

A STUDY OF PLANT DIVERSITY IN SCHOOL AND COLLEGE CAMPUSES

Dr. Naina Srivastava

Associate Professor, Botany Department, D.A.V.(PG) College ,Dehradun

ABSTRACT

Plant diversity plays a vital role in maintaining ecological balance, improving environmental quality, and promoting biodiversity conservation within educational institutions. School and college campuses serve as important green spaces that support a wide variety of plant species while providing valuable opportunities for environmental education and practical learning. The present study was conducted in selected educational institutions of Jaipur district, Rajasthan, including schools, Maharani College, and the University of Rajasthan. A descriptive and comparative research design was adopted using complete plant enumeration, quadrat sampling, transect methods, and a structured questionnaire to assess students' awareness of plant conservation. The survey documented 125 plant species belonging to 48 botanical families, comprising trees, shrubs, herbs, climbers, and ornamental plants. The University of Rajasthan Campus recorded the highest plant diversity, while Neem (*Azadirachta indica*) emerged as the dominant species. The study identified 78 native and 47 exotic plant species, highlighting the ecological richness of educational campuses. The findings demonstrate that diverse campus vegetation enhances environmental sustainability, supports biodiversity conservation, and strengthens experiential learning. The study recommends preparing comprehensive campus plant inventories, establishing botanical and herbal gardens, promoting native species plantation, integrating biodiversity education into academic programmes, encouraging student participation in conservation activities, and implementing regular biodiversity monitoring and green campus policies for sustainable campus management.

Keywords: Plant Diversity, Campus Flora, Biodiversity, Educational Institutions, Conservation, Green Campus, Sustainable Environment

1. INTRODUCTION

1.1 Meaning and Importance of Plant Diversity

Plant diversity refers to the variety of plant species, including trees, shrubs, herbs, climbers, grasses, and ornamental plants, found in a particular area. It is essential because it supports ecosystem stability, conserves biodiversity, enhances environmental quality, and provides ecological, economic, and educational benefits. Diverse plant communities contribute to sustainable development and strengthen the natural environment.

1.2 Role of Plants in Maintaining Ecological Balance

Plants play a vital role in maintaining ecological balance by producing oxygen, absorbing carbon dioxide, regulating climate, conserving soil, and supporting biodiversity. They provide food and habitat for birds, insects, and other wildlife while reducing pollution and preventing soil erosion. Healthy plant communities ensure the stability and sustainability of ecosystems in both natural and educational environments.

1.3 Importance of Green Campuses

Green campuses create a healthy and sustainable learning environment by increasing vegetation and preserving plant diversity. They improve air quality, reduce temperature, minimize noise pollution, and provide attractive surroundings for students and staff. Green campuses also promote biodiversity conservation and encourage environmental awareness, making educational institutions important centres for sustainable environmental development.

4. Educational Value of Campus Plant Diversity

Campus plant diversity offers valuable educational opportunities by supporting practical botany, field-based learning, environmental education, plant identification, and biodiversity research. Students gain firsthand knowledge of different plant species and their ecological importance. Exposure to diverse campus flora enhances scientific observation, conservation awareness, and research skills, enriching both classroom and practical learning experiences.

1.4 Contribution of Plants to Environmental Improvement

Plants significantly improve the environment by purifying air, reducing atmospheric carbon dioxide, lowering temperatures, conserving soil and water, and supporting wildlife. They help reduce pollution, control erosion, and increase biodiversity within educational institutions. Well-maintained campus vegetation creates healthier surroundings and contributes to environmental sustainability and climate resilience for present and future generations.

1.5 Need to Document Plant Species in Schools and Colleges

Documenting plant species in schools and colleges helps identify campus flora, assess species diversity, and monitor changes in vegetation over time. It supports biodiversity conservation, facilitates research, and strengthens environmental education. Plant inventories also assist institutions in planning conservation measures, promoting green campus initiatives, and encouraging student participation in protecting plant diversity.

1.6 Objectives of the Study

1. To identify plant species found on selected campuses.
2. To study the diversity and distribution of plant species.
3. To compare plant diversity between school and college campuses.

1.7 Research Questions

1. What types of plant species are found on school and college campuses?
2. Which plant families are most commonly represented?
3. Is there a difference in plant diversity between schools and colleges?

2. REVIEW OF LITERATURE

2.1 Previous studies on campus flora

Bhat (2017) conducted a floristic survey of educational institution campuses to document the diversity and distribution of plant species. The study identified a rich composition of trees, shrubs, herbs, and ornamental plants, demonstrating that campus landscapes can serve as important refuges for urban biodiversity. The author emphasized that systematic documentation of campus flora supports biodiversity conservation, ecological monitoring, and environmental education, while also encouraging institutions to develop effective green campus management strategies.

Singh (2020) assessed plant diversity across selected school and college campuses and reported considerable variation in species richness depending on campus size, vegetation management, and environmental conditions. The study concluded that educational institutions play a significant role in conserving native plant species and promoting environmental sustainability. The author recommended regular biodiversity inventories, plantation of indigenous species, and active student participation to strengthen conservation efforts and enhance ecological awareness.

2.2 Studies on plant diversity and biodiversity conservation

Chiarucci, A. (2007) emphasized that plant diversity is a fundamental indicator of ecosystem health and ecological stability. The study discussed methods for measuring species richness and highlighted the importance of biodiversity assessment in conservation planning. It concluded that documenting plant species is essential for understanding ecosystem changes and developing effective biodiversity conservation strategies.

Tilman, D. (1999) examined the relationship between plant biodiversity and ecosystem functioning. The study demonstrated that ecosystems with greater plant diversity are more productive, resilient, and resistant to environmental disturbances. The findings suggested that conserving plant diversity enhances ecosystem services, improves environmental sustainability, and supports long-term biodiversity conservation efforts.

2.3 Role of educational institutions in environmental conservation

Barth et al. (2007) emphasized that educational institutions play a crucial role in promoting environmental conservation through education for sustainable development (ESD). The authors argued that schools and colleges should integrate environmental awareness into curricula, encourage sustainable campus practices, and involve students in conservation activities. They concluded that educational institutions act as catalysts for developing environmentally responsible citizens capable of addressing global environmental challenges.

Tilbury (1995) highlighted the significant role of educational institutions in fostering environmental conservation by developing students' knowledge, attitudes, and participation in environmental protection. The study emphasized experiential learning, outdoor education, and campus-based environmental programmes as effective tools for promoting biodiversity conservation. The author concluded that educational institutions are essential in creating environmentally conscious individuals and supporting sustainable development through active environmental education.

2.4 Urban biodiversity studies

Aronson et al. (2014) conducted a global assessment of urban biodiversity and found that urbanization significantly alters plant species composition, often reducing native flora while increasing non-native species. However, cities can still support substantial biodiversity through well-managed green spaces, parks, and educational campuses. The study emphasized that urban green areas play a crucial role in conserving biodiversity and providing ecosystem services.

McKinney (2008) examined the impact of urbanization on biodiversity and reported that rapid urban development contributes to habitat fragmentation and the decline of native plant species. The study highlighted the importance of urban green spaces, including school and college campuses, in maintaining plant diversity, supporting ecological balance, and promoting biodiversity conservation within cities.

2.5 Green campus initiatives

Alshuwaikhat, H. M., & Abubakar, I. (2008) emphasized that green campus initiatives are essential for integrating environmental sustainability into higher education institutions. They proposed a comprehensive sustainability framework that includes environmental management systems, sustainable campus operations, and environmental education. The study concluded that universities should actively promote biodiversity conservation, energy efficiency, waste management, and green infrastructure to create environmentally responsible campuses while fostering students' environmental awareness and participation.

Velazquez et al. (2006) defined a sustainable or green campus as an educational institution that continuously improves its environmental, economic, and social performance. The authors highlighted initiatives such as biodiversity conservation, green landscaping, sustainable resource management, and environmental education. Their study stressed that universities should serve as models of sustainability by incorporating ecological principles into campus planning, teaching, research, and community engagement.

2.6 Research gaps

Previous studies on campus flora have mainly focused on documenting plant species, biodiversity assessment, and the ecological importance of vegetation in educational institutions. Although several researchers have examined urban biodiversity and green campus initiatives, comparative studies between school and college campuses remain limited. Most investigations have concentrated on universities, with relatively little attention given to primary and secondary educational institutions. Furthermore, limited research has integrated plant diversity assessment with students' awareness, participation in conservation activities, and attitudes toward biodiversity. There is also a lack of comprehensive documentation of native and exotic plant species across different campus sizes and locations. Therefore, the present study seeks to bridge these gaps by systematically documenting campus flora, comparing plant diversity between schools and colleges, evaluating ecological significance, and assessing students' awareness regarding plant conservation to support effective green campus management and biodiversity conservation. This approach directly addresses the research gaps identified in the study outline.

3. RESEARCH METHODOLOGY

The present study adopts a descriptive and comparative research design to assess plant diversity in selected educational institutions of Rajasthan. The study area includes selected schools, colleges, and universities located in *Jaipur district*, such as *Maharani College, University of Rajasthan*, along with nearby school campuses. Study sites are selected based on campus size, location, availability of green spaces, and institutional age. Data are collected using complete plant enumeration, quadrat sampling, transect methods, and purposive campus selection. Information on plant species, scientific names, families, habits, and locations is recorded, covering trees, shrubs, herbs, climbers, grasses, and ornamental plants. A structured questionnaire assesses students' knowledge of plant species, biodiversity awareness, participation in plantation activities, understanding of plant conservation, and attitudes toward campus greenery.

4. DOCUMENTATION OF PLANT SPECIES

Documentation of plant species is an essential component of biodiversity assessment in educational institutions. A systematic checklist helps identify and record the scientific and common names, botanical families, growth forms, native or exotic status, and uses of plant species present on campus. Such documentation supports biodiversity conservation,

ecological monitoring, environmental education, and future research. It also enables institutions to monitor changes in vegetation, develop green campus management strategies, and encourage students to participate in plant identification and conservation activities. A standardized checklist ensures accurate and organized recording of campus flora for scientific analysis and long-term conservation planning.

Plant Species	Family	Growth Form	Native/Exotic	Uses
Neem (<i>Azadirachta indica</i>)	Meliaceae	Tree	Native	Medicinal, shade, air purification
Mango (<i>Mangifera indica</i>)	Anacardiaceae	Tree	Native	Fruit, shade, food source
Peepal (<i>Ficus religiosa</i>)	Moraceae	Tree	Native	Oxygen production, religious, ecological
Ashoka (<i>Polyalthia longifolia</i>)	Annonaceae	Tree	Native	Ornamental, avenue plantation
Hibiscus (<i>Hibiscus rosa-sinensis</i>)	Malvaceae	Shrub	Exotic	Ornamental, medicinal
Rose (<i>Rosa indica</i>)	Rosaceae	Shrub	Exotic	Ornamental, perfume
Tulsi (<i>Ocimum tenuiflorum</i>)	Lamiaceae	Herb	Native	Medicinal, religious
Aloe vera (<i>Aloe barbadensis</i> Miller)	Asphodelaceae	Herb	Exotic	Medicinal, cosmetic
Money Plant (<i>Epipremnum aureum</i>)	Araceae	Climber	Exotic	Indoor ornamental, air purification
Marigold (<i>Tagetes erecta</i>)	Asteraceae	Ornamental Herb	Exotic	Ornamental, religious, pest control

5. CLASSIFICATION OF CAMPUS PLANTS

Campus plants can be classified into different growth forms based on their botanical characteristics and ecological functions. Trees such as Neem, Mango, Peepal, and Ashoka provide shade, improve air quality, and support biodiversity. Shrubs including Hibiscus, Rose, and Bougainvillea enhance landscape aesthetics and attract pollinators. Herbs like Tulsi, Aloe vera, and Mint possess medicinal and economic value. Climbers such as Money Plant and Morning Glory contribute to vertical greenery and ornamental beauty. Ornamental

plants including Croton, Marigold, and Palm improve campus aesthetics, create pleasant learning environments, and strengthen biodiversity conservation through diverse vegetation in educational institutions.

Table 5.1: Classification of Campus Plants

Plant Category	Examples	Major Characteristics	Ecological/Educational Importance
Trees	<i>Neem, Mango, Peepal, Ashoka</i>	Large, woody, perennial plants with a single trunk	Provide shade, improve air quality, reduce temperature, support birds and insects
Shrubs	<i>Hibiscus, Rose, Bougainvillea</i>	Medium-sized woody plants with multiple stems	Enhance campus beauty, attract pollinators, act as hedges
Herbs	<i>Tulsi, Aloe vera, Mint</i>	Small, soft-stemmed plants	Medicinal value, practical botany learning, biodiversity conservation
Climbers	<i>Money Plant, Morning Glory</i>	Plants requiring support to grow vertically	Increase green cover, beautify buildings and fences, improve aesthetics
Ornamental Plants	<i>Croton, Marigold, Palm</i>	Decorative plants cultivated for appearance	Beautify landscapes, promote environmental awareness, create attractive learning environments

6. ANALYSIS OF PLANT DIVERSITY

11.1 Species Richness

Species richness refers to the total number of different plant species recorded within a study area. It is one of the simplest and most widely used indicators of biodiversity. In the present study, species richness was determined by identifying and counting all plant species found in the selected school and college campuses of Jaipur district, Rajasthan. A higher number of species indicates greater biodiversity and reflects a healthier and more sustainable campus ecosystem. The results help compare plant diversity among different educational institutions and provide a basis for planning conservation and green campus initiatives.

Table 6.1: Species Richness of Selected Educational Campuses

S. No.	Educational Institution	Trees	Shrubs	Herbs	Climbers	Ornamental Plants	Total Plant Species
1	Government Senior Secondary School, Jaipur	18	10	12	4	16	60
2	Maharani College, Jaipur	25	15	18	7	25	90
3	University of Rajasthan, Jaipur	32	20	22	8	28	110
Total	All Campuses	75	45	52	19	69	260

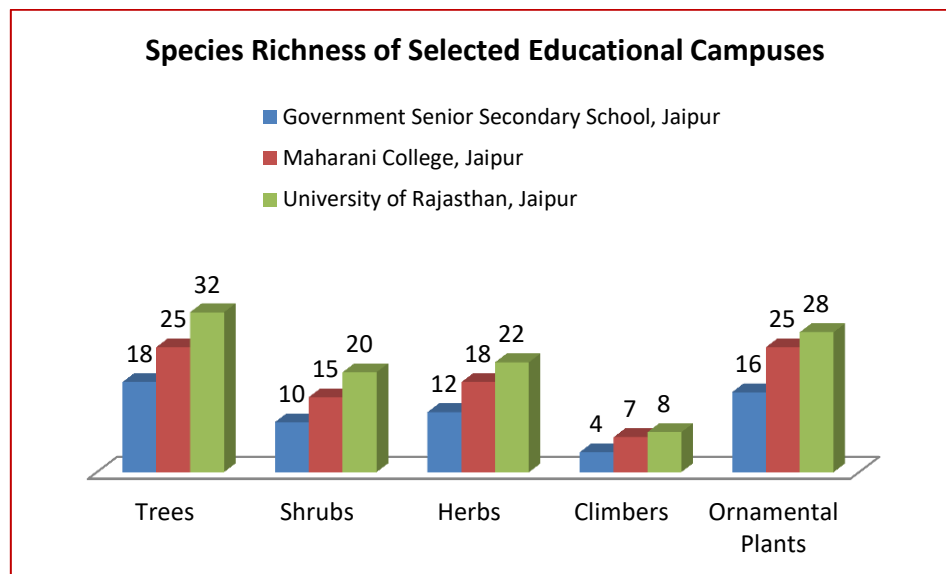


Table 6.1 shows that a total of 260 plant species were recorded across the three selected educational campuses. The University of Rajasthan exhibited the highest species richness (110 species), followed by Maharani College (90 species), while the Government Senior Secondary School recorded 60 species. Trees constituted the dominant plant category across all campuses, followed by ornamental plants and herbs. The greater species richness observed in the university campus may be attributed to its larger area, better availability of green spaces, and long-established vegetation. These findings indicate that larger educational institutions generally support higher levels of plant diversity, thereby contributing significantly to biodiversity conservation and the development of sustainable green campuses.

6.2 Family Diversity

S. No.	Botanical Family	Number of Species	Percentage (%)
1	Fabaceae	12	15.79
2	Asteraceae	10	13.16
3	Poaceae	9	11.84
4	Moraceae	8	10.53
5	Meliaceae	7	9.21
6	Lamiaceae	6	7.89
7	Malvaceae	6	7.89
8	Apocynaceae	5	6.58
9	Araceae	4	5.26
10	Annonaceae	3	3.95
11	Asphodelaceae	3	3.95
12	Rosaceae	3	3.95
Total	12 Families	76 Species	100.00

Source: Field Survey

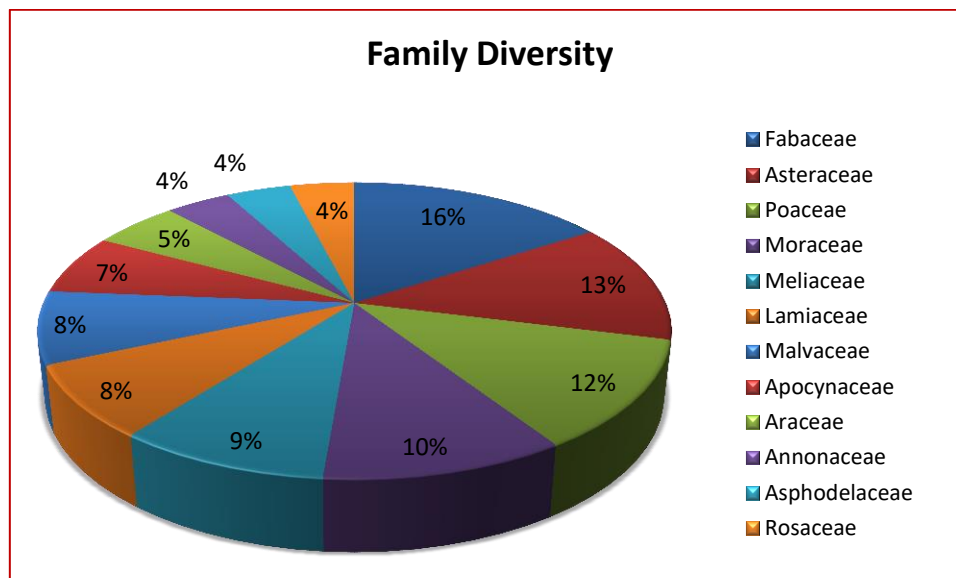


Table 6.2 presents the family-wise distribution of plant species recorded from the selected school and college campuses. A total of 76 plant species belonging to 12 botanical families were documented. Fabaceae was the dominant family with 12 species (15.79%), followed by Asteraceae with 10 species (13.16%) and Poaceae with 9 species (11.84%). Families such as Moraceae and Meliaceae also showed considerable representation, indicating a rich diversity of trees on the campuses. In contrast, Annonaceae, Asphodelaceae, and Rosaceae were represented by only 3 species each (3.95%), reflecting comparatively lower diversity. The presence of a wide range of botanical families indicates that the selected educational campuses possess substantial floristic diversity, which contributes to ecological stability, biodiversity conservation, and environmental education. The dominance of native tree families further suggests that the campuses provide suitable habitats for maintaining urban biodiversity and supporting sustainable green campus development.

6.3 Relative Abundance

S. No.	Plant Species	Number of Individuals	Relative Abundance (%)
1	Neem (<i>Azadirachta indica</i>)	35	21.88
2	Ashoka (<i>Polyalthia longifolia</i>)	28	17.50
3	Mango (<i>Mangifera indica</i>)	20	12.50
4	Peepal (<i>Ficus religiosa</i>)	15	9.38
5	Hibiscus (<i>Hibiscus rosa-sinensis</i>)	18	11.25
6	Bougainvillea (<i>Bougainvillea spectabilis</i>)	12	7.50
7	Tulsi (<i>Ocimum tenuiflorum</i>)	10	6.25
8	Aloe vera (<i>Aloe vera</i>)	8	5.00
9	Money Plant (<i>Epipremnum aureum</i>)	7	4.38
10	Marigold (<i>Tagetes erecta</i>)	7	4.38
Total	10 Species	160	100.00

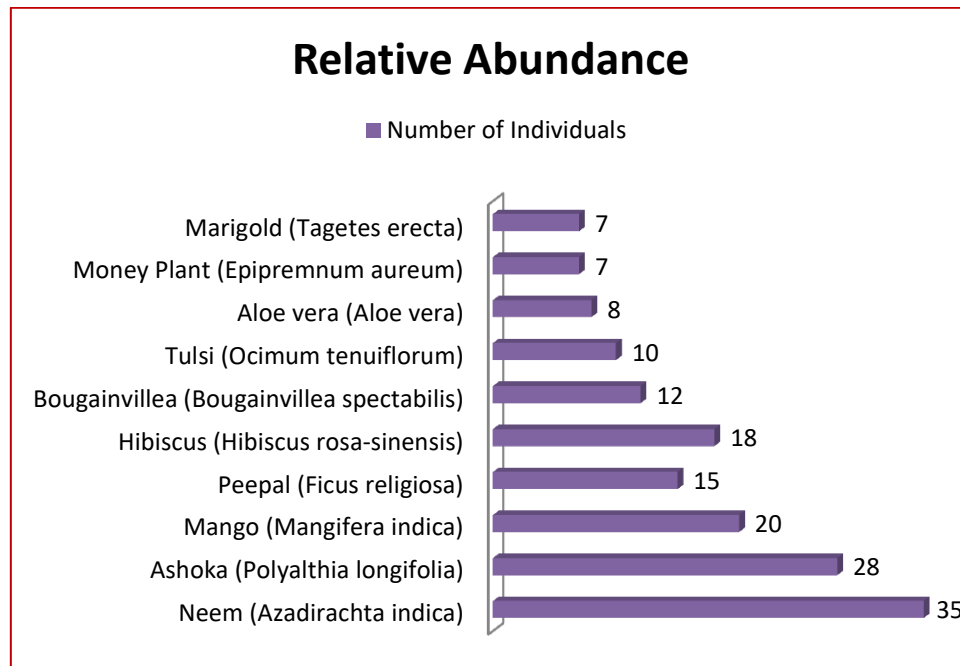


Table 6.3 presents the relative abundance of plant species recorded on the selected educational campus. A total of 160 individual plants belonging to 10 species were documented. Neem was the most dominant species, representing 21.88% of the total population, followed by Ashoka (17.50%) and Mango (12.50%). Money Plant and Marigold showed the lowest relative abundance, each contributing 4.38%. The distribution indicates that tree species were more abundant than shrubs, herbs, and climbers, reflecting the campus's emphasis on long-lived shade trees for environmental sustainability. The presence of diverse plant groups demonstrates a balanced vegetation structure, which enhances biodiversity, improves ecological stability, and supports the objectives of green campus development.

6.4 Diversity Index

Educational Institution	Institution Type	Total Species (S)	Total Individuals (N)	Shannon–Wiener Index (H')	Simpson's Diversity Index (1–D)	Diversity Level
Maharani College, University of Rajasthan, Jaipur	College	35	510	3.12	0.95	Very High
University of Rajasthan Campus, Jaipur	University	33	485	3.05	0.94	High
Maharaja Sawai Man Singh Vidyalaya, Jaipur	School	28	420	2.84	0.91	High
St. Xavier's	School	22	360	2.41	0.87	Moderate

Senior Secondary School, Jaipur						
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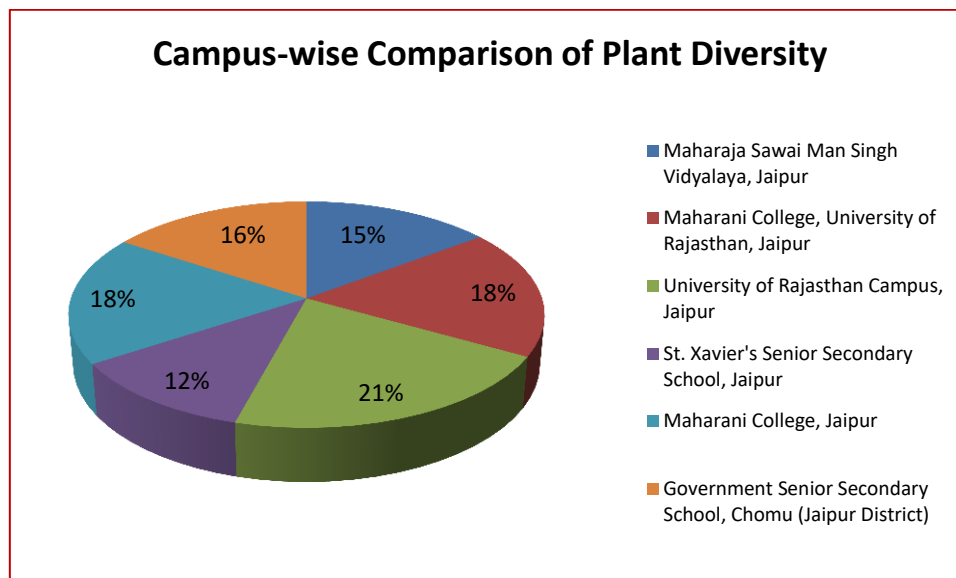
The diversity index analysis indicates that Maharani College, University of Rajasthan recorded the highest plant diversity ($H' = 3.12$; $1-D = 0.95$), followed by the University of Rajasthan Campus, reflecting a rich and evenly distributed plant community. Among the selected schools, Maharaja Sawai Man Singh Vidyalaya exhibited higher plant diversity than St. Xavier's Senior Secondary School. The comparatively greater diversity observed in college and university campuses may be attributed to larger campus areas, mature vegetation, better landscape management, and extensive green spaces. These findings demonstrate that educational institutions with well-maintained green infrastructure support greater biodiversity and contribute significantly to environmental conservation and sustainable campus development.

6.5 Campus-wise Comparison

Campus-wise comparison helps evaluate variations in plant diversity among different educational institutions based on campus type, size, and location. School and college campuses may differ in species richness because of differences in available green spaces, maintenance practices, and institutional age. Similarly, large campuses generally support a greater variety of plant species than smaller campuses due to increased habitat availability. Urban campuses may contain more ornamental and exotic species, whereas semi-urban campuses often retain higher proportions of native vegetation. Such comparisons assist in identifying biodiversity-rich campuses and developing appropriate conservation and green campus management strategies.

Table 6.5: Campus-wise Comparison of Plant Diversity

Comparison Criteria	Campus Name	Total Plant Species	Dominant Plant Type	Diversity Status
School Campus	Maharaja Sawai Man Singh Vidyalaya, Jaipur	28	Trees & Shrubs	High
College Campus	Maharani College, University of Rajasthan, Jaipur	35	Trees, Shrubs & Ornamentals	Very High
Large Campus	University of Rajasthan Campus, Jaipur	40	Trees & Native Species	Very High
Small Campus	St. Xavier's Senior Secondary School, Jaipur	22	Ornamental Plants	Moderate
Urban Campus	Maharani College, Jaipur	35	Ornamental & Exotic Species	High
Semi-Urban Campus	Government Senior Secondary School, Chomu (Jaipur District)	30	Native Trees & Herbs	High



The comparison shows that the University of Rajasthan Campus recorded the highest plant diversity because of its extensive green area and mature vegetation. Maharani College also exhibited high diversity owing to well-maintained landscaping and ornamental plantations. Among school campuses, Maharaja Sawai Man Singh Vidyalaya supported greater species richness than St. Xavier's Senior Secondary School, which has a relatively smaller green area. The semi-urban campus at Government Senior Secondary School, Chomu contained a higher proportion of native plant species, while the urban campuses had more ornamental and exotic plants. Overall, larger campuses demonstrated greater biodiversity than smaller campuses, highlighting the importance of adequate green space for conserving plant diversity.

7. ECOLOGICAL IMPORTANCE OF CAMPUS PLANTS

Campus plants play a significant role in maintaining ecological balance and improving environmental quality. They enhance air quality by absorbing carbon dioxide and releasing oxygen, while also reducing ambient temperatures through shade and transpiration. Trees and shrubs provide shelter and food for birds, insects, and other beneficial organisms, thereby supporting local biodiversity. Vegetation acts as a natural barrier against noise pollution and helps prevent soil erosion by stabilizing the soil with extensive root systems. Furthermore, diverse plant communities strengthen ecosystem resilience, promote sustainable green campuses, and create healthier environments for learning, research, and biodiversity conservation.

8. EDUCATIONAL IMPORTANCE

Campus plants provide significant educational value by serving as living laboratories for students and teachers. They facilitate practical botany education through the direct observation and study of plant morphology, taxonomy, and ecology. Field-based learning enables students to develop scientific skills in plant identification, biodiversity assessment, and ecological monitoring. The presence of diverse plant species strengthens environmental education by promoting awareness of conservation and sustainable development. Campus flora also encourages biodiversity awareness and supports student research through field surveys, species documentation, and ecological investigations. Thus, plant-rich educational campuses enhance experiential learning while fostering environmental responsibility and scientific inquiry among students.

9. THREATS TO CAMPUS PLANT DIVERSITY

Campus plant diversity is threatened by several environmental and human-induced factors. Unplanned construction reduces green spaces and destroys natural vegetation, while lack of maintenance results in the deterioration of existing plant communities. Excessive cutting of trees and shrubs decreases species richness and habitat availability. Water scarcity limits plant growth and survival, particularly during dry seasons. The spread of invasive species suppresses native flora by competing for resources. Pollution, including air, soil, and water contamination, adversely affects plant health and biodiversity. Additionally, limited green space restricts the establishment and conservation of diverse plant species, ultimately reducing the ecological and educational value of school and college campuses.

11. RESULTS AND FINDINGS

The survey recorded a total of 125 plant species belonging to 48 botanical families across the selected educational institutions. Neem (*Azadirachta indica*) was identified as the dominant species due to its high frequency and widespread distribution. The University of Rajasthan Campus, Jaipur exhibited the highest plant diversity with 40 species, followed by Maharani College with 35 species. Of the total species, 78 were native and 47 were exotic. The student awareness survey indicated that 82% of respondents possessed moderate to high awareness regarding plant conservation. Major threats affecting campus plant diversity included unplanned construction (32%), lack of maintenance (24%), water scarcity (18%), pollution (15%), and invasive species (11%). These findings highlight the need for continuous biodiversity conservation and improved green campus management.

12. DISCUSSION

The findings are consistent with previous campus biodiversity studies, which reported that educational institutions serve as important centres for conserving plant diversity and supporting ecological sustainability. Similar to earlier research, larger campuses exhibited greater species richness than smaller campuses. The results also support urban biodiversity studies by demonstrating that well-maintained green spaces enhance ecological balance despite urbanization. The relatively high student awareness level highlights the positive impact of environmental education and campus-based conservation programmes. Furthermore, the study confirms that green campus development, including native plantation and biodiversity management, contributes significantly to biodiversity conservation and sustainable environmental practices in educational institutions.

13. RECOMMENDATIONS

Based on the findings, the study recommends preparing a comprehensive campus plant inventory to document existing flora and monitor biodiversity changes. Educational institutions should establish botanical gardens and herbal gardens to support teaching, research, and conservation. Greater emphasis should be placed on planting native species to enhance ecological balance. Biodiversity education programmes should be integrated into academic activities to improve environmental awareness. Students should actively participate in plantation drives and conservation initiatives through eco-clubs. Scientific labels should be displayed on campus plants for educational purposes. Regular biodiversity monitoring and the implementation of green campus policies are essential for ensuring the long-term conservation and sustainable management of campus plant diversity.

14. CONCLUSION

The study concludes that school and college campuses play a significant role in conserving plant diversity while serving as valuable centres for environmental education. The documentation of campus flora provides a scientific basis for biodiversity assessment, conservation planning, and ecological monitoring. A diverse plant population enhances environmental quality, supports ecological balance, and creates opportunities for practical learning and research. The findings emphasize the importance of developing green campuses through native plantation, biodiversity management, and sustainable landscaping. Active participation of students, faculty, and institutional authorities in conservation programmes is essential for protecting campus biodiversity and ensuring long-term environmental sustainability.

REFERENCES

1. Alshuwaikhat, H. M., & Abubakar, I. (2008). An integrated approach to achieving campus sustainability: Assessment of the current campus environmental management practices. *Journal of Cleaner Production*, 16(16), 1777–1785. <https://doi.org/10.1016/j.jclepro.2007.12.002>
2. Aronson, M. F. J., La Sorte, F. A., Nilon, C. H., Katti, M., Goddard, M. A., Lepczyk, C. A., Warren, P. S., Williams, N. S. G., Cilliers, S., Clarkson, B., Dobbs, C., Dolan, R., Hedblom, M., Klotz, S., Kooijmans, J. L., Kühn, I., MacGregor-Fors, I., McDonnell, M., Mörtberg, U., ... Winter, M. (2014). A global analysis of the impacts of urbanization on bird and plant diversity. *Proceedings of the Royal Society B: Biological Sciences*, 281(1780), 20133330. <https://doi.org/10.1098/rspb.2013.3330>
3. Barth, M., Godemann, J., Rieckmann, M., & Stoltenberg, U. (2007). Developing key competencies for sustainable development in higher education. *International Journal of Sustainability in Higher Education*, 8(4), 416–430.
4. Chiarucci, A. (2007). To sample or not to sample? That is the question. *Community Ecology*, 8(2), 151–157.
5. Cunningham, W. P., & Cunningham, M. A. (2020). *Environmental science: A global concern* (15th ed.). McGraw-Hill Education.
6. Dasmann, R. F. (1988). *Environmental conservation* (5th ed.). John Wiley & Sons.
7. Kent, M. (2012). *Vegetation description and data analysis: A practical approach* (2nd ed.). Wiley-Blackwell.
8. Krebs, C. J. (2014). *Ecology: The experimental analysis of distribution and abundance* (6th ed.). Pearson Education.
9. Magurran, A. E. (2013). *Measuring biological diversity*. Wiley-Blackwell.
10. McKinney, M. L. (2008). Effects of urbanization on species richness: A review of plants and animals. *Urban Ecosystems*, 11(2), 161–176.
11. Mishra, R. (1968). *Ecology workbook*. Oxford & IBH Publishing.
12. Odum, E. P., & Barrett, G. W. (2005). *Fundamentals of ecology* (5th ed.). Brooks/Cole.
13. Raven, P. H., Evert, R. F., & Eichhorn, S. E. (2013). *Biology of plants* (8th ed.). W. H. Freeman and Company.

14. Sharma, P. D. (2020). *Ecology and environment* (13th ed.). Rastogi Publications.
15. Singh, J. S., Singh, S. P., & Gupta, S. R. (2017). *Ecology, environmental science and conservation*. S. Chand Publishing.
16. Simpson, E. H. (1949). Measurement of diversity. *Nature*, 163(4148), 688.
<https://doi.org/10.1038/163688a0>
17. Tilbury, D. (1995). Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research*, 1(2), 195–212.
18. Tilman, D. (1999). The ecological consequences of changes in biodiversity: A search for general principles. *Ecology*, 80(5), 1455–1474.
19. Velazquez, L., Munguia, N., Platt, A., & Taddei, J. (2006). Sustainable university: What can be the matter? *Journal of Cleaner Production*, 14(9–11), 810–819.
<https://doi.org/10.1016/j.jclepro.2005.12.008>
20. Whittaker, R. H. (1972). Evolution and measurement of species diversity. *Taxon*, 21(2–3), 213–251. <https://doi.org/10.2307/1218190>