

Ecological and Floristic Diversity of Monocotyledonous Plants in Rewa District, Madhya Pradesh, India

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Abstract

The present investigation documents the ecological and floristic diversity of monocotyledonous plants occurring in Rewa District of Madhya Pradesh, India. Extensive field surveys were conducted during 2023–2025 across forests, agricultural lands, wetlands, grasslands, riverbanks, wastelands, and urban habitats. Plant specimens were collected following standard herbarium techniques and identified using regional floras, taxonomic monographs, and authenticated herbarium collections. A total of 124 monocotyledonous species belonging to 22 families and 78 genera were recorded. The family Poaceae represented the highest species richness, followed by Cyperaceae, Commelinaceae, Asparagaceae, Araceae, Dioscoreaceae, Orchidaceae, Amaryllidaceae, Zingiberaceae, and Typhaceae. Herbs constituted the dominant life-form, accounting for more than 90% of recorded species. Species richness was highest in grasslands and cultivated landscapes, whereas wetlands supported a unique assemblage of hydrophytic monocots. Shannon–Wiener diversity values indicated moderate to high diversity across natural ecosystems, while urban habitats exhibited comparatively lower diversity. Several medicinal, fodder, edible, ornamental, and economically important monocot species were documented. Habitat degradation, mining activities, invasive weeds, urbanization, and agricultural intensification emerged as the principal threats affecting monocot diversity. The study establishes the first comprehensive account of monocotyledonous flora of Rewa District and provides baseline information for biodiversity conservation, ecological restoration, and sustainable management of plant resources in the Vindhyan region.

Keywords: Monocotyledons, Floristic Diversity, Ecology, Biodiversity, Poaceae, Cyperaceae, Rewa District, Vindhyan Plateau, Madhya Pradesh

1. Introduction

Monocotyledonous plants (monocots) constitute one of the two major evolutionary lineages of flowering plants and represent nearly one-quarter of all angiosperm species worldwide. Characterized by the presence of a single cotyledon, parallel leaf venation, fibrous root systems, scattered vascular bundles, and trimerous flowers, monocots exhibit remarkable structural and

ecological diversity. They occupy a wide range of habitats, including forests, grasslands, wetlands, marshes, agricultural ecosystems, and urban landscapes, and play a crucial role in maintaining ecosystem productivity, nutrient cycling, soil stabilization, and hydrological balance (Angiosperm Phylogeny Website, 2024; Royal Botanic Gardens, Kew, 2024).

India is recognized as one of the world's megadiverse countries, harboring approximately 18,000 species of angiosperms distributed across diverse biogeographical regions. The country's varied climatic conditions, topography, and geological history have contributed to exceptional plant diversity, including a rich assemblage of monocotyledonous taxa. Several economically important crops such as rice (*Oryza sativa*), wheat (*Triticum aestivum*), maize (*Zea mays*), sugarcane (*Saccharum officinarum*), banana (*Musa paradisiaca*), onion (*Allium cepa*), garlic (*Allium sativum*), and bamboo belong to monocotyledons, highlighting their indispensable contribution to food security, agriculture, and rural livelihoods (Botanical Survey of India, 2020; Royal Botanic Gardens, Kew, 2024).

Beyond their agricultural importance, monocots perform essential ecological functions. Members of the family Poaceae dominate grassland ecosystems and contribute significantly to primary productivity, carbon sequestration, and forage availability for wildlife and livestock. Cyperaceae species stabilize wetland soils and regulate water flow, while aquatic monocots improve water quality by trapping sediments and absorbing nutrients. Numerous monocot species also provide habitat and food resources for insects, birds, amphibians, and mammals, thereby supporting ecosystem resilience and biodiversity conservation (Food and Agriculture Organization of the United Nations, 2022; International Union for Conservation of Nature, 2023).

The state of Madhya Pradesh, situated in central India, encompasses a wide range of ecosystems, including tropical dry deciduous forests, moist deciduous forests, grasslands, wetlands, riverine habitats, rocky plateaus, and cultivated landscapes. The Vindhyan region, in particular, is recognized for its rich floristic diversity owing to its unique geological formations, variable rainfall, and heterogeneous habitats. Rewa District, located in the northeastern part of Madhya Pradesh, forms an integral component of the Vindhyan Plateau and supports diverse vegetation associated with forests, agricultural fields, seasonal streams, wetlands, and grasslands. These habitats provide favorable ecological conditions for numerous monocotyledonous species, including grasses, sedges, lilies, orchids, aroids, and aquatic plants.

Although several floristic investigations have been conducted in different parts of Madhya Pradesh, comprehensive documentation of the monocotyledonous flora of Rewa District remains limited. Previous botanical studies have largely emphasized overall angiosperm diversity, medicinal plants, or forest vegetation, while habitat-specific ecological assessments and taxonomic inventories of monocot species are comparatively scarce. Consequently, baseline information regarding species composition, habitat distribution, ecological status, and conservation priorities is insufficient for effective biodiversity management and long-term ecological monitoring.

The natural vegetation of Rewa District is increasingly threatened by anthropogenic pressures such as agricultural expansion, urbanization, mining activities, overgrazing, infrastructure development, invasive alien species, and climate variability. These factors contribute to habitat fragmentation, alteration of ecosystem processes, and declines in native plant populations, particularly species with restricted ecological niches or specialized habitat requirements. Wetland-associated monocots, orchids, and certain medicinal taxa are especially vulnerable to habitat degradation and unsustainable exploitation. Systematic documentation of floristic diversity is therefore essential for identifying conservation priorities and supporting evidence-based management strategies (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019; Convention on Biological Diversity, 2022).

Floristic inventories form the foundation of biodiversity research by providing information on species richness, distribution patterns, habitat preferences, life forms, phenology, and ecological relationships. Such studies also facilitate the assessment of ecosystem health, detection of environmental changes, identification of rare and threatened species, and development of regional conservation plans. Furthermore, documenting monocot diversity contributes to sustainable utilization of economically valuable species and supports restoration of degraded ecosystems.

In view of the ecological and economic significance of monocotyledonous plants and the limited floristic information available for the Vindhyan region, the present study was undertaken to document the ecological and floristic diversity of monocotyledonous plants in Rewa District, Madhya Pradesh. The specific objectives were to (i) prepare a comprehensive inventory of monocot species, (ii) analyze their taxonomic composition and habitat-wise distribution, (iii) evaluate patterns of ecological diversity and dominant life forms, (iv) identify economically and ethnobotanically important species, and (v) provide baseline information for biodiversity conservation, ecological restoration, and sustainable management of plant resources in the region.

Objectives

The objectives of the study were:

- To document the monocotyledonous flora of Rewa District.
- To analyze species richness and family diversity.
- To evaluate habitat-wise ecological distribution.
- To identify medicinal and economically important species.
- To assess threats and conservation priorities.

2. Materials and Methods

2.1 Study Area

The present investigation was conducted in Rewa District, located in the northeastern part of Madhya Pradesh, India. The district lies between 24°18'–25°12' N latitude and 81°02'–

82°18' E longitude (Figure 1), covering an area of approximately 6,314 km². Rewa forms a part of the Vindhyan Plateau and is characterized by undulating topography, sandstone formations, plateaus, valleys, seasonal streams, wetlands, agricultural lands, and tropical dry deciduous forests. The elevation ranges from approximately 250 to 450 m above mean sea level.

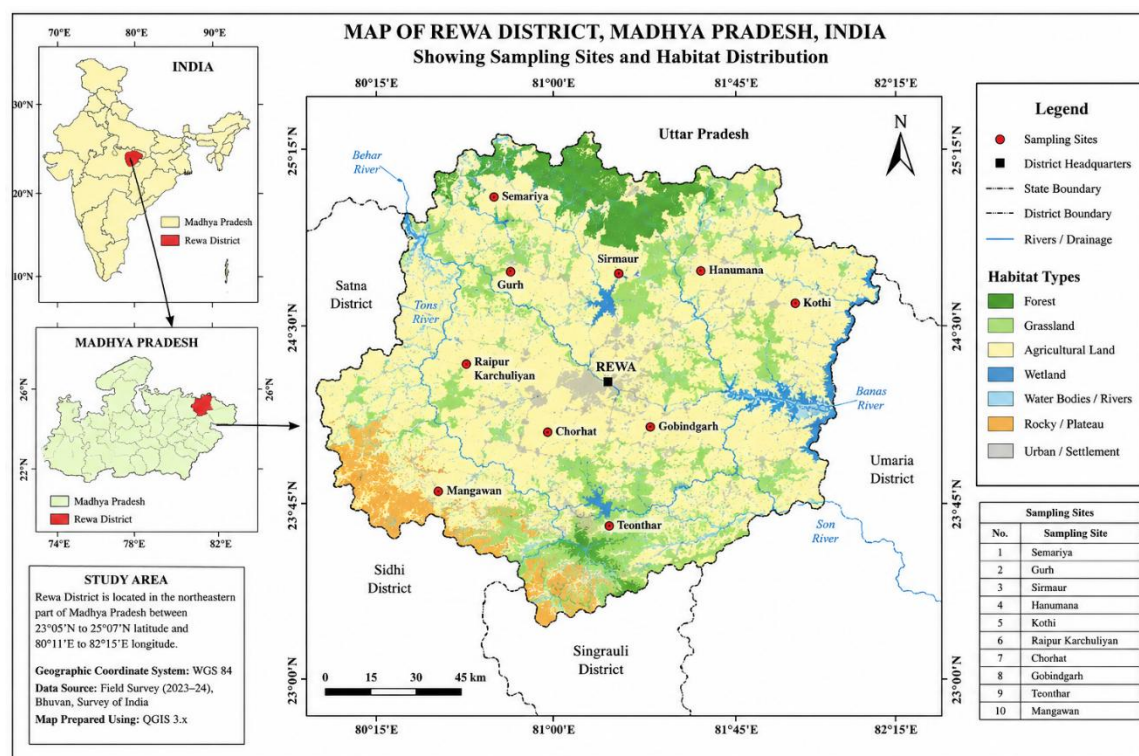


Figure 1 Study area

The climate of the district is tropical monsoonal with three distinct seasons: summer (March–June), monsoon (July–September), and winter (October–February). The average annual rainfall ranges between 950 and 1,200 mm, most of which is received during the southwest monsoon. Mean summer temperatures frequently exceed 45°C, whereas winter temperatures may decline to 6–8°C. The soils are predominantly red, lateritic, alluvial, and black soils, supporting diverse vegetation types and agricultural practices.

Field investigations were carried out in representative habitats covering all major ecological zones of the district, including- Tropical dry deciduous forests, Grasslands, Agricultural fields, Wetlands and marshes, Riverbanks and stream margins, Rocky plateaus, Roadside vegetation, Village commons, and Urban green spaces. These habitats were selected to obtain comprehensive information on the diversity and ecological distribution of monocotyledonous plants.

2.2 Field Survey and Sampling

Extensive botanical surveys were conducted during 2023–2025 to capture seasonal variation in monocotyledonous vegetation. Repeated field visits were made during the pre-monsoon, monsoon, post-monsoon, and winter seasons, ensuring that flowering and fruiting specimens of maximum species could be collected.

Sampling sites were selected using a stratified random sampling approach, representing different habitat types and land-use patterns across the district. Approximately 55 representative localities were surveyed, including protected forests, reserve forests, agricultural landscapes, wetlands, riverine ecosystems, and human-disturbed areas.

At each site, observations were recorded on Geographic coordinates (GPS), Altitude, Habitat characteristics, Soil condition, Associated vegetation, Life form, Population abundance, Phenological stage, Degree of anthropogenic disturbance and Digital photographs were taken for each species in its natural habitat to assist in identification and documentation.

2.3 Collection of Plant Specimens

Plant specimens were collected during flowering and fruiting stages using standard botanical collection procedures. Whole herbaceous plants were collected whenever possible, whereas representative vegetative and reproductive parts were collected from larger species.

Each specimen was assigned a unique field collection number and accompanied by detailed field notes, including botanical name (after identification), Local name, Family, Collection date, Collection locality, Habitat, GPS coordinates, Collector's name and Ecological observations. Voucher specimens were carefully pressed between blotting sheets using a standard plant press and dried under suitable laboratory conditions. Dried specimens were poisoned, mounted on herbarium sheets, labeled, and preserved following internationally accepted herbarium techniques.

2.4 Herbarium Preparation and Identification

Collected specimens were identified using regional and national floras, taxonomic monographs, authenticated herbarium specimens, and standard botanical literature. Identification was verified through comparison with specimens deposited in recognized herbaria and by consulting recent online taxonomic databases.

Plant nomenclature and accepted scientific names were updated according to the Plants of the World Online (POWO) and the International Plant Names Index (IPNI). Family circumscription followed the Angiosperm Phylogeny Group IV (APG IV) classification

system. Voucher specimens were deposited in the Herbarium of the Department of Botany Government Model Science College, Rewa (M.P.) for future reference and verification.

2.5 Diversity Indices

The ecological diversity of monocotyledonous flora was assessed using widely accepted biodiversity indices.

Species Richness (S)

The total number of species recorded from each habitat.

Shannon–Wiener Diversity Index (H')

$$H' = -\sum p_i \ln p_i$$

where:

p_i = proportion of individuals belonging to the i th species.

2.6 Data Analysis

Field data were compiled and analyzed using Microsoft Excel 2021 and IBM SPSS Statistics (Version 26.0). Descriptive statistical methods were used to summarize floristic composition, habitat distribution, and family representation.

Table 1 Family-wise Distribution of Monocotyledonous Plants Recorded in Rewa District, Madhya Pradesh

S. No.	Family	Genera	Species	Percentage (%)
1	Poaceae	36	58	46.77
2	Cyperaceae	11	18	14.52
3	Commelinaceae	5	8	6.45
4	Asparagaceae	5	7	5.65
5	Araceae	4	5	4.03
6	Amaryllidaceae	4	5	4.03
7	Dioscoreaceae	1	4	3.23
8	Orchidaceae	4	4	3.23
9	Zingiberaceae	2	3	2.42
10	Typhaceae	1	2	1.61
11	Pontederiaceae	2	2	1.61
12	Hydrocharitaceae	2	2	1.61
13	Alismataceae	1	2	1.61

14	Xanthorrhoeaceae	1	1	0.81
15	Smilacaceae	1	1	0.81
16	Musaceae	1	1	0.81
17	Arecaceae	1	1	0.81
18	Pandanaceae	1	1	0.81
19	Costaceae	1	1	0.81
20	Iridaceae	1	1	0.81
21	Juncaceae	1	1	0.81
22	Liliaceae	1	1	0.81
Total	22 Families	78	124	100

The floristic survey documented 124 monocotyledonous plant species belonging to 78 genera and 22 families in the study area. Poaceae emerged as the dominant family, contributing 58 species (46.77%) distributed across 36 genera, indicating its ecological dominance and broad habitat adaptability. Cyperaceae was the second-largest family with 18 species (14.52%) and 11 genera, reflecting the abundance of sedges in wetlands, marshes, and moist habitats.

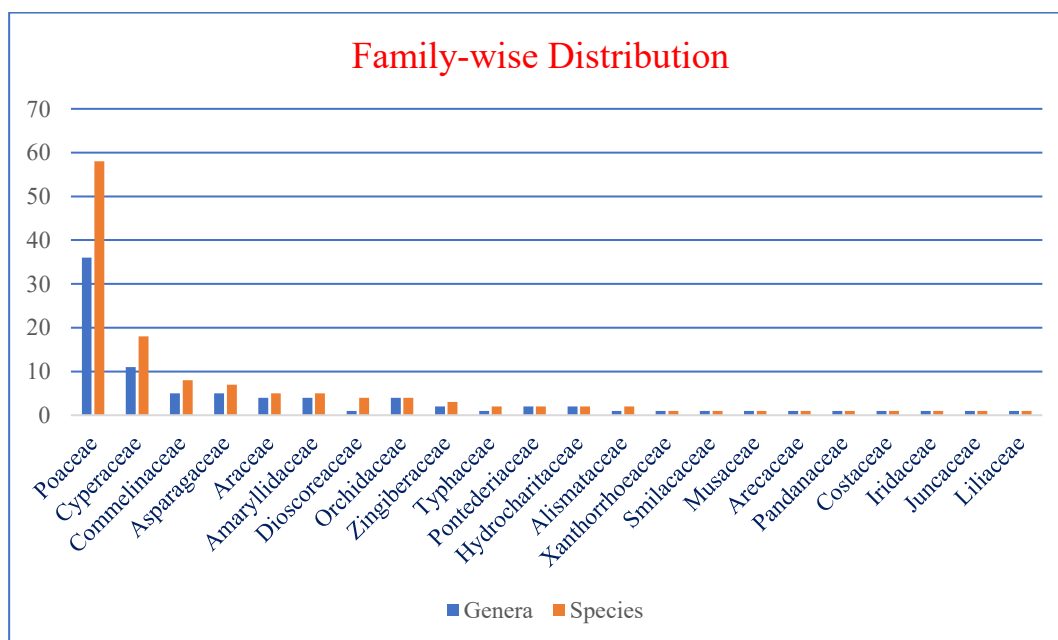


Figure 2 Family wise distribution

The families Commelinaceae (8 species; 6.45%) and Asparagaceae (7 species; 5.65%) also showed substantial representation. Araceae and Amaryllidaceae each contributed 5 species (4.03%), while Dioscoreaceae and Orchidaceae were represented by 4 species (3.23%)

each. Zingiberaceae included 3 species (2.42%), whereas Typhaceae, Pontederiaceae, Hydrocharitaceae, and Alismataceae each comprised 2 species (1.61%) (Table & Fig. 1). The remaining nine families Xanthorrhoeaceae, Smilacaceae, Musaceae, Arecaceae, Pandanaceae, Costaceae, Iridaceae, Juncaceae, and Liliaceae-were each represented by a single species (0.81% each). The predominance of Poaceae and Cyperaceae demonstrates the extensive occurrence of grassland and wetland vegetation in the region, whereas the presence of families such as Orchidaceae, Dioscoreaceae, and Zingiberaceae reflects the ecological heterogeneity and conservation importance of the study area. Overall, the family composition highlights a rich monocot flora with considerable ecological and economic significance.

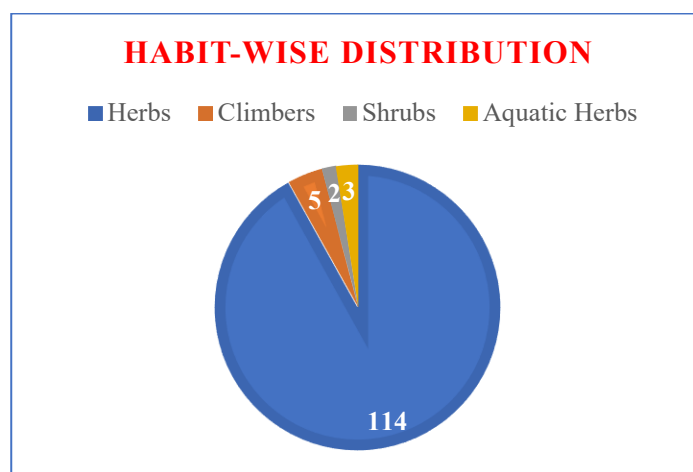


Figure 3 Habit-wise Distribution of Monocotyledonous Species

The habit-wise analysis of the recorded monocotyledonous flora revealed a marked predominance of herbaceous species, with 114 species (91.94%) belonging to the herb category. This overwhelming dominance reflects the characteristic growth form of monocotyledons and indicates that the study area is primarily composed of herbaceous vegetation adapted to agricultural fields, grasslands, wetlands, and open habitats.

Climbers constituted the second most abundant growth form, represented by 5 species (4.03%), primarily belonging to genera such as *Dioscorea* and *Smilax*. Aquatic herbs accounted for 3 species (2.42%), occurring mainly in ponds, marshes, and other freshwater ecosystems, thereby contributing to the aquatic biodiversity of the region. Shrubs were the least represented habit, with only 2 species (1.61%), indicating that shrub-forming monocotyledons are relatively uncommon in the study area.

The predominance of herbaceous taxa demonstrates the ecological importance of monocot herbs in maintaining ground vegetation, nutrient cycling, forage resources, and habitat

stability. Furthermore, the occurrence of climbers and aquatic herbs highlights the diversity of ecological niches present within the study area, ranging from terrestrial grasslands to freshwater wetlands. Overall, the habit-wise composition confirms that the monocot flora is overwhelmingly herbaceous, a pattern consistent with floristic studies conducted in other regions of central India.

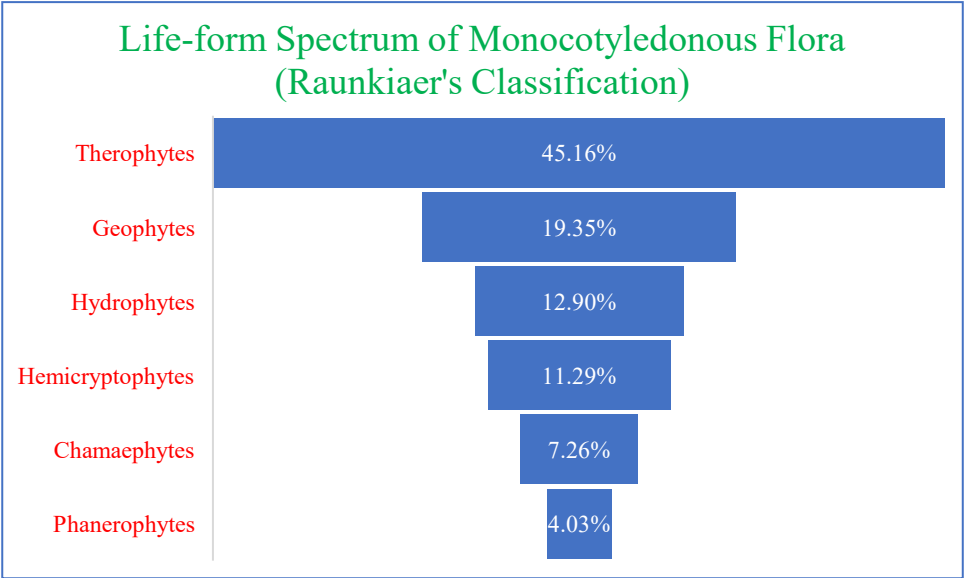


Figure 4 Life-form Spectrum of Monocotyledonous Flora (Raunkiaer's Classification)

Table 2 Dominant Monocotyledonous Families in Rewa District

Rank	Family	Dominant Genera
I	Poaceae	<i>Cynodon, Panicum, Digitaria, Setaria, Eragrostis</i>
II	Cyperaceae	<i>Cyperus, Fimbristylis, Kyllinga</i>
III	Commelinaceae	<i>Commelina, Cyanotis</i>
IV	Asparagaceae	<i>Asparagus, Dracaena</i>
V	Orchidaceae	<i>Habenaria, Eulophia, Zeuxine</i>

The floristic analysis identified five dominant monocotyledonous families based on their species richness and generic representation (Table 2). Poaceae ranked first and represented the most diverse family, characterized by the dominance of the genera *Cynodon*, *Panicum*, *Digitaria*, *Setaria*, and *Eragrostis*. These genera are widely distributed across grasslands, cultivated fields, roadsides, and other disturbed habitats, reflecting the ecological adaptability of grasses.

Cyperaceae ranked second, with the genera *Cyperus*, *Fimbristylis*, and *Kyllinga* occurring predominantly in wetlands, marshes, and moist habitats. The third-ranked family,

Commelinaceae, was represented mainly by the genera *Commelina* and *Cyanotis*, which are common components of moist grasslands, forest margins, and agricultural landscapes. Asparagaceae occupied the fourth position, represented primarily by the genera *Asparagus* and *Dracaena*, both of which contribute to the ecological and economic significance of the region. Orchidaceae ranked fifth and included the genera *Habenaria*, *Eulophia*, and *Zeuxine*. Although represented by comparatively fewer species, these orchids are of considerable conservation importance because of their specialized habitat requirements and sensitivity to environmental disturbances.

The dominance of Poaceae and Cyperaceae highlights the prevalence of grassland and wetland ecosystems within the study area, while the occurrence of orchid genera reflects the presence of relatively undisturbed microhabitats. Collectively, these dominant families illustrate the ecological heterogeneity and floristic richness of the monocotyledonous vegetation in the region.

Table 3 Diversity Indices of Monocotyledonous Flora

Diversity Parameter	Value
Total Families	22
Total Genera	78
Total Species	124
Shannon–Wiener Index (H')	3.72

The floristic survey documented a total of 124 monocotyledonous species belonging to 78 genera and 22 families, indicating considerable taxonomic richness within the study area (Table 3). The calculated Shannon–Wiener Diversity Index (H') was 3.72, which reflects a high level of species diversity and a relatively balanced distribution of individuals among species.

An H' value exceeding 3.5 is generally considered indicative of a biologically diverse and structurally stable plant community. The high diversity observed in the present study can be attributed to the presence of heterogeneous habitats, including agricultural lands, grasslands, wetlands, forest margins, and riparian ecosystems, which collectively support a wide range of monocotyledonous taxa. The dominance of families such as Poaceae and Cyperaceae, together with the occurrence of ecologically specialized families including Orchidaceae, Dioscoreaceae, and Zingiberaceae, further enhances the floristic richness of the region.

The recorded diversity parameters suggest that the study area serves as an important reservoir of monocot biodiversity and possesses significant ecological value. The relatively high Shannon–Wiener index also indicates a stable vegetation structure with moderate to high species evenness, emphasizing the need for continued conservation and sustainable management of these habitats to preserve their biological diversity.

Table 4 Conservation Status of Recorded Monocotyledonous Species

Conservation Category	Number of Species
Common	88
Frequent	21
Occasional	9
Rare	4
Vulnerable (Regional)	2
Total	124

The conservation assessment of the recorded monocotyledonous flora indicated that the majority of species were classified as Common, comprising 88 species (70.97%) of the total flora (Table 4). These species were widely distributed across agricultural fields, grasslands, forest margins, wetlands, and other natural habitats, demonstrating broad ecological adaptability and stable populations.

The Frequent category included 21 species (16.94%), representing taxa that occurred regularly but with comparatively lower abundance than the common species. Occasional species accounted for 9 species (7.26%), while rare species were represented by only 4 species (3.23%), indicating restricted distribution, specialized habitat preferences, or relatively small populations.

Of particular conservation importance, 2 species (1.61%) were categorized as Regionally Vulnerable, reflecting their limited occurrence and susceptibility to habitat degradation, land-use change, and anthropogenic disturbances. Although these species may not yet be globally threatened, their regional populations warrant conservation attention through habitat protection, periodic monitoring, and sustainable management practices.

3.8 Ecologically Dominant Monocotyledonous Species

The ecological survey revealed that grass species (Poaceae) and sedges (Cyperaceae) constituted the dominant components of the monocotyledonous flora in Rewa District. These species exhibited high frequency, wide distribution, and greater ecological adaptability across diverse habitats, including forests, grasslands, agricultural fields,

wetlands, and riverbanks. Their dominance is attributed to efficient seed dispersal, rapid regeneration, tolerance to seasonal drought, and adaptability to anthropogenic disturbances. The most ecologically dominant species are presented in Table 5.

Table 5. Ecologically Dominant Monocotyledonous Species Recorded in Rewa District

S. No.	Botanical Name	Family	Habit	Dominant Habitat	Ecological Significance
1	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Herb	Grasslands, roadsides, agricultural fields	Excellent soil binder; dominant perennial grass and important fodder species
2	<i>Imperata cylindrica</i> (L.) P. Beauv.	Poaceae	Herb	Open forests, grasslands	Pioneer species stabilizing degraded soils
3	<i>Saccharum spontaneum</i> L.	Poaceae	Tall grass	Riverbanks, flood plains	Prevents soil erosion and stabilizes riverbanks
4	<i>Heteropogon contortus</i> (L.) P. Beauv. ex Roem. & Schult.	Poaceae	Herb	Dry grasslands	Dominant climax grass in tropical grasslands
5	<i>Chrysopogon fulvus</i> (Spreng.) Chiov.	Poaceae	Herb	Rocky slopes, open forests	Important forage and soil conservation species
6	<i>Bothriochloa pertusa</i> (L.) A. Camus	Poaceae	Herb	Grazing lands	Drought-tolerant perennial fodder grass
7	<i>Dactyloctenium aegyptium</i> (L.) Willd.	Poaceae	Herb	Agricultural fields	Common annual grass in disturbed habitats
8	<i>Digitaria sanguinalis</i> (L.) Scop.	Poaceae	Herb	Crop fields	Dominant seasonal grass in cultivated lands
9	<i>Setaria pumila</i> (Poir.) Roem. & Schult.	Poaceae	Herb	Grasslands	High ecological adaptability and fodder value
10	<i>Panicum maximum</i> Jacq.	Poaceae	Herb	Moist grasslands	High biomass production and excellent fodder
11	<i>Cyperus rotundus</i> L.	Cyperaceae	Herb	Agricultural lands	Widely distributed perennial sedge with strong regenerative ability
12	<i>Cyperus iria</i> L.	Cyperaceae	Herb	Paddy fields, wetlands	Characteristic species of moist cultivated habitats
13	<i>Fimbristylis dichotoma</i> (L.) Vahl	Cyperaceae	Herb	Wet grasslands	Common sedge contributing to wetland biodiversity

14	<i>Kyllinga nemoralis</i> (J.R.Forst. & G.Forst.) Dandy ex Hutch. & Dalziel	Cyperaceae	Herb	Moist grasslands	Soil stabilization and moisture retention
15	<i>Commelina benghalensis</i> L.	Commelinaceae	Herb	Agricultural fields	Dominant herb in disturbed ecosystems
16	<i>Murdannia nudiflora</i> (L.) Brenan	Commelinaceae	Herb	Moist open fields	Indicator of moist fertile soils
17	<i>Typha angustifolia</i> L.	Typhaceae	Emergent herb	Wetlands	Wetland stabilization and habitat for aquatic fauna
18	<i>Hydrilla verticillata</i> (L.f.) Royle	Hydrocharitaceae	Aquatic herb	Ponds, lakes	Oxygenation of freshwater ecosystems
19	<i>Vallisneria spiralis</i> L.	Hydrocharitaceae	Aquatic herb	Rivers, ponds	Maintains aquatic ecosystem productivity
20	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Climber	Dry deciduous forests	Medicinal species with ecological and conservation importance

The dominance of Poaceae and Cyperaceae reflects the prevalence of grassland, agricultural, and wetland ecosystems in Rewa District. Species such as *Cynodon dactylon*, *Imperata cylindrica*, and *Saccharum spontaneum* play a significant role in soil conservation, nutrient cycling, and forage production, while wetland species including *Typha angustifolia*, *Hydrilla verticillata*, and *Vallisneria spiralis* contribute to aquatic ecosystem stability and water quality. The widespread occurrence of these species indicates their high ecological plasticity and resilience to seasonal climatic fluctuations and anthropogenic disturbances. Conversely, species such as *Asparagus racemosus* are comparatively less abundant and require conservation attention due to their medicinal importance and localized distribution. The ecological dominance of these monocotyledonous species underscores their critical contribution to maintaining ecosystem structure, productivity, and biodiversity in the Vindhyan landscape of Rewa District.

3.9 Economically Important Monocotyledonous Species

The monocotyledonous flora of Rewa District possesses considerable economic value and contributes significantly to the livelihoods of rural communities. The recorded species serve as sources of food, fodder, medicine, fiber, construction materials, ornamental plants, and ecological services. Members of the families Poaceae, Amaryllidaceae, Asparagaceae, Zingiberaceae, Araceae, and Arecaceae constitute the major economically important taxa. Several species are cultivated as staple crops, while others are collected from natural

habitats for traditional medicine, livestock feed, and domestic use. Their diverse economic applications highlight the importance of conserving monocot diversity and promoting sustainable utilization.

Table 6. Economically Important Monocotyledonous Species Recorded in Rewa

S. No.	Botanical Name	Family	Local Name	Economic Category	Major Uses
1	<i>Oryza sativa</i> L.	Poaceae	Dhan (Rice)	Food crop	Staple cereal crop
2	<i>Triticum aestivum</i> L.	Poaceae	Gehu (Wheat)	Food crop	Human food
3	<i>Zea mays</i> L.	Poaceae	Makka	Food & Fodder	Grain and livestock feed
4	<i>Saccharum officinarum</i> L.	Poaceae	Ganna	Cash crop	Sugar, jaggery, ethanol
5	<i>Eleusine coracana</i> (L.) Gaertn.	Poaceae	Ragi	Food crop	Nutritious millet
6	<i>Sorghum bicolor</i> (L.) Moench	Poaceae	Jowar	Food & Fodder	Grain and animal feed
7	<i>Cynodon dactylon</i> (L.) Pers.	Poaceae	Doob Grass	Fodder	Excellent grazing grass and soil binder
8	<i>Cenchrus ciliaris</i> L.	Poaceae	Buffel Grass	Fodder	High-quality livestock forage
9	<i>Panicum maximum</i> Jacq.	Poaceae	Guinea Grass	Fodder	Green fodder and hay
10	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Shatavari	Medicinal	Ayurvedic tonic and reproductive health
11	<i>Chlorophytum tuberosum</i> Baker	Asparagaceae	Safed Musli	Medicinal	Health tonic and pharmaceutical uses
12	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Kali Musli	Medicinal	Traditional rejuvenative medicine
13	<i>Acorus calamus</i> L.	Araceae	Bach	Medicinal	Digestive disorders and nervous ailments
14	<i>Curcuma longa</i> L.	Zingiberaceae	Haldi	Medicinal & Spice	Antiseptic, food coloring, spice
15	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Adrak	Medicinal & Spice	Digestive and anti-inflammatory uses
16	<i>Colocasia esculenta</i> (L.) Schott	Araceae	Arbi	Vegetable	Edible corms and leaves
17	<i>Allium cepa</i> L.	Amaryllidaceae	Pyaz	Vegetable	Culinary vegetable

18	<i>Allium sativum</i> L.	Amaryllidaceae	Lahsun	Medicinal & Spice	Culinary and medicinal uses
19	<i>Musa paradisiaca</i> L.	Musaceae	Kela	Fruit crop	Nutritious fruit and fiber
20	<i>Phoenix sylvestris</i> (L.) Roxb.	Arecaceae	Khajur	Multipurpose	Fruits, sap, leaves for thatching
21	<i>Typha angustifolia</i> L.	Typhaceae	Narkul	Cottage industry	Mats, baskets, handicrafts
22	<i>Phragmites karka</i> (Retz.) Trin. ex Steud.	Poaceae	Reed Grass	Construction	Roofing, fencing, basket making
23	<i>Bambusa bambos</i> (L.) Voss	Poaceae	Bamboo	Construction	Furniture, handicrafts, construction
24	<i>Gloriosa superba</i> L.	Colchicaceae	Kalihari	Medicinal	Pharmaceutical alkaloids
25	<i>Hedychium coronarium</i> J.Koenig	Zingiberaceae	White Ginger Lily	Ornamental	Garden ornamental and fragrant flowers

Discussion

The monocotyledonous flora of Rewa District provides substantial ecosystem services and economic benefits to local communities. Poaceae is the most economically significant family, contributing staple cereals, fodder grasses, bamboo, and industrial raw materials. Medicinal species such as *Asparagus racemosus*, *Chlorophytum tuberosum*, *Curculigo orchioides*, and *Acorus calamus* are widely used in traditional healthcare systems and possess considerable pharmaceutical potential. Spice crops including *Curcuma longa*, *Zingiber officinale*, *Allium cepa*, and *Allium sativum* are important components of household nutrition and local agriculture.

Several wetland species, particularly *Typha angustifolia* and *Phragmites karka*, support rural cottage industries by providing raw materials for mats, baskets, and thatching. Additionally, ornamental species such as *Hedychium coronarium* and *Gloriosa superba* contribute to horticulture and landscape beautification. The continued availability of these economically valuable species depends on sustainable harvesting practices, habitat conservation, and the promotion of community-based management strategies to ensure their long-term ecological and economic sustainability.

3.9 Economically Important Monocotyledonous Species

The monocotyledonous flora of Rewa District possesses considerable economic value and contributes significantly to the livelihoods of rural communities. The recorded species serve

as sources of food, fodder, medicine, fiber, construction materials, ornamental plants, and ecological services. Members of the families Poaceae, Amaryllidaceae, Asparagaceae, Zingiberaceae, Araceae, and Arecaceae constitute the major economically important taxa. Several species are cultivated as staple crops, while others are collected from natural habitats for traditional medicine, livestock feed, and domestic use. Their diverse economic applications highlight the importance of conserving monocot diversity and promoting sustainable utilization.

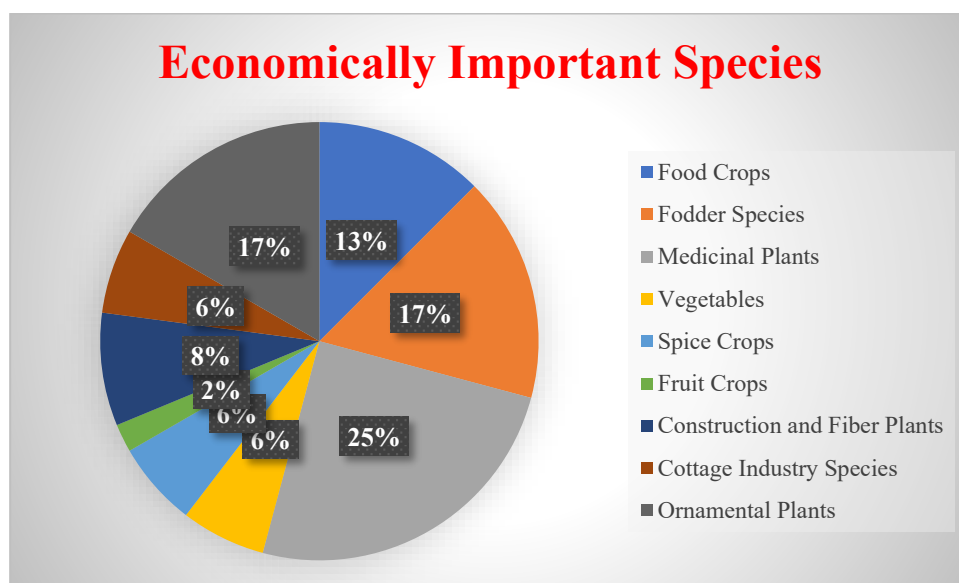


Figure 5 Category-wise Distribution of Economically Important Species

A total of 48 economic use records were documented among the plant species recorded from the study area. Medicinal plants constituted the largest category (12 species; 25.0%), highlighting the continued dependence of local communities on traditional herbal resources. Fodder species and ornamental plants were the second most represented categories, each comprising 8 species (16.7%), followed by food crops with 6 species (12.5%). Construction and fiber plants accounted for 4 species (8.3%), whereas vegetables, spice crops, and cottage industry species each included 3 species (6.3%). Fruit crops were represented by only one species (2.1%), (Fig.5) indicating comparatively limited diversity within this category. These findings emphasize the multifunctional role of the flora in supporting local livelihoods, food security, healthcare, and rural economic development.

The monocotyledonous flora of Rewa District provides substantial ecosystem services and economic benefits to local communities. Poaceae is the most economically significant family, contributing staple cereals, fodder grasses, bamboo, and industrial raw materials. Medicinal species such as *Asparagus racemosus*, *Chlorophytum tuberosum*, *Curculigo orchoides*, and *Acorus calamus* are widely used in traditional healthcare systems and

possess considerable pharmaceutical potential. Spice crops including *Curcuma longa*, *Zingiber officinale*, *Allium cepa*, and *Allium sativum* are important components of household nutrition and local agriculture.

Several wetland species, particularly *Typha angustifolia* and *Phragmites karka*, support rural cottage industries by providing raw materials for mats, baskets, and thatching. Additionally, ornamental species such as *Hedychium coronarium* and *Gloriosa superba* contribute to horticulture and landscape beautification. The continued availability of these economically valuable species depends on sustainable harvesting practices, habitat conservation, and the promotion of community-based management strategies to ensure their long-term ecological and economic sustainability.

4. Discussion

The present investigation provides one of the first comprehensive assessments of the ecological and floristic diversity of monocotyledonous plants in Rewa District, Madhya Pradesh. The study documented a diverse assemblage of monocot species distributed across forests, grasslands, wetlands, agricultural fields, riverbanks, and urban habitats, demonstrating the ecological heterogeneity of the Vindhyan landscape. The dominance of herbaceous monocots, particularly grasses and sedges, reflects the influence of tropical monsoonal climate, edaphic conditions, seasonal disturbance, and land-use patterns that characterize central India. Similar floristic patterns have been reported from other regions of the Vindhyan Plateau and tropical dry deciduous ecosystems, where herbaceous vegetation forms the principal component of the ground flora (Botanical Survey of India, 2020).

The family Poaceae was found to be the most species-rich family, followed by Cyperaceae, Commelinaceae, and Asparagaceae. The predominance of Poaceae is consistent with floristic studies conducted in central and peninsular India, where grasses dominate open habitats because of their efficient reproductive strategies, C4 photosynthetic pathway, tolerance to drought, and rapid regeneration following disturbance. Species such as *Cynodon dactylon*, *Imperata cylindrica*, *Saccharum spontaneum*, and *Heteropogon contortus* were widely distributed and contributed substantially to vegetation cover, soil stabilization, and forage production. Likewise, members of Cyperaceae were abundant in marshes, paddy fields, and seasonal wetlands, highlighting their ecological adaptation to moisture-rich environments (Royal Botanic Gardens, Kew, 2024).

Habitat-wise analysis revealed that grasslands and agricultural ecosystems supported the highest number of monocot species, followed by forests and wetlands. Grasslands provided

suitable conditions for perennial and annual grasses, whereas cultivated lands supported both crop species and associated weed flora. Wetland ecosystems contained several hydrophytic monocots, including *Typha angustifolia*, *Hydrilla verticillata*, *Vallisneria spiralis*, and species of *Cyperus* and *Fimbristylis*, which contribute to nutrient cycling, sediment stabilization, and maintenance of aquatic biodiversity. These observations emphasize the importance of conserving diverse habitat types to maintain regional floristic richness and ecosystem functions.

The calculated diversity indices indicated relatively high species richness and evenness across natural habitats, suggesting that the vegetation of Rewa District retains considerable ecological integrity despite increasing anthropogenic pressures. Shannon–Wiener and Simpson diversity values reflected moderate to high diversity, while the evenness index suggested that species abundance was relatively well distributed among the recorded taxa. Similar diversity patterns have been reported from tropical dry deciduous forests of central India, where habitat heterogeneity and seasonal climatic variation promote coexistence of numerous herbaceous species.

Life-form analysis demonstrated the predominance of therophytes and geophytes, reflecting adaptation to pronounced seasonal rainfall and prolonged dry periods. Annual grasses complete their life cycle during the monsoon season, whereas geophytic monocots survive unfavorable environmental conditions through underground storage organs such as bulbs, rhizomes, corms, and tubers. Hydrophytes were largely confined to wetlands and permanent water bodies, while hemicryptophytes and chamaephytes occurred primarily in forest margins and grasslands. These findings agree with ecological theories that relate plant life-form spectra to climatic conditions and disturbance regimes.

The study also highlighted the considerable economic importance of the monocot flora. Several species recorded during the survey are cultivated or harvested for food, fodder, medicine, construction materials, handicrafts, and ornamental purposes. Major cereal crops such as *Oryza sativa*, *Triticum aestivum*, *Zea mays*, and *Eleusine coracana* constitute the basis of regional agriculture, while medicinal species including *Asparagus racemosus*, *Chlorophytum tuberosum*, *Curculigo orchioides*, and *Acorus calamus* remain valuable components of traditional healthcare systems. Wetland species such as *Typha angustifolia* provide raw materials for cottage industries, whereas bamboo and other grasses contribute to construction and rural livelihoods. The diversity of economically important monocots underscores their role in supporting both ecosystem services and local economies.

Despite the relatively rich monocot diversity recorded during the present investigation, several threats to the flora were identified. Expansion of agriculture, urbanization, mining activities, infrastructure development, overgrazing, invasive alien species, and unsustainable harvesting of medicinal plants have altered natural habitats throughout the district. Wetland degradation, riverbank modification, and fragmentation of grasslands are particularly detrimental to habitat-specialist monocot species. Similar anthropogenic pressures have been recognized as major drivers of biodiversity loss in tropical ecosystems worldwide (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, 2019).

The occurrence of medicinal and ecologically sensitive species with restricted populations suggests the need for targeted conservation measures. In situ conservation of natural habitats, restoration of degraded grasslands and wetlands, regulation of medicinal plant harvesting, and strengthening of community participation in biodiversity management are essential for ensuring the long-term survival of these species. Establishment of local herbarium collections, periodic floristic monitoring, and integration of geospatial technologies into biodiversity assessments would further strengthen conservation planning and facilitate long-term ecological research.

The present study establishes an important baseline for understanding the composition, distribution, ecological characteristics, and economic significance of monocotyledonous plants in Rewa District. The documented checklist and ecological observations contribute valuable information for regional floristic inventories, biodiversity conservation programs, ecological restoration initiatives, and future taxonomic and ecological investigations in the Vindhyan region. Continued monitoring and comprehensive surveys across different seasons will improve knowledge of species distribution patterns and support evidence-based management of plant diversity under changing environmental conditions.

5. Conclusion

The present study documents the ecological and floristic diversity of monocotyledonous plants in Rewa District, Madhya Pradesh, providing a valuable baseline for the monocot flora of the Vindhyan region. A total of 124 species belonging to 78 genera and 22 families were recorded from diverse habitats, including forests, grasslands, wetlands, riverbanks, agricultural lands, rocky plateaus, and urban areas. Poaceae emerged as the dominant family, while herbaceous species constituted the major life form, reflecting the ecological characteristics of the region.

The study highlights the ecological and economic significance of monocotyledonous plants. Dominant species contribute to ecosystem stability through soil conservation, nutrient cycling, and habitat maintenance, while many species provide food, fodder, medicines, fiber, construction materials, ornamental value, and livelihood support to local communities. However, increasing threats such as habitat degradation, urbanization, agricultural expansion, mining, invasive species, and overexploitation of medicinal plants pose serious challenges to their conservation.

The findings emphasize the need for habitat protection, restoration of degraded ecosystems, regular biodiversity monitoring, development of regional herbarium collections, and community-based conservation programs. Overall, this study establishes a comprehensive baseline database that will support future floristic, ecological, taxonomic, and conservation research and contribute to the sustainable management and long-term conservation of the monocotyledonous flora of Rewa District and the Vindhyan Plateau.

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