Species

Miscanthus nepalensis (Trin.) Hack, an addition to the flora of Jammu & Kashmir state, India

Kuntal Saha[1], **Manoj Chandran**[2], **Ranjana Negi**[3], **Akhtar H Malik**[4], **Saurabh Guleri**[1], **Nasrin Parvin**[5*]

To Cite:
Saha K, Chandran M, Negi R, Malik AH, Guleri S, Parvin N. *Miscanthus nepalensis* (Trin.) Hack, an addition to the flora of Jammu & Kashmir state, India. *Species* 2024; 25: e25s1671
doi: https://doi.org/10.54905/disssi.v25i75.e25s1671

Author Affiliation:
[1]Department of Botany, Shri Guru Ram Rai University, Patel Nagar, Dehradun, Uttarakhand 248001, India
[2]Indian Forest Service, Uttarakhand Forest Department, Dehradun, Uttarakhand 248001, India
[3]Systematic Botany Discipline, Forest Botany Division, Forest Research Institute (FRI), Dehradun, Uttarakhand 248006, India
[4]Centre for Biodiversity & Taxonomy, Department of Botany, University of Kashmir, Srinagar 190006, Jammu & Kashmir, India
[5]Applied & Molecular Mycology & Plant Pathology Laboratory, Department of Botany, The University of Burdwan, Bardhaman, 713104, West Bengal, India

[*]**Corresponding Author**
Applied & Molecular Mycology & Plant Pathology Laboratory, Department of Botany, The University of Burdwan, Bardhaman, 713104, West Bengal,
India
Email: parvinnasrin3@gmail.com

Peer-Review History
Received: 12 March 2024
Reviewed & Revised: 16/March/2024 to 18/May/2024
Accepted: 22 May 2024
Published: 25 May 2024

Peer-Review Model
External peer-review was done through double-blind method.

Species
pISSN 2319–5746; eISSN 2319–5754

DISCOVERY
SCIENTIFIC SOCIETY

ABSTRACT

The current study reports a new record, *Miscanthus nepalensis* (Trin.) Hack. (Poaceae) in the flora of Jammu and Kashmir based on the data collected from three locations in the northwestern Kashmir Himalayas and the western Himalayas of Jammu. This result marks its first documented presence in the flora of Jammu and Kashmir. The report offers an in-depth account of the macro and micro-morphological features of the plant, complete with illustrations. It also includes a geo-coordinate map that indicates the locations of the newly documented specimen. The report also contains ecological information about the species like distribution, blooming and fruiting times, and habitat features.

Keywords: Kashmir Himalayas, *Miscanthus*, new report, Poaceae, Western Himalayas

1. INTRODUCTION

The genus *Miscanthus* Andersson, which can be used for electricity generation or liquid biofuel production Sun et al., (2010), is native to southern tropical Africa, tropical Asia, and the Pacific Islands (Chen and Renvoize, 2006). This particular genus is introduced as a potential energy crop in Europe and North America due to its high biomass yield, C4 photosynthesis, and stress tolerances. The genus is part of the subtribe Saccharinae Griseb Clayton and Renvoize, (1986) under the tribe Andropogoneae Dumort., which belongs to the subfamily Panicoideae in the Poaceae family.

It exhibits typical characteristics of the tribe Andropogoneae, such as paired spikelets at each node of the rachis, spikelets containing two florets, and the rachis typically disarticulating at maturity, with the spikelet pair serving as the dispersal unit. Glumes are as long as the spikelet and enclose the florets. The upper lemma is usually awned. The genus stands apart from other typical genera of the tribe Andropogoneae. Its distinctive characteristics include the similar shape of all paired spikelets, and the paired spikelets are usually both fertile and pedicelled. Spikelets are arranged in more or less ample panicles or compound racemes along a central

axis. The glumes are cartilaginous to leathery. The lemma is typically awned and two-toothed (Clayton and Renvoize, 1986).

2. MATERIAL AND METHODS

While investigating grasses in the Western Himalayas in the summer of 2024, we came across two interesting herbarium depositories of *M. nepalensis* (Trin.) Hack. at Janaki Ammal Herbarium (RRLH) of CSIR-IIIM, Jammu, collected from Uri, Kashmir. Furthermore, within this period, the author also has identified two populations of *M. nepalensis* (Trin.) Hack. in Nashri and Ramsoo, in the Ramban district of Jammu and Kashmir.

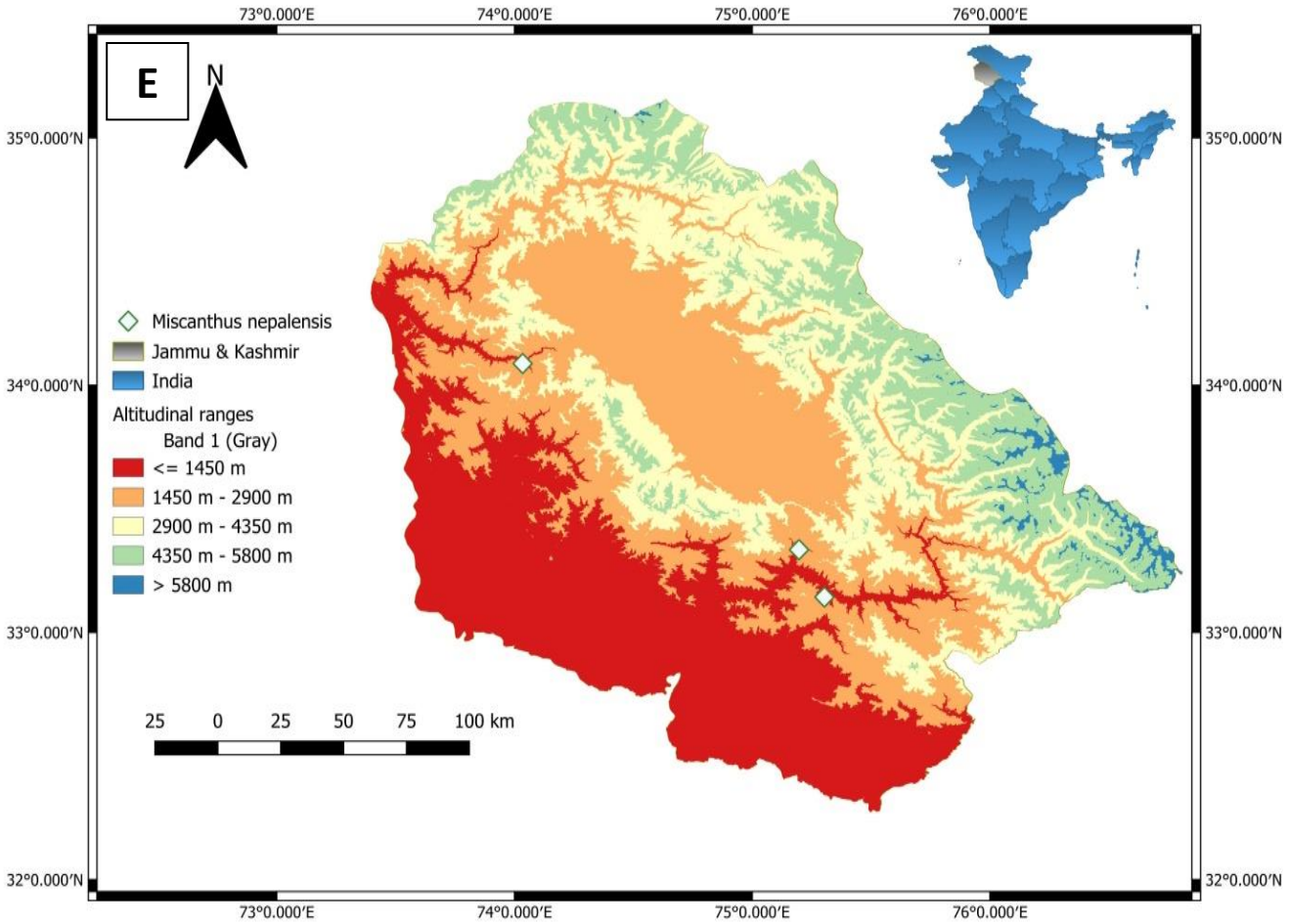

Figure 1 Miscanthus nepalensis (Trin.) Hack.: A– Natural Habit; B– Close up of Inflorescence; C– Herbarium (RRLH); D– Inflorescence; E– Map depicting the place of collection.

The identification of both herbarium and fresh specimens was ensured through an extensive review of taxonomic literature (Stewart, 1972; Sun et al., 2010). A comprehensive description of the species has been given complemented by the colored photographs in their native habitat (Figures 1A and 1B), and illustrations (Figure 2). The map of collection locations (Figure 1E) is generated using QGIS version 3.36.2 software. The herbarium specimen (fresh collection) is submitted to the herbarium of the Forest Research Institute, Dehradun (DD).

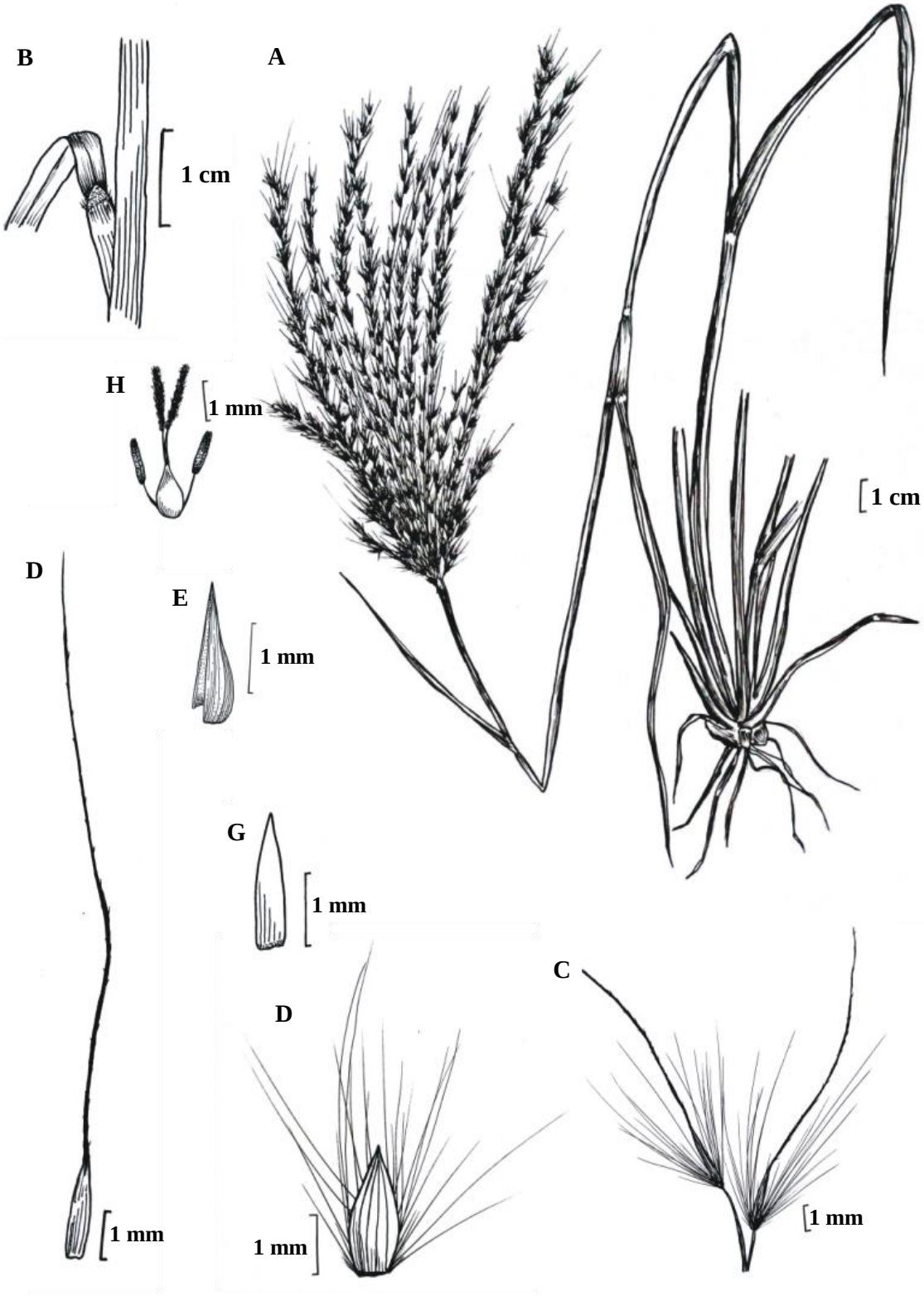

Figure 2 Illustration of *Miscanthus nepalensis* (Trin.) Hack.: A– Habit; B– Ligule; C– Spikelet; D– Lower glume; E– Upper glume; F– Upper lemma with awn; G– Lower lemma; H– Pistil.

3. RESULT AND DISCUSSION

A detailed review of the literature revealed that the genus *Miscanthus* Andersson comprises 14 species. According to the reports of Kellogg et al., (2020), there are 4 species in India distributed across various parts of the country. Interestingly, during the literature survey, it was discovered that neither regional Sharma and Kachroo, (1981), Dhar and Kachroo, (1983), Swami and Gupta, (1998), Dar et al., (2014), Dar and Khuroo, (2020), Dar et al., (2022) nor national flora Kellogg et al., (2020) mentioned the presence of *M. nepalensis* (Trin.) Hack. in Jammu and Kashmir. Hence, this study represents the initial documentation of *M. nepalensis* (Trin.) Hack. in the grass flora of Jammu and Kashmir. Therefore, as of now, in the flora of Jammu & Kashmir, the *Miscanthus* genus is newly added, with only one species, *M. nepalensis* (Trin.) Hack., documented thus far.

Taxonomic Treatment

Miscanthus nepalensis Hack., Monogr. Phan. [A.DC. & C.DC.] 6: 104 (1889); Hook.F., Fl. Brit. India 7: 107. 1896; Bor, Gras. Burma, Ceyl., Ind. & Pak. 196. 1960; Stewart, in E. Nasir & S.I. Ali (Eds.), Ann. Catalogue Vasc. Pl. W. Pak. & Kashmir. 112. 1972; Florae. Indicae. Enumeratio. Monocotyledonae. 238. 1989; Noltie, Fl. Bhutan 3: 769. 2000.

Description

Perennial herb. Culms 25 – 180 cm × 0.1 – 1 cm, erect, unbranched, smooth or glabrous below the panicle, node glabrous. Leaf sheaths 9 – 14 cm, ciliate, overlapping. Ligule 0.15 – 0.25 cm, semicircular, membranous, ciliate, dorsally pilose. Leaf-blades linear, flat, 14 – 45 cm × 0.5 – 2 cm, linear-lanceolate, margins serrate, base tapering or attenuate, apex acuminate, green, glabrous on abaxial surface, convex on abaxial surface; midrib white, prominent. Inflorescence 11 – 19 cm × 3 – 14 cm, raceme, terminal, branched. Racemes 5–45 cm × 8–26 cm, spreading; rachis slender, glabrous; pedicels unequal, scabrous, lower pedicel 1.5 – 2 mm, upper pedicel 2.5 – 5 mm, recurved.

Spikelets 2.0–2.8 mm × 0.5 – 0.9 mm, paired, bisexual, lanceolate, ciliate, awned; callus ciliate, golden brown hairs. Lower glume 2.0–2.5 mm × 0.3–0.5 mm, lanceolate, coriaceous, hairy, muticous, 9–11- nerved, margins inflexed, apex emarginate. Lower glume 1.5 – 2.5 mm × 0.25 – 0.6 mm, 9–11- nerved, lanceolate, coriaceous, muticous, margins inflexed, apex emarginate. Upper glume 2 –2.3 mm × 0.25 – 0.45 mm, 11 – 13- nerved, lanceolate, chartaceous, margins curved inwards, apex acuminate. Lower lemma 1.5 – 2.5 mm × 0.25 – 0.4 mm, ovate, hyaline, margin ciliate, apex acute. Upper lemma 1.5 – 2.1 mm × 0.25 – 0.35 mm, lanceolate, apex 2-lobed; awn 10–16 mm, arising from the sinus of lemma, geniculate. Palea up to 1.2 mm, lanceolate, membranous, hyaline, delicate. Stamens 2, anthers 1.0–1.2 mm. Style 1 – 1.6 mm. Stigmas 1.1 – 1.5 mm, purple-black, exserted from the spikelet.

Flowering & Fruits

April – November.

Habitat

On the edges of hillsides and forest trails in open, sunny areas.

Locations of the study area

Jammu and Kashmir, Baramula District, Uri**,** 28.09.1952**,** *s.col.***,** 2696 (RRLH). Ramban district, Nashri (33°08′43.598″N, 75°18′12.857″E), 1194m a.s.l., 23.04.2024, *K. Saha* & *I. Hussain*, *K.Saha* 202 (DD). Ramban district, Ramsoo **(**33°20′04″N, 75°11′48″E), 1183 m a.s.l.**,** 23.04. 2024**,** *K. Saha* & *I. Hussain*, *K.Saha* 207 (DD).

Distribution

In India, the particular species has reported in Jammu and Kashmir (this report), Arunachal Pradesh, Assam, Delhi, Himachal Pradesh, Meghalaya, Nagaland, Rajasthan, Sikkim, Tamil Nadu, Uttar Pradesh, Uttarakhand, and West Bengal (Kellogg et al., 2020).

Etymology

The genus name *Miscanthus* is derived from the Greek words “miskos” (meaning stem) and “anthos” (meaning flower), possibly alluding to the long, flowering stems of the plant. The specific epithet *nepalensis* is a Latin form reflecting the type locality of the species in Nepal.

Note

The native people use it for decoration purposes because of its attractive golden-brown inflorescence.

Acknowledgments

The author expressed gratitude to Dr. Kuldip Singh Dogra, Scientist-E, High Altitude Western Himalayan Regional Centre, Solan, Himachal Pradesh for his support during the field survey. The first author gratefully acknowledges the financial support in the form of a fellowship (UGC Ref No-211610009488/ Joint CSIR-UGC NET June 2021) by the University Grant Commission, New Delhi, India.

Authors Contribution

KS analyzed the data, and prepared the manuscript; AHM and SG analyzed thoroughly, added revisions and comments, and edited the manuscript; NP helped in mapping and illustrations; MC and RN conceptualized and supervised the research, and edited the manuscript.

Conflicts of interests:

The authors declare that there are no conflicts of interests.

Funding:

The study has not received any external funding.

Ethical approval

The ethical guidelines for plants & plant materials are followed in the study for species collection & identification.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES

1. Chen SL, Renvoize SA. Miscanthus Andersson. In: Wu ZY, Raven PH, eds. Flora of China, Beijing: Science Press; St. Louis, Missouri Botanical Garden Press, 2006; 581–583.
2. Clayton WD, Renvoize SA. Genera graminum, Grasses of the World. Her Majesty's Stationery Office, London, 1986.
3. Dar AA, Malik AH, Narayanaswamy P. A floristic survey across three coniferous forests of Kashmir Himalaya, India–a checklist. J Threat Taxa 2022; 14(1):20323-20345.
4. Dar GH, Khuroo AA. Biodiversity of the Himalaya: Jammu and Kashmir State. Topics Biodivers Conserv 2020; 18.
5. Dar GH, Malik AH, Khuroo AA. A contribution to the flora of Rajouri and Poonch districts in the Pir Panjal Himalaya (Jammu & Kashmir), India. Checkl 2014; 10(2):317-328.
6. Dhar U, Kachroo P. Alpine flora of Kashmir Himalaya. Scientific Publishers, Jodhpur, Rajasthan, 1983; 280.
7. Kellogg EA, Abbott JR, Bawa KS, Gandhi KN, Kailash BR, Ganeshaiah KN, Shrestha UB, Raven P. Checklist of the grasses of India. PhytoKeys 2020; 163:1-560.
8. Noltie HJ. Flora of Bhutan. Edinburgh: Royal Botanic Garden, 2000; 3.
9. Sharma BM, Kachroo P. Flora of Jammu and Plants of the Neighborhood. Bishen Singh Mahendra Pal Singh, Dehradun, 1981; 1.
10. Stewart RR. An annotated catalogue of the vascular plants of West Pakistan and Kashmir. In E Nasir and SI Ali (eds.), Flora of West Pakistan. Karachi, 1972; 566-571.
11. Sun Q, Lin Q, Yi ZL, Yang ZR, Zhou FS. A taxonomic revision of Miscanthus s.l. (Poaceae) from China. Bot J Linn Soc 2010; 164(2):178–220. doi: 10.1111/j.1095-8339.2010.01082.x
12. Swami A, Gupta BK. Flora of Udhampur. Bishen Singh Mahendra Pal Singh, Dehra Dun, 1998.