

Chapter 9

Grass diversity of Deomali hills, Koraput, Odisha, India

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Abstract: The Deomali hills of Koraput district, Odisha, represent one of the biologically rich regions of the Eastern Ghats, supporting a wide diversity of grass species that play a crucial role in ecological functioning and local livelihoods. The present study documented the diversity and phenological patterns of grasses occurring in the Deomali hills. A total of 49 grass species belonging to 36 genera of the family Poaceae were recorded. The documented grasses include ecologically significant wild species as well as economically important millets, fodder and medicinal grasses. The presence of perennial grasses such as *Cynodon dactylon*, *Alloteropsis cimicina* and *Sporobolus diandrus* indicates stable grassland ecosystems, whereas the occurrence of seasonal species reflects climatic influences on vegetation dynamics. The present study highlights the ecological importance of grass diversity in the Deomali hills and emphasizes the need for conservation and sustainable management of these grassland resources.

Keywords: Deomali hills, Eastern Ghats, grass diversity, Odisha, phenology, Poaceae

Introduction

Grasses, belonging to the family Poaceae, constitute one of the most widespread and ecologically important groups of flowering plants on Earth. With more than 12,000 species distributed across diverse habitats, grasses dominate terrestrial ecosystems such as grasslands, savannas, wetlands, agricultural fields and forest understoreys (Hooker, 1897; Mande et al., 2025). They play a crucial role in maintaining ecosystem stability by contributing to soil conservation, nutrient cycling, carbon sequestration and providing food and shelter for a wide range of organisms. In addition to their ecological significance, grasses are of immense economic importance, as they include major cereal crops, millets, fodder species, medicinal plants and aromatic grasses (Priyadarshini et al., 2021). The Eastern Ghats of India represent a

unique biogeographical region characterized by complex topography, varied climatic conditions and rich plant diversity (Shukla and Ramakrishnan, 1982). Within this region, the Deomali hills, located in the Koraput district of Odisha, form the highest peak of Odisha and are recognized for their ecological and floristic significance. The hills involve a tropical monsoon climate with distinct wet and dry seasons, creating favourable conditions for the growth and diversification of grass species (Pujari, 2025). The variation in altitude, coupled with diverse soil types and moisture regimes, supports a wide range of grassland and forest-edge habitats. Grasslands of the Deomali hills serve as an important component of the local ecosystem, supporting grazing resources for livestock, preventing soil erosion on steep slopes and sustaining traditional agricultural practices. Many indigenous and local communities depend on grasses for fodder, food grains, medicinal uses, thatching, broom making and other livelihood needs. Despite their importance, grasses are often under-represented in floristic studies compared to trees and shrubs, leading to gaps in knowledge regarding their diversity, distribution and phenology. The present study aims to document the diversity and phenological patterns of grasses occurring in the Deomali hills, Koraput district, Odisha. Through documentation of grass species along with their common names and phenological characteristics, the present study seeks to enhance understanding of the grass flora in the Deomali hills and generate baseline data for future ecological monitoring, conservation planning and sustainable utilization of grassland resources.

Methodology

The present study was conducted in the Deomali Hills, located in the Koraput district of Odisha, India. Deomali represents the highest peak of Odisha and is characterized by undulating terrain, rocky slopes, open grasslands, forest margins and cultivated landscapes (Figure 1). Extensive field surveys were carried out across diverse habitats of the Deomali hills, including open grasslands, hill slopes, wetlands, roadside areas and agricultural fields in the year 2025 (Behera et al., 2025).

Results and discussion

The present study revealed a total of 49 grass species of 36 genera from the Deomali hills, Koraput district, Odisha. The documented species exhibited considerable diversity in terms of growth habit, ecological adaptation and phenological behaviour, reflecting the heterogeneous environmental conditions of the region. The study revealed that the grass species diversity of Deomali hills is represented by a wide range of genera such as *Digitaria*, *Setaria*, *Eragrostis*, *Panicum*, *Sorghum*, *Cymbopogon*, *Bothriochloa* and *Bambusa* (Table 1). Among these, genera like *Digitaria*, *Setaria* and *Eragrostis*



Figure 1: Field survey carried out in Deomali hills, Koraput, Odisha

showed higher species richness, indicating their adaptability to varying moisture and soil conditions prevalent in the region (Bor, 1960; Clayton and Renvoize, 1986). Higher representation of genera like *Digitaria*, *Setaria* and *Eragrostis* suggested their wide ecological amplitude and adaptability to the varied edaphic and climatic conditions of the Eastern Ghats (Hooker, 1897; Karthikeyan et al., 1989). The occurrence of wild grasses (*Heteropogon contortus*, *Themeda quadrivalvis*, *Saccharum spontaneum*) and cultivated or semi-cultivated millets (*Eleusine coracana*, *Panicum sumatrense*, *Paspalum scrobiculatum*) highlighted the agro-ecological importance of

the study areas. As per phenological patterns, it revealed that the majority of grass species blooms during the monsoon to post-monsoon period (August-January). This seasonal trend corresponds with higher rainfall and favourable climatic conditions, which promote vegetative growth and reproductive success. Species such as *Apluda mutica*, *Aristida setacea*, *Bothriochloa bladhii* and *Setaria* species showed restricted seasonal phenology, whereas grasses like *Cynodon dactylon*, *Digitaria ciliaris*, *Echinochloa colona* and *Sporobolus diandrus* were present throughout the year, indicating their perennial nature and resilience to environmental fluctuations. As per ecological and economic values documented by many researchers, several recorded species play a significant role in soil stabilization, fodder supply and traditional agriculture. Perennial grasses such as *Saccharum spontaneum* and *Heteropogon contortus* contribute to erosion control on hill slopes, while fodder grasses like *Cenchrus pedicellatus* and *Bothriochloa pertusa* support livestock-based livelihoods. The presence of economically important species such as *Cymbopogon citratus* (medicinal and aromatic grass) and millets (*Eleusine coracana* and *Sorghum bicolor*) highlights the ethnobotanical and agricultural value of the region's grass diversity (Kirtikar and Basu, 1935; Jain, 1991). The rich grass diversity of Deomali hills reflects a healthy grassland ecology (Whyte et al., 1959; Nayar and Sastry, 1987); however, increasing anthropogenic pressure, grazing and land-use changes may threaten these natural resources. Documentation of grass species and their phenology provides baseline data essential for future ecological monitoring and conservation planning.

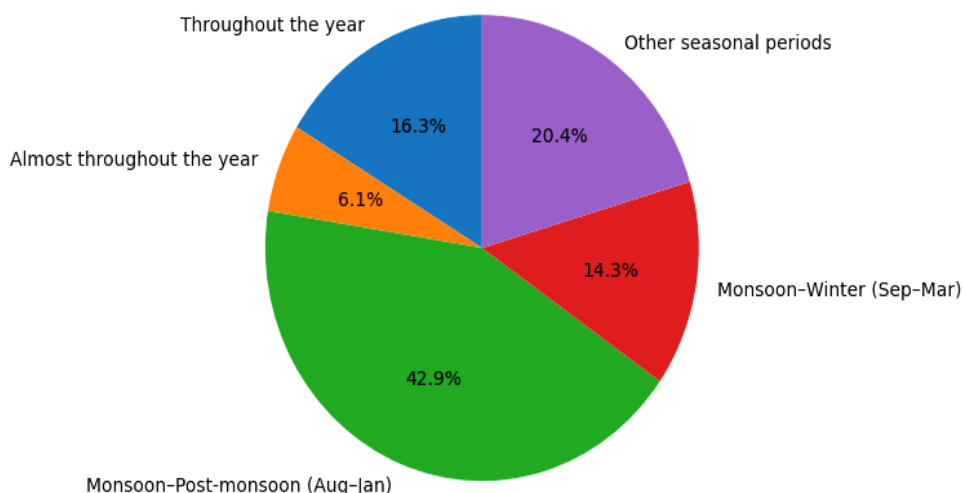


Figure 2: Phenological distribution of grass species recorded from the Deomali hills, Koraput district, Odisha

A majority of species (~43%) exhibit flowering and fruiting during the monsoon to post-monsoon period (August-January), followed by species occurring in other seasonal phases. Perennial grasses present throughout the year indicate ecological stability of the grassland ecosystem (Figure 2).

Table 1: Grasses of Deomali hills, Koraput, Odisha

Botanical name	Common name	Phenology
<i>Alloteropsis cimicina</i> (L.) Stapf (Figure 3)	Summer grass	Throughout the year
<i>Apluda mutica</i> L. (Figure 4)	Mauritian grass	Aug-Feb
<i>Aristida setacea</i> Retz (Figure 5)	Wire grass	Aug-Jan
<i>Arthraxon lancifolius</i> (Trin.) Hochst. (Figure 6)	Lanceolate-leaved Arthraxon	Aug-Dec
<i>Arundinella pumila</i> (Hochst. ex A.Rich.) Steud. (Figure 7)	Dwarf arundinella	Aug-Dec
<i>Arundo donax</i> L. (Figure 8)	Giant reed	Nov-Dec
<i>Bambusa bambos</i> (L.) Voss	Indian thorny bamboo	Jan-Mar
<i>Bambusa tulda</i> Roxb.	East India brown cane	July -Aug
<i>Bothriochloa bladhii</i> (Retz.) S. T. Blake (Figure 10)	Australian bluestem	Aug-Jan
<i>Bothriochloa pertusa</i> (L.) A. Camus (Figure 9)	Hurricane grass	Aug-Jan
<i>Capillipedium parviflorum</i> (R.Br.) Stapf (Figure 11)	Small-flowered Capillipedium	Aug-Dec
<i>Cenchrus pedicellatus</i> (Trin.) Morrone	Deenanath grass	Aug-Dec
<i>Chrysopogon aciculatus</i> (Retz.) Trin. (Figure 12)	Lesser spear grass	Apr-Nov
<i>Cymbopogon citratus</i> (DC.) Stapf (Figure 13)	Lemon grass	Sep-Jan
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	Throughout the year
<i>Cyrtococcum oxyphyllum</i> (Hochst. ex Steud.) Stapf (Figure 14)	Oxyphyllous cyrtococcum	Aug-Dec
<i>Diectomis fastigiata</i> (Sw.) P.Beauv. (Figure 15)	Annual tufted grass	Sep-Dec
<i>Digitaria bicornis</i> (Lam.) Roem. & Schult. (Figure 16)	Asian crab grass	Aug-Dec

<i>Digitaria ciliaris</i> (Retz.) Koeler (Figure 17)	Southern crabgrass	Throughout the year
<i>Digitaria longiflora</i> (Retz.) Pers. (Figure 18)	Long-flowered finger grass	July-Nov
<i>Dimeria ornithopoda</i> Trin. (Figure 19)	Feather grass	Sep-Jan
<i>Echinochloa colona</i> (L.) Link (Figure 20)	Jungle rice	Throughout the year
<i>Eleusine coracana</i> (L.) Gaertn. (Figure 21)	Finger millet	Sep-Mar
<i>Eleusine indica</i> (L.) Gaertn. (Figure 22)	Indian goosegrass	Throughout the year
<i>Eragrostis ciliaris</i> (L.) R.Br. (Figure 23)	Gophertail lovegrass	Almost throughout the year
<i>Eragrostis pilosa</i> (L.) P.Beauv.	Indian lovegrass	Almost throughout the year
<i>Eragrostis unioides</i> (Retz.) Nees ex Steud. (Figure 24)	Love grass	Almost throughout the year
<i>Heteropogon contortus</i> (L.) P.Beauv. ex Roem. & Schult. (Figure 25)	Black spear grass	Jul-Nov
<i>Isachne globosa</i> (Thunb.) Kuntze (Figure 26)	Swamp millet	Sep-Nov
<i>Ischaemum rugosum</i> Salisb. (Figure 29)	Saramollagrass	Oct-Jan
<i>Iseilema antheophoroides</i> Hack. (Figure 27)	Antheophoroides grass	July-Dec
<i>Melinis repens</i> (Willd.) Zizka (Figure 30)	Fairy grass	Sep-Dec
<i>Oplismenus compositus</i> (L.) P. Beauv.	Basket grass	Sep-Dec
<i>Panicum repens</i> L.	Torpedo grass	Sep-Jan
<i>Panicum sumatrense</i> Roth	Little millet	Aug-Jan
<i>Paspalum scrobiculatum</i> L. (Figure 31)	Kodo millet	Throughout the year
<i>Pogonatherum crinitum</i> (Thunb.) Kunth (Figure 32)	Bamboo grass	May-Mar
<i>Polytrias indica</i> (Houtt.) Veldkamp (Figure 28)	Yellow bluestem	Oct-Feb
<i>Saccharum spontaneum</i> L. (Figure 33)	Wild sugarcane	Sep-Mar
<i>Sacciolepis indica</i> (L.) Chase (Figure 34)	Indian cudweed	Aug-Jan
<i>Setaria flavida</i> (Retz.) Veldkamp (Figure 35)	Yellow foxtail	Aug-Feb
<i>Setaria intermedia</i> Roem. & Schult. (Figure 36)	Intermediate foxtail	Aug-Jan

<i>Setaria italica</i> (L.) P. Beauv. (Figure 37)	Indian millet	Sep-Mar
<i>Setaria pumila</i> (Poir.) Roem. & Schult. (Figure 38)	Yellow foxtail	Jun-Jan
<i>Setaria viridis</i> (L.) P.Beauv.	Green foxtail	July-Sep
<i>Sorghum bicolor</i> (L.) Moench (Figure 39)	Indian millet	Aug-Dec
<i>Sorghum halepense</i> (L.) Pers. (Figure 40)	Johnglass	Oct-Jan
<i>Themeda quadrivalvis</i> (L.) Kuntze (Figure 41)	Grader grass	Aug-Dec
<i>Thysanolaena latifolia</i> (Roxb. ex Hornem.) Honda (Figure 42)	Asian broom grass	Apr-Dec



Figure 3: Habit and habitat of *Alloteropsis cimicina*



Figure 4: Inflorescence of *Apluda mutica*



Figure 5: Inflorescence of *Aristida setacea*



Figure 6: Morphology of *Arthraxon lancifolius*



Figure 7: Inflorescence of *Arundinella pumila*



Figure 8: Habit and habitat of *Arundo donax*



Figure 9: Inflorescence of *Bothriochloa pertusa*



Figure 10: Inflorescence of *Bothriochloa bladhii*



Figure 11: Morphology of *Capillipedium parviflorum*



Figure 12: Inflorescence of *Chrysopogon aciculatus*



Figure 13: Habit and habitat of *Cymbopogon citratus*



Figure 14: Inflorescence of *Cyrtococcum oxyphyllum*



Figure 15: Inflorescence of *Diectomis fastigiata*



Figure 16: Habit and habitat of *Digitaria bicornis*



Figure 17: Inflorescence of *Digitaria ciliaris*



Figure 18: Inflorescence of *Digitaria longiflora*



Figure 19: Habit and habitat of *Dimeria ornithopoda*



Figure 20: Inflorescence of *Eleusine indica*



Figure 21: Inflorescence of *Echinochloa colona*



Figure 22: Fruit of *Eleusine coracana*



Figure 23: Inflorescence of *Eragrostis ciliaris*



Figure 24: Habit and habitat of *Eragrostis unioides*



Figure 25: Habit of *Heteropogon contortus*



Figure 26: Morphology of *Isachne globosa*



Figure 27: Habit of *Iseilema anthephoroides*



Figure 28: Inflorescence of *Polytrias indica*



Figure 29: Inflorescence of *Ischaemum rugosum*



Figure 30: Inflorescence of *Melinis repens*



Figure 31: Habit of *Paspalum scrobiculatum*



Figure 32: Habit and habitat of *Pogonatherum crinitum*



Figure 33: Inflorescence of *Saccharum spontaneum*



Figure 34: Inflorescence of *Sacciolepis indica*

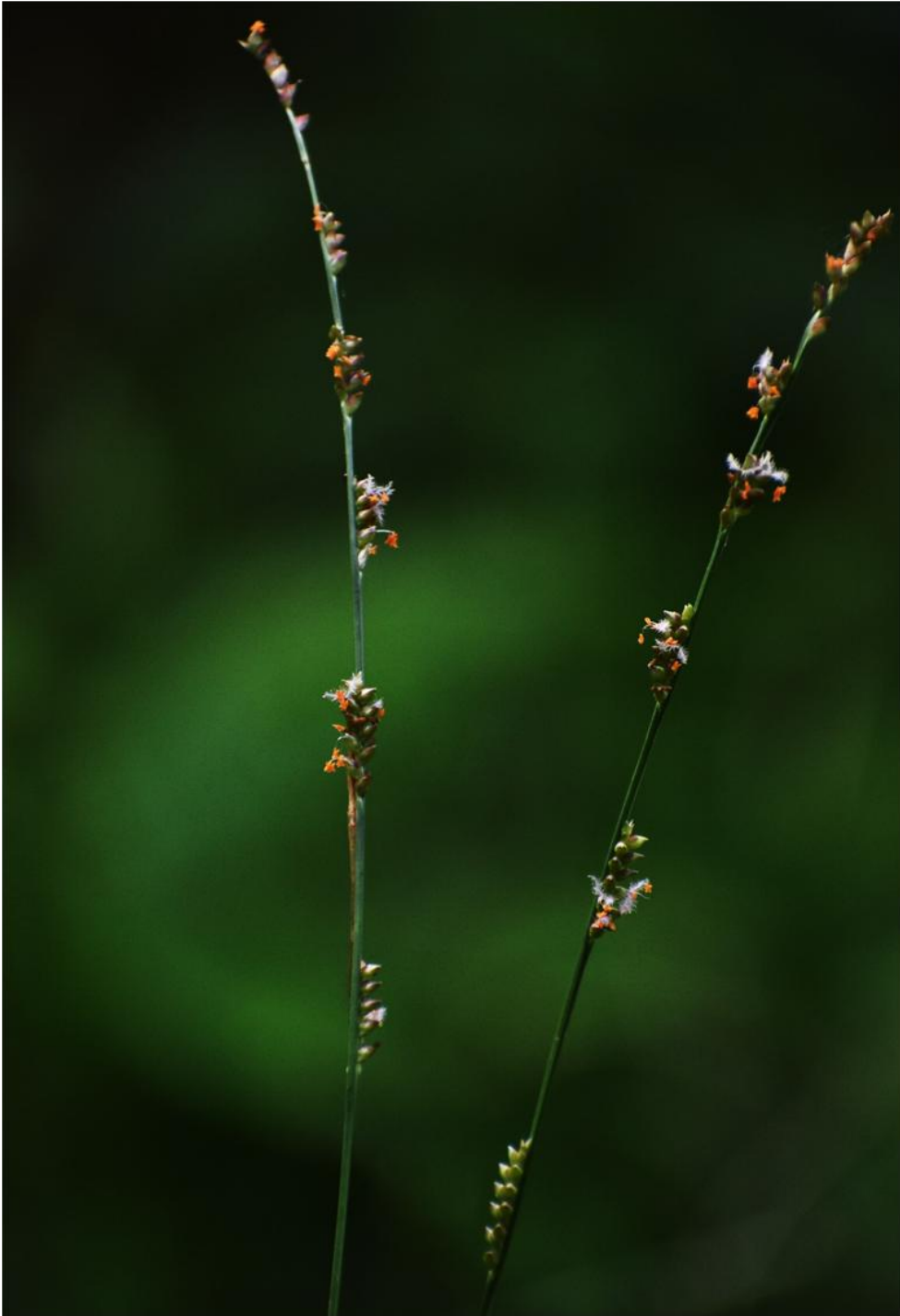


Figure 35: Inflorescence of *Setaria flavida*



Figure 36: Morphology of *Setaria intermedia*



Figure 37: Morphology of *Setaria italica*



Figure 38: Inflorescence of *Setaria pumila*



Figure 39: Grains of *Sorghum bicolor*



Figure 40: Inflorescence of *Sorghum halepense*



Figure 41: Habit of *Themeda quadrivalvis*



Figure 42: Habit and habitat of *Thysolaena latifolia*

Conclusion

The present study provides a comprehensive account of the grass diversity of Deomali hills, Koraput district, Odisha, documenting 49 species of 36 genera belonging to the family Poaceae along with photos of common species. The high species richness and representation of diverse genera such as *Digitaria*, *Setaria*, *Eragrostis*, *Panicum*, *Cymbopogon* and *Bothriochloa* reflect the heterogeneous edaphic and climatic conditions of the region and feature the ecological significance of the Eastern Ghats grasslands. The dominance of adaptable genera like *Digitaria*, *Setaria* and *Eragrostis* indicates their wide ecological amplitude and resilience to environmental variability. Phenological observations reveal that most species flower and fruit during the monsoon to post-monsoon period (August-January), coinciding with favourable moisture and temperature conditions. Moreover, the coexistence of wild grasses and cultivated or semi-cultivated millets highlights the close linkage between natural grasslands and traditional agricultural practices in the region. Before study of ecological, economical and ethnomedicinal uses, it is very crucial to document the present status of the diversity of grass species in a specific region. Therefore, an attempt has been made to document the grass diversity in Deomali hills. The rich grass diversity of Deomali hills signifies a healthy grassland ecosystem; however, increasing anthropogenic pressures and land-use changes pose potential threats. The baseline data generated through this study will be valuable for future ecological monitoring, sustainable management and conservation planning of grassland resources in the Deomali hills.

References

- Behera SC, Mishra S, Mishra AK and Kumar S. (2025). Grasses of Chandaka-Dampara Wildlife Sanctuary. Chandaka-Dampara Wildlife Sanctuary, Odisha and Ambika Prasad Research Foundation, Odisha, India.
- Bor NL. (1960). The grasses of Burma, Ceylon, India and Pakistan. Pergamon Press, Oxford, United Kingdom.
- Clayton WD and Renvoize SA. (1986). Genera *Graminum*. Kew Bulletin Additional Series XIII. Kew, United Kingdom.
- Hooker JD. (1897). The Flora of British India, Vol. VII. L. Reeve and Co., London, England, United Kingdom.
- Jain SK. (1991). Dictionary of Indian folk medicine and ethnobotany. Deep Publications, New Delhi, India.
- Karthikeyan S, Jain SK, Nayar MP and Sanjappa M. (1989). Florae Indicae Enumeratio: Monocotyledonae. Botanical Survey of India, Kolkata, West Bengal, India.

- Kirtikar KR and Basu BD. (1935). Indian Medicinal Plants, Vol. IV. Lalit Mohan Basu, Allahabad, Uttar Pradesh, India.
- Mande M, Joshi AA, Paramjyothi H, Ratnam J and Sankaran M. (2025). Patterns of grass (Poaceae) species distribution and richness across India. *Global Ecology and Conservation*. 62: e03741. DOI: 10.1016/j.gecco.2025.e03741
- Nayar MP and Sastry ARK. (1987). Red Data Book of Indian Plants. Botanical Survey of India, Kolkata, West Bengal, India.
- Priyadarshini P, Suna T and Shashikumara P. (2021). Grasses: a plant family with social, economical and ecological benefits. *Krishi Science*. 2(1): 30-34.
- Pujari SC. (2025). Indigenous knowledge and medicinal plants, the healing practices of the tribals: a case study of Deomali hills of Koraput district, Odisha. *International Journal of Innovative Research in Technology*. 12(3): 2988-2993.
- Shukla RP and Ramakrishnan PS. (1982). Phenology of trees in a sub-tropical humid forest in north-eastern India. *Vegetatio*. 49: 103-109.
- Whyte RO, Moir TRG and Cooper JP. (1959). Grasses in agriculture. FAO, Rome, Italy.