

# A Floristic Diversity, Distribution and Ecological Importance of Roadside Grasses in Latur District, Maharashtra India

Prof. Mr Dnyanoba Rambhau Awad<sup>1</sup>, Ms. Pranjali V. Kumbhar<sup>2</sup>, Ms. Pratima B. Gore<sup>3</sup>,  
Mr. Pratik Dasud<sup>4</sup>, Ms Harshika Pardeshi<sup>5</sup>

<sup>1,2,3,4,5</sup> *Department of Botany, Rajarshi Shahu Mahavidyalaya, Latur Empowered Autonomous Institution*

**Abstract**—Grasses constitute the foundation of global food systems, all the major cereal crops belong to the family Poaceae, one of the most economically important monocotyledonous plant families. Beyond their agricultural significance, grasses perform vital ecological functions, including soil stabilization, regulation of water dynamics, moderation of local microclimates, and facilitation of nutrient cycling through the decomposition of plant litter. They also provide essential food resources and habitats for a wide range of animal species.

Roadside grass communities play an important role in maintaining ecological balance along transportation networks. These grasses, whether naturally occurring along rural roads, trunk roads, and national highways, contribute to soil conservation through their dense fibrous root systems and spreading growth forms, which effectively minimize erosion. In addition, roadside grasses serve as an important fodder source for livestock and wild herbivores, thereby supporting local livelihoods and sustaining roadside ecosystems.

The family Poaceae encompasses more than 10,000 species across approximately 600–700 genera and is recognized as one of the most evolutionarily advanced groups of angiosperms, characterized by reduced floral structures adapted primarily for wind pollination. The present study focuses on the diversity, adaptive traits, and ecological functions of roadside grasses, highlighting their significance in biodiversity conservation, environmental sustainability, and rural socio-economic systems.

**Index Terms**—Poaceae, roadside grasses, grass diversity, soil conservation, ecosystem services, biodiversity

## I. INTRODUCTION

Most of the staple foods consumed worldwide, such as maize, wheat, rice, oats, rye, barley, and sugarcane, belong to the grass family. The plant family Poaceae is therefore regarded as one of the most economically significant families of flowering plants, as it includes the major cereal crops that form the foundation of global human nutrition, including maize, wheat, rice, barley, and millets.

In addition to their economic value, grasses perform several essential ecological functions. They play a vital role in soil conservation by reducing erosion, improving water retention, and contributing to nutrient cycling through the decomposition of plant litter. Grasses also provide food and shelter for a wide range of animals and insects and help moderate environmental temperatures.

Grasses growing along roadsides have considerable ecological and economic importance. These grasses are intentionally planted and maintained along various types of roads, including rural roads, trunk roads, and national highways, primarily to stabilize soil. The extensive fibrous root systems and creeping stems of grasses firmly bind the soil, lead to preventing erosion. Roadside grasses also serve as a primary food source for grazing livestock and other herbivorous animals, making them an integral component of roadside ecosystems.

Members of the Poaceae family are among the most evolutionarily successful groups of flowering plants. They are characterized by reduced floral structures that are highly adapted for wind pollination, and in some cases, insect pollination. Owing to these advanced reproductive adaptations, Poaceae is

considered one of the most highly evolved families of angiosperms.

In phylogenetic classifications, Poaceae is often placed among the most advanced angiosperm families. C.E. Bessey, an American botanist, proposed a phylogenetic system of angiosperm classification based on modifications of the Bentham and Hooker system. His work, published in 1915 as *“The Phylogenetic Taxonomy of Flowering Plants”*, emphasized evolutionary relationships using a branching diagram known as a phylogram, with primitive groups at the base and advanced groups at the tips.

Hutchinson’s classification system later proposed a monophyletic origin of angiosperms and suggested that monocotyledons are evolutionarily more advanced than dicotyledons, placing the order Graminales among the advanced groups. Members of Poaceae are mostly annual or perennial herbs, though a few species may occur as shrubs or tree-like forms. The stem is generally cylindrical or laterally compressed, with distinct nodes and internodes; the internodes are typically hollow, while the nodes remain solid.

## II. REVIEW OF LITERATURE

The grass family, Poaceae, occupies a central role in both natural and human-managed ecosystems due to its exceptional economic importance, ecological functions, and evolutionary success. This family includes all major cereal and sugar crops such as rice, wheat, maize, barley, millets, and sugarcane, which collectively form the dietary foundation for a large proportion of the world’s human population and domesticated livestock. Due to its extensive cultivation and global importance, Poaceae has been widely recognized as the most economically important family among monocotyledonous plants (Chase, 1948).

Beyond their agronomic value, grasses play an essential role in maintaining ecosystem processes. Numerous studies have emphasized their contribution to soil stability, particularly in open and disturbed habitats. The characteristic fibrous root systems of grasses bind soil particles, enhance aggregation, facilitate water infiltration, and minimize surface runoff, thereby reducing erosion. Additionally, grasses contribute significantly to nutrient cycling by

adding organic matter to the soil through the decomposition of leaves, roots, and other plant residues. Their ability to influence local microclimatic conditions and to provide food and shelter for a variety of organisms highlights their broad ecological adaptability.

In recent decades, roadside grass vegetation has received increased attention due to its importance in sustaining environmental stability along transport networks. Road development and vehicular activity often cause habitat fragmentation, soil compaction, and nutrient imbalance. However, grasses that establish along roadsides help counteract these disturbances. Their spreading or tufted growth habits and dense root systems stabilize road embankments and margins, effectively reducing erosion and dust generation. Several studies have also indicated that roadside grasses act as valuable forage resources for livestock and wild herbivores, particularly in rural areas where conventional grazing lands are limited.

From a taxonomic and evolutionary standpoint, Poaceae is among the largest and most advanced families of angiosperms, comprising more than 10,000 species distributed across approximately 600–700 genera (Watson & Dallwitz, 1992). The evolutionary success of grasses is largely attributed to their highly specialized floral structures, which are reduced and primarily adapted for wind pollination. Morphologically, grasses are predominantly annual or perennial herbs characterized by jointed stems with solid nodes and hollow internodes, features that confer flexibility, mechanical strength, and resilience under environmental stress.

The diversity and ecological relevance of roadside grass communities have been increasingly recognized in recent ecological research. In human-dominated landscapes, roadside habitats often function as alternative refuges for native plant species and associated fauna. Grasses demonstrate a high tolerance to pollution, physical disturbance, and fluctuating environmental conditions, making them particularly well suited to roadside environments. As a result, the conservation and management of roadside grass assemblages are now considered important components of sustainable land-use planning and biodiversity conservation strategies.

Historical studies on Indian grasses date back to the early nineteenth century, with pioneering contributions by Griffith (1834). These early efforts

laid the groundwork for grass taxonomy in India. A major consolidation of this knowledge was achieved through Hooker's *Flora of British India* (1896), which provided a comprehensive treatment of Indian Gramineae.

Further regional floristic investigations enriched the understanding of grass diversity across the subcontinent. Cooke (1901–1908) documented grasses in *The Flora of the Presidency of Bombay*, while Blatter and McCann (1935) produced an illustrated account of Bombay grasses. In northeastern India, Bor's systematic treatment of grasses, published as the fifth volume of *Flora of Assam* (1940), remains a landmark contribution to regional grass taxonomy.

Later studies expanded beyond taxonomy to include ecological, anatomical, and phytogeographical perspectives. Jain (1986) presented a synoptic account of the uses and distribution of Indian grasses, reporting approximately 266 genera and 1,200 species from the country. Anatomical research by Brown (1958), based on tissue organization in 72 grass genera, classified grasses into six major anatomical types, providing insights into their adaptive strategies.

Roadside and other disturbed habitats have also been examined from an ecological standpoint. Vehicular emissions contribute to nitrogen enrichment of roadside soils, with deposition levels generally highest near road edges (Truscott et al., 2005). Such nutrient enrichment often favors ruderal and turf-forming grass species, which tend to dominate areas close to roads. Moreover, soils within highway rights-of-way are typically characterized by low organic matter content, reduced fertility, and diminished microbial activity due to construction-related disturbances (Joshi et al., 2010). Despite these adverse conditions, grasses frequently establish and persist in these environments because of their efficient root systems and adaptive growth forms.

The utilitarian potential of roadside grasses has also been explored in different geographical contexts. Mosweu et al. (2013) demonstrated the suitability of roadside grasses as livestock fodder in Botswana, particularly in regions facing forage shortages. Broader syntheses of tropical and subtropical grass species were presented in the FAO publication *Tropical Grasses* by Skerman and Riveros (1990). In India, Shukla (1996) made a significant contribution

by documenting the grass flora of northeastern regions, thereby enhancing regional floristic knowledge.

More recently, Chowdhury (2021) provided an updated checklist of Indian angiosperms, identifying Poaceae as the largest flowering plant family in the country. Despite the extensive body of taxonomic and ecological literature on grasses at national and regional scales, comprehensive studies focusing specifically on roadside grass diversity in Latur district of Maharashtra are lacking. This gap underscores the need for localized investigations to better understand the composition, ecological functions, and management potential of roadside grass communities in the region.

#### Study Area

The present study was conducted in Latur district, located in the state of Maharashtra, India, within the semi-arid region of the Deccan Plateau. Geographically, the district lies between 17°52' N and 18°50' N latitude and 76°18' E and 79°12' E longitude, with elevations ranging approximately from 540 to 638 m above mean sea level. The area forms part of the Balaghat plateau, although local variations in elevation occur across the district.

The investigation focused on roadside habitats distributed along the major transportation networks of Latur district, including National Highways (NH-361H and NH-52), Maharashtra State trunk roads, as well as urban and village roads. These road networks traverse diverse landscapes and land-use types, providing a suitable gradient of disturbance levels for studying roadside grass communities.

Latur has a tropical semi-arid climate marked by clearly defined wet and dry seasons. The wet season is generally humid and overcast, whereas the dry season is predominantly clear and hot. Mean annual temperatures show considerable seasonal variation, typically ranging from 16°C to 39°C, with extreme temperatures rarely falling below 13°C or exceeding 42°C. The hot season extends from late March to the end of May, during which average daily maximum temperatures exceed 37°C. May is the warmest month, recording average maximum and minimum temperatures of approximately 38–39°C and 26°C, respectively.

The cooler period spans from mid-July to late January, with average daily maximum temperatures remaining below 30°C. December is the coolest month of the year, with mean minimum temperatures around 17°C and average maximum temperatures

close to 28°C. These climatic conditions, combined with seasonal rainfall patterns, strongly influence the growth and distribution of roadside grass species in the district.

Table: The list of Grass species available along the roadside of Latur district

Sr. No.	Grass species	Common Name	Flowering and Fruiting time
1.	<i>Axonopus compressus</i>	Carpet grass	Almost throughout the year
2.	<i>Brachiaria ramosa</i>	Chapar	Almost throughout the year
3.	<i>Brachiaria mutica</i>	Para grass	February-June
4.	<i>Chrysopogon aciculatus</i>	Abhali	June-October
5.	<i>Cynodon dactylon</i>	Harali / Durva	March-September
6.	<i>Cyrtococcum accrescens</i>	Ghas	August-March
7.	<i>Dactyloctenium aegyptium</i>	Makda	May-August
8.	<i>Digitaria ciliaris</i>	Raangavat	May-December
9.	<i>Digitaria setigera</i>	Bristly crab grass	February-June
10.	<i>Echinochloa olonum</i>	Bhagar	July-September
11.	<i>Eleusine indica</i>	Rannachani	July-October
12.	<i>Eragrostis japonica</i>	Chiksi	June-November
13.	<i>Eragrostis tenella</i>	Chiman chara	March-September
14.	<i>Eragrostis unioloides</i>	Seete che pohe	August-October
15.	<i>Imperata cylindrica</i>	Darbha	March-May
16.	<i>Ischaemum rugosum</i>	Bardi and Lag	October-December
17.	<i>Isachne globosa</i>	Swamp millet	Al most throughout the year
18.	<i>Leersia hexandra</i>	Rice grass	March-June
19.	<i>Panicum maximum</i>	Gini gavat	November-July
20.	<i>Paspalum conjugatum</i>	Hilo grass	May-November
21.	<i>Paspalum distichum</i>	Kalkat gavat	August-February
22.	<i>Sacciolepis myosuroides</i>	Kara lom	August-February
23.	<i>Setaria pumila</i>	Bhadli	August-December
24.	<i>Sporobolus diander</i>	--	March-September

### III. RESULT AND DISCUSSION

A total of 24 species of grasses from the family Poaceae were documented in roadside habitats throughout Latur district. The species documented represent a diverse assemblage of annual and perennial grasses adapted to disturbed environments. The presence of genera such as *Cynodon*, *Digitaria*, *Eragrostis*, *Panicum*, *Paspalum*, and *Brachiaria* indicates the dominance of disturbance-tolerant and ecologically versatile taxa in roadside ecosystems. Phenological observations revealed that several species, including *Axonopus compressus*, *Brachiaria*

*ramosa*, and *Ischaemum globosum*, flower and fruit almost throughout the year, reflecting their high adaptive capacity and continuous regeneration potential. A majority of species exhibited peak flowering and fruiting during the monsoon and post-monsoon seasons (June–October), corresponding with favorable moisture and temperature conditions in the region. This seasonal pattern is typical of grasses in semi-arid tropical climates. Perennial species such as *Cynodon dactylon*, *Imperata cylindrica*, and *Panicum repens* were commonly observed along road margins and embankments, where their extensive fibrous root

systems contribute significantly to soil binding and erosion control. Annual species like *Dactyloctenium aegyptium* and *Echinochloa colonum* were more frequent in highly disturbed sites, indicating their role as pioneer species in roadside succession.

Several grasses recorded in the study, including *Cynodon dactylon*, *Panicum maximum*, *Paspalum distichum*, and *Brachiaria* species, are widely used as fodder grasses, highlighting the socio-economic importance of roadside vegetation for local livestock-dependent communities. The extended flowering periods of these species enhance their persistence and forage availability throughout the year.

Overall, the results demonstrate that roadside habitats in Latur district support a functionally diverse grass community with significant ecological and economic value. The observed phenological diversity ensures year-round ground cover, contributing to ecosystem stability, nutrient cycling, and biodiversity conservation.

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