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Floristic diversity and therapeutic potential of herbaceous plants in Maharaja Purna Chandra Autonomous College Campus, Odisha, India

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Abstract
A comprehensive study was carried out at Maharaja Purna Chandra Autonomous College, Takhatpur, Baripada (21º93'N; 86º76'E) in Mayurbhanj, Odisha, India, from September 2024 to February 2025 to evaluate the floristic diversity and therapeutic potential of herbaceous plants. Random sampling techniques were employed for the collection of plant specimens, which were subsequently identified using standard floras and herbarium references. The documented species were categorized based on their respective families, life forms, and ecological characteristics. In total, 40 herbaceous species with recognized medicinal value were recorded within the college campus. These species were distributed across 21 plant families, with Asteraceae emerging as the most dominant, while the others showed relatively uniform representation. Ethnobotanical information was gathered through a combination of literature review and informal interviews with local herbal practitioners and traditional healers. The medicinal applications of the recorded species were analysed to assess their relevance in traditional healthcare systems. Several of these plants were found to exhibit significant therapeutic properties and are traditionally used to manage conditions such as fever, skin infections, digestive issues, respiratory ailments, and inflammatory disorders. The observed diversity of herbaceous vegetation is likely influenced by various environmental and biological factors, including the region's floral composition, topography, soil properties, climatic conditions, and ecological interactions.

Keywords: Therapeutic potential, life forms, herbal practitioner, topography, ecological interactions

Introduction

Herbaceous plants play a vital role in terrestrial ecosystems by enhancing biodiversity, supporting ecological stability, and contributing to human well-being. Many possess medicinal properties and have been used in traditional medicine for centuries. Their presence enhances ecosystem biodiversity, which is crucial for ecological balance (Tallamy, 2020) [1]. Root systems of herbaceous plants improve soil structure, reduce erosion, and aid nutrient cycling (Hooper *et al*., 2005) [2]. Beyond ecology, these plants offer educational opportunities in ecology, plant biology, and ecosystem management through hands-on learning (Krasny & Tidball, 2009) [3]. Their aesthetic appeal promotes mental well-being and stress relief (Kaplan & Kaplan, 1989) [4]. Several species, like *Ginkgo biloba* and *Echinacea purpurea*, are known for cognitive and immune benefits, respectively (Heinrich *et al*., 2004) [5]. Phytochemicals such as flavonoids and alkaloids found in these plants possess anti-inflammatory, antioxidant, and anticancer properties (Cragg & Newman, 2013) [6]. Herbaceous plants are also vital to nutrition. Leafy greens like kale and spinach are rich in vitamins, minerals, and fiber, aiding in the prevention of chronic diseases (Liu, 2003) [7]. Wild edibles like parsley and basil contribute to food security and sustainable diets (Bharucha & Pretty, 2010) [8]. Additionally, exposure to green spaces dominated by herbaceous plants improves cognitive function and lowers stress hormones (Bratman *et al*., 2015) [9]. Urban green spaces can improve air quality by absorbing pollutants and releasing oxygen (Nowak *et al*., 2006) [10]. In Odisha, a biodiversity-rich region of eastern India, several ethnobotanical studies have documented the medicinal use of herbaceous plants by tribal communities. In Kandhamal, 102 species were identified for treating various ailments (Mohanty *et al*., 2013) [11]. Studies in Similipal Biosphere Reserve and Sundargarh reported 78 and 56 medicinal species used for conditions like diabetes, skin diseases, and respiratory issues (Behera *et al*., 2015; Mishra *et al*., 2011) [12, 13]. Key species such as *Withania somnifera*, *Azadirachta indica*, and *Ocimum sanctum* have proven medicinal value (Panda *et al*., 2014) [14]. Research also highlights antibacterial properties in *Aloe vera* and *Curcuma longa* (Rout *et al*., 2012) [15], and antioxidant effects of *Phyllanthus emblica* and *Terminalia arjuna* for liver and cardiovascular health (Dash *et al*., 2018) [16]. However, threats such as overharvesting and deforestation endanger species like *Gloriosa superba* and *Rauvolfia serpentina*, emphasizing the need for conservation (Pattanaik *et al*., 2008) [17]. Neighboring states like Jharkhand and Chhattisgarh report similar traditional uses of plants like *Emblica officinalis*, *Bauhinia variegata*, and *Ocimum sanctum* (Sen *et al*., 2011; Reddy *et al*., 2015) [18, 19]. Globally recognized herbs such as chamomile, turmeric (*curcumin*), echinacea, and garlic exhibit strong anti-inflammatory, immune-boosting, and antimicrobial properties (Aggarwal *et al*., 2007; Bayan *et al*., 2014) [20, 21]. Others, like basil and rosemary, provide antioxidant benefits (Zheng & Wang, 2001) [22], while ginger and peppermint are widely used for digestive issues (McKay & Blumberg, 2006) [23]. Despite extensive research elsewhere, limited studies exist on the floristic diversity and therapeutic potential of herbaceous plants within the campus of Maharaja Purna Chandra Autonomous College, Baripada, Odisha. Further research is essential to explore and conserve the region's herbaceous flora and their medicinal properties.

Material and Methods

Meteorology and Soil Condition of the Study Area

Maharaja Purna Chandra Autonomous College is situated in Baripada, a town in the Mayurbhanj district of Odisha, near the Bay of Bengal in eastern India. Located at approximately 21.9333° N latitude and 86.7333°

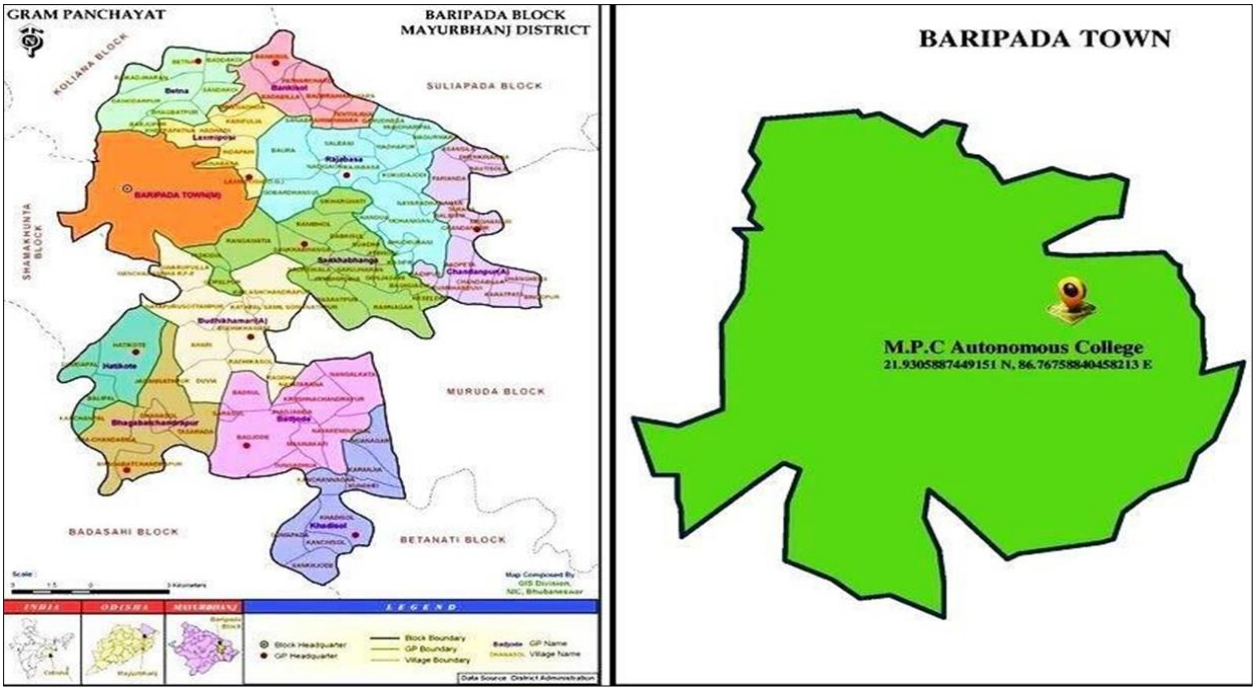

Fig 1. The Campus of M.P.C. (Autonomous) College showing study site

longitude (Fig.-1) (Nayak and Barik, 2024) [24]. The region experiences a tropical climate characterized by hot summers, mild winters, and a monsoon season from June to September. The proximity to the Bay of Bengal helps moderate temperatures on campus. The college is surrounded by lush greenery, with natural vegetation, well-maintained gardens, and abundant plant life creating a verdant atmosphere. The surrounding region is also rich in biodiversity, with nearby forests and wildlife sanctuaries, including the renowned Simlipal National Park. The laterite soil around Odisha, including areas near M.P.C. (Autonomous) College, Odisha is rich in iron and aluminium but low in organic matter and nutrients. Herbaceous plants such as grasses and wildflowers, which tolerate poor, nitrogen-deficient soils, are more common. In contrast, soil enrichment through compost or fertilizers can support a broader range of species. Soil moisture is high during the monsoon, benefiting water-loving plants, while in the dry season, reduced moisture favors drought-resistant species. Well-drained soils in the region prevent water logging, helping maintain herbaceous plant diversity.

Survey design and Plant Identification

A combination of quadrat-based and random sampling used to ensure representative coverage of the campus. The campus will be divided into distinct zones—such as lawns, gardens, pathways, and wooded areas. Random sampling points within each zone will be selected using a grid system or random number generator to minimize bias and ensure all areas have an equal chance of being sampled. The survey was conducted over a six-month period to capture seasonal variation, focusing on the growing season from spring to autumn when herbaceous plants are most active. Monthly observations will document phenological changes (e.g., flowering, fruiting) and shifts in plant composition and abundance. Additional surveys may be conducted after major weather events (e.g., heavy rainfall, drought) to assess their ecological impact. Field tools will include quadrats, measuring tapes, cameras, GPS units, field notebooks, and plant identification manuals. Standardized data will be recorded at each site, including location, date, weather, and observer details. The taxonomic identification of plant specimens was carried out using various floras like (Haines, 1921; Mooney, 1950; Saxena & Brahmam, 1994) [25, 26, 27]. All sampling will be carried out with minimal disturbance to the plants and their habitat.

Results and Discussion

The campus of Maharaja Purna Chandra Autonomous College exhibits rich floristic diversity. The present study highlights 40 significant herbaceous plant species known for their therapeutic potential. These species belong to 21 different families, with Asteraceae being the most dominant. Other notable families include Apocynaceae, Rubiaceae, Amaranthaceae, Commelinaceae, Papaveraceae, Fabaceae, Poaceae, Malvaceae, Lamiaceae, and Euphorbiaceae, which are fairly evenly represented. Commonly found species include *Catharanthus roseus* (L.) G. Don, *Tridax procumbens* L., *Commelina benghalensis* L., *Argemone mexicana* L., *Eleusine indica* (L.) Gaertn., *Dactyloctenium aegyptium* (L.) Willd., *Chrysopogon aciculatus* (Retz.) Trin., *Aristida setacea* Retz., *Impatiens balsamina* L., *Ocimum basilicum* L., *Elephantopus scaber* L., and *Euphorbia hirta* L., among others. The botanical names, families, and medicinal uses of these 40 important herbaceous plants are presented in tabular form (Table-1).

Table 1. The botanical names, families, and medicinal uses of herbaceous plants

SL. NO.	BOTANICAL NAME	FAMILY	MEDICINAL VALUE
01	*Dianthus chinensis* L.	Caryophyllaceae	Constipation, Menstrual Problems and Eye Health.
02	*Catharanthus roseus* (L.) G. Don	Apocynaceae	Antihypertensive, Antioxidant, Antidiabetic and Anticancer.
03	*Oldenlandia corymbosa* L.	Rubiaceae	Antipyretic, Antimicrobial and Hepatoprotective.
04	*Tradescantia spathacea* Sw.	Commelinaceae	Wound-healing, Anti-inflammatory and Antidiabetic.
05	*Emilia sonchifolia* (L.) DC. Ex Wight	Asteraceae	Anticancer, Wound-healing, Antioxidant and Antibacterial.
06	*Aerva lanata* (L.) Juss. Ex Schult.	Amaranthaceae	Diuretic, Hepatoprotective and Antilithic.
07	*Alternanthera sessilis* (L.) DC.	Amaranthaceae	Hepatoprotective, Antioxidant, Antimicrobial and Antidiabetic.
08	*Eclipta prostrata* (L.) L.	Asteraceae	Hair-promoting, Antimicrobial and Anti-inflammatory.
09	*Tridax procumbens* L.	Asteraceae	Anti-inflammatory, Antimicrobial, Antioxidant and Wound healing.
10	*Commelina benghalensis* L.	Commelinaceae	Diuretic, Antioxidant and Antibacterial.
11	*Rungia pectinata* (L.) Nees	Acanthaceae	Anthelmintic, Antibacterial and Hepatoprotective.
12	*Argemone mexicana* L.	Papaveraceae	Analgesic, Antimicrobial, Antimalarial and Anticancer.
13	*Crotalaria prostrata* Rottler ex Willd.	Fabaceae	Antifungal, Wound-healing and Anti-inflammatory.
14	*Cyperus brevifolius* (Rottb.) Hassk.	Cyperaceae	Antidiarrheal, Analgesic, Antipyretic and Antimicrobial.
15	*Eleusine indica* (L.) Gaertn.	Poaceae	Anthelmintic, Antifungal, Antipyretic and Diuretic.
16	*Scoparia dulcis* L.	Plantaginaceae	Antidiabetic, Antimicrobial and Anti-inflammatory.
17	*Hyptis suaveolens* (L.) Poit.	Lamiaceae	Insecticidal, Antioxidant, Antidiabetic and Antimicrobial.
18	*Croton bonplandianus* Baill.	Euphorbiaceae	Cytotoxic, Antioxidant and Antidiarrheal.
19	*Achyranthes aspera* L.	Amaranthaceae	Antifertility, Wound-healing and Antidiabetic.
20	*Xanthium strumarium* L.	Asteraceae	Antimalarial, Antimicrobial and Analgesic.
21	*Dactyloctenium aegyptium* (L.) Willd.	Poaceae	Febrifuge, Anti-inflammatory and Antidiarrheal.
22	*Sida acuta* Burm. F.	Malvaceae	Antimicrobial, Antioxidant, Analgesic and Antimalarial.
23	*Chrysopogon aciculatus* (Retz.) Trin.	Poaceae	Wound-healing, Diuretic and Antipyretic.
24	*Aristida setacea* Retz.	Poaceae	Antioxidant, Antioxidant and Anti-inflammatory.
25	*Boerhavia diffusa* L.	Nyctaginaceae	Antidiabetic, Diuretic and Hepatoprotective.
26	*Blumea eriantha* DC.	Asteraceae	Analgesic, Anti-inflammatory and Wound-healing.
27	*Phyllanthus amarus* Schumach. & Thonn.	Phyllanthaceae	Antiviral, Diuretic and Hepatoprotective.
28	*Impatiens balsamina* L.	Balsaminaceae	Antimicrobial, Analgesic and Antifungal.
29	*Solanum nigrum* L.	Solanaceae	Anticancer, Anti-inflammatory and Antimicrobial.
30	*Coccinia grandis* (L.) Voigt	Cucurbitaceae	Antidiabetic, Antioxidant and Hepatoprotective.
31	*Tragia involucrata* L.	Euphorbiaceae	Diuretic, Antioxidant and Analgesic.
32	*Raphanus sativus* L.	Brassicaceae	Detoxifying, Antimicrobial and Digestive.
33	*Amaranthus spinosus* L.	Amaranthaceae	Wound-healing, Antimicrobial and Antidiabetic.
34	*Ocimum basilicum* L.	Lamiaceae	Antispasmodic, Hepatoprotective and Antimicrobial.
35	*Desmodium triflorum* (L.) DC.	Fabaceae	Antidiarrheal, Anti-inflammatory and Antipyretic.
36	*Cyanthillium cinereum* (L.) H. Rob.	Asteraceae	Anti-ulcer, Antimicrobial and Antioxidant.
37	*Ageratum conyzoides* L.	Asteraceae	Antibacterial, Antibacterial and Antifungal.
38	*Elephantopus scaber* L.	Asteraceae	Anticancer, Hepatoprotective and Diuretic.
39	*Andrographis paniculata* (Burm. F.) Nees	Acanthaceae	Immunomodulatory, Antipyretic and Anti-inflammatory.
40	*Euphorbia hirta* L.	Euphorbiaceae	Antispasmodic, Antidiarrheal and Antiasthmatic.

Conclusion

The campus of Maharaja Purna Chandra Autonomous College in Odisha hosts a rich diversity of herbaceous plants, many of which possess notable medicinal properties used in traditional healthcare practices. Promoting awareness among local communities and students about the medicinal potential of these species can enhance conservation efforts and encourage further research into their pharmacological benefits. Integrating phytochemical and pharmacological studies in future research will provide deeper insights into their therapeutic properties and may contribute to the development of plant-based medicines. In conclusion, the Maharaja Purna Chandra Autonomous College campus serves as a vital microhabitat for diverse herbaceous plants with significant therapeutic value. Conserving this biodiversity and advancing scientific research can greatly benefit both traditional and modern medical systems, emphasizing the importance of protecting local plant resources.

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