** Spikelets on a single raceme forming hoops; **k.** Spikelets with awn Upper, Middle, Lower (From left to right); **l.** Close up view of spikelets Upper, Middle, Lower (From left to right). Scale 1 mm

× 0.3–0.5 mm long, oblong to lanceolate, coriaceous, compressed, rounded on keel, glabrous to sparsely hairy, apex acute to acuminate; upper glume 3–4 × 0.5–1 mm, oblong to lanceolate, coriaceous, glabrous to hairy, compressed, with or without wing at upper half, apex acute to acuminate, glabrous to hairy on back; lower lemma 2–2.5 × 0.4–0.5 mm, narrowly obovate, membranous, hyaline, 1-nerved, apex two toothed; palea absent; upper lemma 2.2–2.7 × 0.3–0.5 mm, oblanceolate, hyaline, cleft at apex, strong midrib produced into 0.2–1.4 cm long awn; awn reduced in lower spikelets while with distinct column in upper spikelet in a raceme or all the spikelets with long distinct column; palea absent. Lodicules 2. Stamens 2; anthers 0.7–1.5 mm long. Pistil c. 2 mm long. Caryopsis 2–2.3 × 0.4–0.5 mm, laterally compressed, narrowly ovate.

Flowering & fruiting: September–November.

Habitat: It grows usually on low elevation lateritic plateaus at Konkan (rarely at high elevations in northern Western Ghats) on exposed rocky surfaces.

Distribution: Goa, Maharashtra, Karnataka (Endemic to Western Ghats and Konkan).

Specimens examined: INDIA, **Goa**, North Goa, Bicholim, 27.10.2017, *Rutuja R. Kolte* RRK1266; Goa University Campus, 26.09.2017, *Rutuja R. Kolte* RRK1103; Taleigao, 23.10.1997, *V.C. Joshi & S. Rajkumar* 357; South Goa, Loliem, 10.09.1997, *V.C. Joshi & S. Rajkumar* 944; *Ibid.*, 01.10.2018, *Rutuja R. Kolte* RRK1770; Vasco De Gama, 09.1909, *R.K. Bhide s.n.* (BLAT). **Maharashtra**, Ratnagiri, Champak Garden, 20.10.2017, *Rutuja R. Kolte* RRK1223; Ratnagiri, Phansop, 20.10.2017, *Rutuja R. Kolte* RRK1232 (Goa University Herbarium); Sindhudurg, Achirne, 18.09.2017, *Rutuja R. Kolte* RRK1102; *Ibid.*, 20.11.2017, *Rutuja R. Kolte* RRK1307; Aronda, 28.09.1978, *s.coll.* (BLAT 109494); Kokare, 07.10.2017, *Rutuja R. Kolte* RRK1198; Padel Canteen titha, 17.09.2017, *Rutuja R. Kolte* RRK1041, RRK1051; Patgao, 17.09.2017, *Rutuja R. Kolte* RRK1055, RRK1065 (Goa University Herbarium).

Notes: On the sheet in Kew, two gatherings are available, *viz.* (i) Rutnagherry district, S. of Bombay, Coll. Woodrow and (ii) Division Goa, Marmagoa, Oct. 20, 1891, Coll. W.A. Talbot. No. 2557, Recd Sept. 1893. The first sheet was communicated to Kew by Lisboa in 1893 (vide sheet and protologue). However, the second gathering, in spite of collector's name and locality did not find place in protologue. In protologue, Stapf (1894) has mentioned, "HAB. India: Rutnagherry District, South of Bombay, Woodrow; near Goa". Then Ratnagiri district was bordering Goa in South and hence the word near Goa, whereas Talbot's collection is from Marmagoa which is in South Goa district of Goa. Hence, it is clear that Stapf (1894) has referred only to Woodrow's collection prior to the publication. According to Bor (1952), a note by Woodrow on a sheet in DD, the specimen was collected by Bhiva Babajee from Karanje, Ratnagiri District. Oct. 1892 (Dr. Prashant Pusalkar, pers. Comm.). However, there is no evidence to show that collection at K by Woodrow and DD from Bhiva Babajee are from same gathering.

Dimeria woodrowii grows in a range of microhabitats. Usually it grows on exposed rock surfaces, on very thin layer of soil or Cryptogamic mat (Fig. 1 a & b). Availability of water varies among these microhabitats during intermittent dry spells during monsoon. Because of this, colour, hairiness, bending at first node and forming hoop of racemes vary. Flowering starts from month of September and after this period monsoon decreases gradually in post-monsoon period, plants face longer period of drought conditions. Thus depending upon local environmental conditions in microhabitat, plants show range in morphological variations.

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