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Morphotaxonomic Studies of the Genus *Eragrostis* (Family Poaceae) of Washim District, Maharashtra

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Abstract:
Washim District is located in the Vidarbha region of Maharashtra and comprises six talukas: Washim, Malegaon, Risod, Manora, Mangrulpir and Karanja. The grass flora of the district was previously studied by Deore (2010), who recorded 63 grass species belonging to 25 genera. The present study focuses specifically on the genus *Eragrostis* of the family Poaceae. Field surveys were conducted in different parts of Washim District, and seven species of *Eragrostis* were recorded. The collected specimens were studied in detail based on their vegetative and reproductive characters. Important macro- and micro-morphological features were also considered for species identification and taxonomic study. The study provides information on the occurrence, morphological characteristics and taxonomic diversity of *Eragrostis* in Washim District.

Keywords: *Eragrostis*, Poaceae, grass flora, Washim District, morphology, taxonomy.

Introduction

Grasses are one of the most important groups of monocotyledonous plants. They are mainly found in open areas and play an important role in grasslands, agriculture and livestock grazing. They also help in maintaining soil stability.

Grass species are often difficult to identify because their vegetative characters are similar, while their floral parts are small and specialized. Spikelets and inflorescences show important characters useful for identification and classification. Bor (1960), in *The Grasses of Burma, Ceylon, India and Pakistan*, provided an important reference for the study of grasses in the Indian region.

Among the grasses, *Eragrostis* is an important genus of the family Poaceae. It occurs in open areas, agricultural fields, roadsides and other habitats. The genus shows variation in its morphological characters, particularly in inflorescences and spikelets.

Washim District, situated in the Vidarbha region of Maharashtra, has a diverse grass flora. The present study was undertaken to document and study the species of *Eragrostis* occurring in different parts of Washim District, with emphasis on their morphological and taxonomic characters.

Review of Literature

The monumental work of Bor (1960), *The Grasses of Burma, Ceylon, India and Pakistan* (excluding Bambuseae), published more than six decades ago, changed this scenario and created interest in the study of grasses. This resulted in the publication of several books on grasses, and the latest addition is *Flora of Tamil Nadu – Grasses* by Kabeer and Nair (2009), which deals with 447 species (excluding bamboos).

Patunkar (1980) studied the grasses of the Marathwada region and published the book *Grasses of Marathwada*. Potdar et al. (2012) published *Grasses of Maharashtra*, a book that is the outcome of exploration and detailed studies on the grass diversity of Maharashtra; in this work, 415 species belonging to 125 genera have been described.

Other floristic works that include accounts of grasses are those on Wardha (Acharya, 1985), Nagpur (Purekar, 1985), Amravati (Dhore, 1986; Masatkar, 2018), Buldhana (Diwakar and Sharma, 2000), Akola (Kamble and Pradhan, 1988), Yavatmal (Karthikeyan and Kumar, 1993), Gondia (Kahalkar, 2009), Chandrapur and Gadchiroli (Patil, 1991), the Nagpur Division (Tathod, 2019), Kolhapur (Yadav and Sardesai, 2002), Marathwada (Naik, 1998), Maharashtra State (Sharma et al., 1996) and Washim (Deore, 2010; Deore and Bhogaonkar, 2023).

Materials and Methods

Plan of Work

The selected sites were surveyed systematically during different seasons. Grass-dominated areas were examined, and grass specimens were collected from different habitats such as irrigated and unirrigated fields, open grasslands, forests, field bunds, river banks, wastelands, rice fields and rocky areas.

Sample Collection and Preservation

During field visits, grass specimens were collected and assigned individual field numbers. Important observations were recorded in a field notebook. The collected specimens were carefully examined in the laboratory, properly dried and mounted on herbarium sheets using standard methods.

Identification

The collected specimens were identified with the help of standard floras, including *Flora of British India* (Hooker, 1872–1897), *Flora of the Presidency of Bombay* (Cooke, 1958), *Flora of Marathwada* (Naik, 1998), *Flora of Maharashtra* (Almeida, 1990), *Grasses of Maharashtra* (Potdar, Salunkhe and Yadav, 2012) and *Grasses of Marathwada* (Patunkar, 1980). The specimens were examined using a stereoscopic binocular microscope.

Observation and Results

Identification Key to the Species of *Eragrostis*

1a. Culm, leaf sheath and panicle distinctly viscous ..... *Eragrostis viscosa*
1b. Culm, leaf sheath and panicle non-viscous 2
2a. Panicle compact and cylindrical; spikelets densely clustered; palea ciliate *Eragrostis ciliaris*
2b. Panicle not compact and cylindrical 3
3a. Panicle lax or open; spikelets 10–17 mm long; palea persistent .....*Eragrostis nutans*
3b. Panicle lax or open; spikelets smaller 4
4a. Spikelets very small, about 1–1.6 mm long ..... *Eragrostis japonica*
4b. Spikelets longer than 1.6 mm 5

5a. Spikelets linear-oblong, 5–7 mm long; panicle branches and pedicels capillary *Eragrostis pilosa*
5b. Spikelets not linear-oblong 6
6a. Spikelets ovate-lanceolate, 5–10 mm long; palea deciduous .....*Eragrostis unioloides*
6b. Panicle lax; spikelets narrowly oblong; pedicels capillary ..... *Eragrostis gangetica*

1. ***Eragrostis ciliaris*** (L.) R. Br.; Stapf in Hook. f., Fl. Brit. India 7: 314. 1896; Blatt. & McCann, Bombay Grass. 237. 1935; Bor, Grass. Burma Ceylon India Pakistan 506. 1960; Laxmi. in Sharma et al., Fl. Maharashtra Monocot. 403. 1996; S. Moulik, Grass. Bamb. India 2: 598. 1997; Naik, Fl. Marathwada 2: 1035. 1998; G. G. Potdar, C. B. Salunkhe and S. R. Yadav, *Grasses of Maharashtra* 530. 2012.
Annual herbs. Culms tufted, terete, 20–30 cm tall, branched from near the base, slender; nodes glabrous. Leaves: sheaths compressed, 1.3–5 cm long, glabrous; ligule a rim of short hairs; blades flat, linear-lanceolate, 2–20 × 0.25–0.7 cm, glabrous, abruptly narrowed above the middle. Panicles compact, cylindric, 2–5 × 0.5–1 cm, contracted; rachis bearded in the axils, erect; pedicels filiform, longer than the spikelets. Spikelets oblong, compressed, 2–3 mm long, 5–6 flowered, breaking up from above downwards, pale or purplish-green. Lower glume hyaline, oblong, 0.5–0.9 mm long, nerveless, sub-acute. Upper glume 0.5–1 mm long, 1-nerved. Lemmas elliptic-oblong, 1 mm long, 3-nerved; lateral nerves submarginal; keel scaberulous or very shortly ciliated; apex obtuse or acute. Palea subequal, deciduous; keels 2, long ciliate. Lodicules 2. Stamens 3; anthers 0.2 mm. Caryopsis ellipsoid, 0.5–0.6 mm long.
Flowering and fruiting: September to October.
Occurrence: Occasional, on wasteland.
Locality: Karanja (Lad).

2. *Eragrostis gangetica* (Roxb.) Steud., Syn. Pl. Glum. 1: 266. 1854; Cooke, Fl. Presid. Bombay 3: 547. 1958 (Repr.); Blatt. & McCann, Bombay Grass. 236. 1935; Bor, Grass. Burma Ceylon India Pakistan 508. 1960; Laxmi. in Sharma et al., Fl. Maharashtra Monocot. 484. 1996; S. Moulik, Grass. Bamb. India 2: 602. 1997; Naik, Fl. Marathwada 2: 1036. 1998. *Poa gangetica* Roxb., Fl. Ind. 1: 341. 1820. *Eragrostis stenophylla* Hochst. ex Miq. in Verh. Konink. Nederl. Inst. 3, 4: 39. 1851; Stapf in Hook. f., Fl. Brit. India 7: 318. 1896; G. G. Potdar, C. B. Salunkhe and S. R. Yadav, *Grasses of Maharashtra* 533. 2012.
Annual. Culms tufted, terete, 10–40 cm tall, erect or ascending, slender, glabrous; nodes glabrous. Leaf sheaths terete, 2–7 cm long, glabrous; mouth glabrous or hairy; ligule a rim of short hairs. Panicles oblong to pyramidal, 7–12 × 4–9 cm; branches filiform, scaberulous. Pedicels capillary, flexuous. Spikelets narrowly oblong, 3–12 × 1–1.4 mm, 8–20 flowered, breaking up from below upwards. Lower glume membranous, narrowly ovate, 0.6–1.1 × 0.1–0.2 mm, 1-keeled, 1-nerved, apex acute. Upper glume membranous, narrowly ovate, 0.9–1.2 × 0.1–0.3 mm, 1-keeled, 1-nerved, apex acute. Lemmas membranous, 0.8–1.1 × 0.1–0.3 mm, 3-nerved, apex sub-acute. Palea subequal to the lemma, narrowly obovate, 2-keeled, apex obtuse, persistent. Lodicules 2. Stamens 3. Caryopsis ovate.
Flowering and fruiting: September to January.
Occurrence: Occasional, along wetlands, stream banks and damp places.
Locality: Risod.

3. *Eragrostis japonica* (Thunb.) Trin. in Mem. Acad. Sci. Petersb., Ser. 6, 1: 405. 1831; Bor, Grass. Burma Ceylon India Pakistan 509. 1960; Laxmi. in Sharma et al., Fl. Maharashtra Monocot. 448. 1996; S. Moulik, Grass. Bamb. India 2: 603. 1997; Naik, Fl. Marathwada 2: 1037. 1998. *Eragrostis interrupta* sensu Stapf

in Hook. f., Fl. Brit. India 7: 316. 1896, non (R.Br.) P. Beauv. 1812; Blatt. & McCann, Bombay Grass. 233. 1935. *Eragrostis interrupta* var. *diarrhena* (Schult.) Stapf in Hook. f., op. cit. *Eragrostis interrupta* var. *diplachnoides* (Steud.) Stapf in Hook. f., op. cit. *Eragrostis interrupta* var. *koenigii* Stapf in Hook. f., op. cit.; Cooke, Fl. Presid. Bombay 3: 546. 1958 (Repr.). *Eragrostis interrupta* var. *tenuissima* Stapf in Hook. f., op. cit. *Eragrostis namaquensis* Schrad. var. *diplachnoides* (Steud.) Clayton in Kew Bull. 25: 251. 1971; Naik, Fl. Marathwada 2: 1038. 1998; G. G. Potdar, C. B. Salunkhe and S. R. Yadav, *Grasses of Maharashtra* 533. 2012.

Annual. Culms tufted, terete, 10–90 cm tall, erect, slender, simple or branched, glabrous; nodes glabrous. Leaf sheaths subcompressed, 5–12 cm long, glabrous; ligule 0.2–0.5 mm long, membranous. Leaf blade flat or convolute, linear, 2–30 × 0.3–0.7 cm, glabrous, apex acuminate. Panicles lax, 11–25 cm long; rachis slender, glabrous; branches filiform, whorled; pedicels capillary, scaberulous. Spikelets broadly ovate-elliptic, 1–1.6 × 0.8–1.1 mm, 3–9 flowered, purple or reddish. Lower glume membranous, broadly ovate, 0.6–0.8 × 0.2–0.4 mm, 1-keeled, keels scaberulous, 1-nerved, apex subacute. Upper glume membranous, broadly ovate, 0.6–0.8 × 0.2–0.4 mm, 1-keeled, 1-nerved, apex subacute. Lemmas membranous, broadly elliptic, 0.6–0.8 × 0.2–0.3 mm, 3-nerved. Palea hyaline, elliptic-obovate, keels 2, apex obtuse. Lodicules 2, minute. Stamens 2. Caryopsis ellipsoid, 0.4–0.5 × 0.2–0.3 mm.

Flowering and fruiting: September to December.

Occurrence: Common, along wet places and cultivated fields.

Locality: Sakhra

4. *Eragrostis nutans* (Retz.) Nees ex Steud., Nom. Bot. ed. 2, 563. 1840; Blatt. & McCann, Bombay Grass. 237. 1935; Bor, Grass. Burma Ceylon India Pakistan 511. 1960; Laxmi. in Sharma et al. (eds.), Fl. Maharashtra Monocot. 485. 1996; S. Moulik, Grass. Bamb. India 2: 605. 1997. *Poa nutans* Retz., Obs. Bot. 4: 19. 1786. *Eragrostis elegantula* Nees ex Steud., Syn. Pl. Glum. 1: 266. 1854; Stapf in Hook. f., Fl. Brit. India 7: 318. 1896; G. G. Potdar, C. B. Salunkhe and S. R. Yadav, *Grasses of Maharashtra* 538. 2012.

Perennial. Culms terete, 10–50 cm tall, erect or geniculately ascending, densely tufted. Leaf blade linear to linear-ovate or convolute, 2–15 × 0.1–0.2 cm, glabrous, apex acuminate. Leaf sheath terete, 1–5 cm long, glabrous; ligule narrow, a rim of hairs. Panicles lax, up to 12 cm long. Spikelets narrowly ovate, 10–17 × 0.8–1.2 mm, loosely arranged, breaking up from below upwards. Lower glume membranous, 1.3–1.7 × 0.3–0.5 mm, glabrous, 1-keeled, keel minutely ciliate, 1-nerved, apex sub-obtuse. Upper glume membranous, narrowly ovate, 1.3–1.7 × 0.3–0.5 mm, glabrous, 1-nerved. Lower lemma membranous, 1.4–1.8 × 0.3–0.5 mm, glabrous, 3-nerved, apex acute. Palea persistent. Caryopsis broadly elliptic.

Flowering and fruiting: August to December.

Occurrence: Rare, along wasteland and wet places.

Locality: S.S.S.K.R. Innani Mahavidyalaya Campus, Karanja (Lad).

5. *Eragrostis pilosa* (L.) P. Beauv., Ess. Agrostogr. 71, 162, 175. 1812; Hook. f., Fl. Brit. India 7: 170. 1896; Cooke, Fl. Presid. Bombay 3: 419. 1958 (Repr.); Sharma et al., Fl. Maharashtra Monocot. 390. 1996; G. G. Potdar, C. B. Salunkhe and S. R. Yadav, *Grasses of Maharashtra* 540. 2012.

Annual, tufted herb. Culms 25–55 cm tall, erect; nodes glabrous. Leaf sheaths compressed, 3–12 cm long, mouth bearded; ligule a rim of white hairs; blades glabrous, finely acuminate, 5–15 × 0.1–0.3 cm. Panicles oblong or pyramidal, 8–20 × 3–8 cm; branches and pedicels capillary. Spikelets linear-oblong, 5–7 mm

long, 8–12 flowered, breaking up from below upwards, slaty-grey. Lower glume hyaline, linear, 0.5–0.7 mm long, 1-nerved. Upper glume 0.5–0.8 mm long, 1-nerved. Lemmas elliptic-oblong, 1.2–1.5 mm long, often grey-tipped, 3-nerved, subacute to acute. Palea hyaline, oblong, 1–1.4 mm long. Lodicules 2, minute. Stamens 3. Caryopsis ellipsoid.
Flowering and fruiting: September to December.
Occurrence: Common, as a weed in cultivated fields, roadside ditches, channels and along pond margins.
Locality: Poha

6. *Eragrostis unioloides* (Retz.) Nees ex Steud., Syn. Pl. Glum. 1: 264. 1854; Bor, Grass. Burma Ceylon India Pakistan 515. 1960. *Poa unioloides* Retz., Obs. Bot. 5: 19. 1789. *Eragrostis amabilis* Wight & Arn. ex Nees in Hook. f., Fl. Brit. India 7: 317. 1896; G. G. Potdar, C. B. Salunkhe and S. R. Yadav, *Grasses of Maharashtra* 547. 2012.
Annual herbs. Culms tufted, 20–30 cm tall; nodes glabrous. Leaf sheaths compressed, 1–3 cm long, glabrous; mouth sparsely bearded or smooth; ligule a rim of short hairs; blades convolute, 3–18 × 0.2–0.4 cm, apex acuminate. Panicles effuse, 4–22 cm long; rachis glabrous; branches alternate or obliquely spreading, branched from near the base; pedicels slender, 0.5 cm long. Spikelets ovate-lanceolate, 5–10 × 2–3 mm, pale-purple, 12–20 flowered, breaking up from below upwards. Lower glume oblong, 1.8–2 mm long, pale-purple, 1-nerved, keel scaberulous, apex acute. Upper glume oblong, 1.9–2 mm long, 1-nerved, apex acute. Lemmas membranous, ovate or ovate-elliptic, 2 mm long, pale or reddish-purple, 2-nerved, acute. Palea hyaline, 1.8–2 mm long, deciduous, with two scaberulous keels. Lodicules 2, minute. Stamens 3. Caryopsis ellipsoid.
Flowering and fruiting: August to December.
Occurrence: Occasional, in unirrigated fields.
Locality: Malegaon

7. *Eragrostis viscosa* (Retz.) Trin. in Mem. Acad. Sci. Petersb., Ser. 6, 1: 397. 1830; Blatt. & McCann, Bombay Grass. 233. 1935; Bor, Grass. Burma Ceylon India Pakistan 515. 1960; Laxmi. in Sharma et al., Fl. Maharashtra Monocot. 493. 1996; S. Moulik, Grass. Bamb. India 2: 611. 1997; Naik, Fl. Marathwada 2: 1041. 1998. *Poa viscosa* Retz., Obs. Bot. 4: 20. 1786. *Eragrostis tenella* (L.) P. Beauv. ex Roem. & Schult. var. *viscosa* (Retz.) Stapf in Hook. f., Fl. Brit. India 7: 315. 1896; Cooke, Fl. Presid. Bombay 3: 546. 1958 (Repr.); G. G. Potdar, C. B. Salunkhe and S. R. Yadav, *Grasses of Maharashtra* 549. 2012.
Annual. Culms tufted, terete, 25–50 cm tall, erect, with glandular hairs at the base, more or less viscous; nodes glabrous. Leaf sheaths terete, 1.2–2.5 cm long, viscous; ligule a rim of hairs. Leaf blade flat, linear, 2–8 × 0.3–0.4 cm, glabrous, acuminate at apex. Panicle pyramidal, 18 × 5 cm, viscous; rachis slender, smooth; branches angular, alternate or whorled. Spikelets lanceolate, 1.5–4 × 0.5–1.5 mm, 5–10 flowered. Lower glume membranous, 1–1.4 × 0.1–0.3 mm, glabrous, 1-keeled, keels scaberulous, 1-nerved, apex acute. Upper glume membranous, narrowly ovate, 1–1.5 × 0.2–0.3 mm, glabrous, 1-keeled, 1-nerved, apex obtuse. Lemma membranous, ovate, 1–1.2 × 0.3–0.5 mm, glabrous, 1-keeled, 3-nerved, apex acute. Palea hyaline, narrowly obovate, 0.8–1 × 0.2–0.3 mm, 2-keeled, keels ciliate with long hairs, persistent. Lodicules 2. Stamens 3. Caryopsis broadly elliptic.
Flowering and fruiting: August to December.
Occurrence: Rare, along wasteland and wet places.
Locality: vilegaon

Conclusion

The present study was based on field visits and morphological observations carried out in different parts of Washim District, Maharashtra. The study included *Eragrostis viscosa*, *E. ciliaris*, *E. nutans*, *E. japonica*, *E. pilosa*, *E. unioloides* and *E. gangetica*. Field observations helped in studying these species under natural conditions, while detailed morphological examination supported their identification. Characters such as panicle structure, spikelet shape and size, lemma, pedicels and palea were useful for distinguishing the studied species. The study provides useful morphological information on the genus *Eragrostis* and contributes to the knowledge of grass flora of Washim District.

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