ASSESSMENT OF PLANT BIODIVERSITY IN BANKURA SAMMILANI COLLEGE CAMPUS, BANKURA, WEST BENGAL, INDIA

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Abstract

The present study, conducted at Bankura Sammilani College campus in Bankura, West Bengal, focused on identifying and documenting the plant diversity of the area. A total of 72 plant species were recorded. Among these, dicots were represented by 33 families, 58 genera, and 63 species. Monocots accounted for 5 families, 5 genera, and 5 species. Additionally, gymnosperms were represented by 2 families, 2 genera, and 2 species, and pteridophytes by 2 families and 2 genera. The dominating families in terms of representation were Euphorbiaceae, Asteraceae, Malvaceae, and Rubiaceae. Other families like Poaceae, Caesalpiniaceae, Amaranthaceae, and Mimosaceae were also dominant with many species. In the Botany department, ex-situ conservation of plants like *Cycas*, *Zamia*, and the aquatic plant *Hydrilla* has been undertaken. Through an annual Plantation program, new species of plants are cultivated and added to the campus every year.

Keywords: Biodiversity, flora, Bankura Sammilani College, Monitoring, Survey

Introduction

Phyto-diversity is the most important feature, which plays a significant role in the complexity of natural ecosystems**[**1, 2, 3**].**Therefore, various aspects of plants are essential for health, economic value, sustainable utility, conservation, floral evaluation and documentation. Biodiversity provides us with medicinal plants and other natural resources. It helps in regulating the environment.It also helps maintain the balance of these ecosystems and protect us from environmental risks.

Understanding the plant diversity on campus promotes awareness about conservation and importance of preserving local flora**[**4**]**. In addition, documenting Phyto-diversity supports learning and research opportunities for students in botany, ecology, and envioronmental sciences. In addition, knowing the plant species on campus helps in better management of green spaces, landscaping and maintaining ecological balance.

In this scenario, the present study has been undertaken to understand the Phytodiversity of our college campus which contribute to assess overall biodiversity of the area. From the perusal of literature, it was found that till date there was no published reports regarding phytodiversity of

any local areas of Bankura town. Though there were some scattered reports on ethnomedicinal plants have been found from the found from the districts as well as from West Bengal **[**5, 6, 7, 8, 9].

Material and methods

The study was carried out over the course of a year, from January to December 2022. For this survey, data gather for the entire season and this was carried out once a week. Throughout this investigation, a wide variety of plants, shrubs, trees, climbers, and lianas were seen. Plant specimens were collected and dried and mounted on herbarium sheets **[10]**.Collect the information of plants which is necessary for identification and make documentation of plant information with botanical name and families.There is a very small medicinal garden in our campus. Many important medicinal plants and some important gymnosperms are also conserved here in the form of ex-situ conservation. Some important medicinal plants were also found in campus these plants were categorized into different groupsbased on medicinal uses.The specimens were identified with the help of published flora [11, 12,13,14].

Minimum size and minimum number of quadrates were determined by the species area curve method **[**Oosting, 1958**]**. Quantitative studies were conducted in different plots on the college campusStructural parameters like frequency, density and basal area have been calculated following standard methods **[**Curtis and McIntosh 1950**]**. The size of the plots 5 m×5 m for shrubs, climbers, twiners and 1m × 1m for herbs and seedlings. To determine the vegetation structure, analytical characters such as frequency, density, basal area and importance value index (IVI) were computed for each plant species (tree, shrub, climber & herb).Importance value index was calculated by summing up of the values of relative frequency, relative density and relative dominance **[**1, 3].

Importance Value Index (IVI) and diversity index are calculated by -

Importance Value Index (IVI) = Sum of relative density + relative frequency + relative dominance.

Geography of the College campus

The study site Bankura Sammilani College, established on the 1st of September, 1948 by the Bankura Sammilani Registered Society, a Social Service Organization, with the noble & prudent vision of propagating higher education among the people of Bankura and neighboring districts.The campus is situated in the heart of Bankura town, encompassed by the rivers Dwarakeshwar and Gandheswari. The campus is adjacent to Bankura Sammilani Medical College in the South Western. The GPS location of Bankura Sammilani College is 23.2354^{0} N and 87.0477^{0} E.

Results and Discussion

Altogether 72 different plant species have been recorded from the college campus.Recorded 72 species belong to 33 dicot families, and 58 genera, and 63 dicot species. Monocotsare represented by 5 families, 5 genera, and 5 species. Gymnosperm is represented by 2 families, 2 genera, and 2 species. Bryophytes and Pteridophytes also recorded with 2 families, 2 genera and 2 species (Table 1).

Dominating families in a particular area indicates that the, those families might have a greater number of species or more individuals compared to other families in the area. Dominant families often contribute substantially to the structure and function of the ecosystem. In our college campus domination families are, Euphorbiaceae (18.88%), Asteraceae(18.88%), Malvaceae(9.09%), and Rubiaceae(9.09%). Only two species were recorded from gymnosperm, (Table 4, Fig 3).

Naturally grown species typically establish and growon their own without intentionalhuman plantation or cultivation. Among these 72 species,40 species were naturally grown in the college campus,and 33 plant species were planted and maintained in the campus (Table 2, Fig1).

Among these 72 plant species,33 species have been planted in the herbal garden of the Botany department meaning one kind of ex-situ conservation has been done. Some of the species such as *Cycas circinalis* (Cycadaceae),*Zamia pygmaea* (Zamiaceae), *Morus alba* (Moraceae), *Araucaria Araucana* (Araucariaceae), etc.

Among these 72 recorded species, many plants have potent medicinal value and are used as medicinal plants by the local and tribal people of the districtPradhan, 2023; Pradhan and Mukherjee, 2020**)**. Such important medicinal species are *Hemidesmus indicus*, *Aristolochia indica, Bacopa monnerii, Paederia scandens*, etc.

Importance value index is often calculated based on parameters like relative density, relative frequency, and relative dominance of a species. High IVF value indicates that the species might play a significant role in the ecosystem. In addition, it also indicates the species might be more dominant and widespread in the area. Low IVI value of any species indicates that, the species might play a lesser role in ecosystem and the species is limited in distribution in the area. Here, in this study, it was found that *Sida cordata* recorded with highest IVI value (13.8) and *Scoparia dulcis* recorded with lowest IVI value (2.73) among herbs. From the shrub layer, it was found that *Justicia adhatoda* recorded with highest IVI value (27.49) and *Clitoria ternatea* (6.89)with the lowest IVI value.

Conclusion

Although the college campus is diverse, more plantations are needed to boost ecological balance and aesthetic value. More greenery can improve air quality, provide shade. so, our target will be more plantations for a better environment.

Acknowledgement

We are very much thankful to our TIC sir, Dr. Swapan Mukhapadhya and our ex-Principal sir, Dr. Samir Kumar Mukherjee for giving us permission and helping us during our studies.

Table 1- List of Plant species along with Scientific name, Family, Habit, and frequency in the college campus

Sl. No	Species name	Local name	Family	Habit	Status in the Campus
1.	*Acalypha indica*L.	Muktajhuri	Euphorbiaceae	Herb	Wild, freequent
2.	*Aervasanguinolenta*(L.) Blume	Bishalyakarani	Amaranthaceae	Herb	Planted, rare
3.	*Agave* sp.	Ban keora	Asparagaceae	Herb	Planted
4.	*Amaranthus viridis*L.	Note	Amaranthaceae	Herb	Wild, freequent
5.	*Andrographis paniculata*(Burm.f.) Nees	Kalmegh	Acanthaceae	Herb	Wild, freequent
6.	*Araucaria Araucana* (Molina) K Koch	Christmas tree	Araucariaceae	Tree	Planted
7.	*Aristolochia indica*L.	Iswarmul	Aristolochiaceae	Climber	Planted
8.	*Bacopa monnerii*(L.)Pennel	Bramhi	Scrophulariaceae	Herb	Planted
9.	*Blumea lacera*(Burm.f.) DC	Kukursunga	Asteraceae	Herb	Wild
10	*Bougainvillea sp*	Kagajful	Nyctaginaceae	Shrub	Planted
11	*Kalancho pinnata*(Lam.) Pes	Patharkuchi	Crassulaceae	Herb	Planted
12	*Cholorphytum* sp.	Safed musli	Asparagaceae	Herb	Planted
13	*Cleome rutidosperma*DC.	Hurhuria	Cleomaceae	Herb	Wild
14	*Cleome viscosa*L.	Hurhuria	Cleomaceae	Herb	Wild
15	*Clerodendrum indicum*(L.)Kuntze	Ghentu	Verbanaceae	Shrub	Planted
16	*Clitoria ternatea*L.	Aparajita	Fabaceae	Climber	Planted
17	*Coccinia grandis* (L.) Voigt	Kundri	Cucurbitaceae	Climber	Wild
18	*Commelina benghalensis* L.	Kansira	Commelinaceae	Herb	Wild

19.	*Curcuma longa*L.	Halid	Zingiberaceae	Herb	Planted
20.	*Cycas circinalis*L.	Cycas	Cycadaceae	Tree	Planted
21.	*Dalhia pinnata* Cav.	Dalhia	Asteraceae	Herb	Planted
22.	*Datura metel*L.	Dhutra	Apocynaceae	Shrub	Planted
23.	*Dentella repens*(L.) J.R. Forst. & G. Forst.	Duranta	Rubiaceae	Herb	Wild
24.	*Chrysalidocarpus lutescens*Wendland	Bahari Palm	Arecaceae	Tree	Planted
25.	*Dryopteris affinis*(Low) Fraser-Jenk	Fern	Dryopteridaceae	Herb	Wild
26.	*Eclipta prostrata*(L.) L.	Kesut	Asteraceae	Herb	Wild
27.	*Euphorbia hirta*L.	Khoedoe	Euphorbiaceae	Herb	Wild
28.	*Euphorbia milii*Des Moul.	Mili	Euphorbiaceae	Shrub	Planted
29.	*Euphorbia pulcherema*Willd.ex Klotzsch	Lal pata	Euphorbiaceae	Herb	Wild
30.	*Euphorbia thymifolia*L.	Chota dodhi	Euphorbiaceae	Herb	Wild
31.	*Gnaphalium indicum*L.	Dholi	Asteraceae	Herb	Wild
32.	*Heliotropium indicum*L.	Hatisur	Boraginaceae	Herb	Wild
33.	*Hemidesmus indicus*(L.) R.Br.	Anantamul	Asclepiadaceae	Climber	Planted
34.	*Hibiscus rosa-sinensis*L.	Joba	Malvaceae	Shrub	Planted
35.	*Justicia adhatoda*L.	Basok	Acanthaceae	Under Shrub	Wild
36.	*Justicia gendarussa*Burm.f	Bishalyakarani	Acanthaceae	Shrub	Planted
37.	*Leonurus sibiricus*L.	Shibjhul	Scrophulariaceae	Herb	Wild
38.	*Melilotus albus* Medik	Ban methi	Fabaceae	Herb	Wild
39.	*Mimosa pudica*L.	Lajjabati	Mimosaceae	Herb	Wild
40.	*Mimusops elengi*L.	Bakul	Sapotaceae	Tree	Planted
41.	*Mirabilis jalapa* L.	Sandhamani	Nyctaginaceae	Herb	Planted
42.	*Morus alba*L.	Tunt	Moraceae	Tree	Planted
43.	*Mollugo spergula*L.	Gimasak	Molluginaceae	Herb	Wild
44.	*Ocimum tenuiflorum*L.	Tulsi	Labiatae	Herb	Wild
45.	*Oldenlandia corymbosa* L.	Khetpapara	Rubiaceae	Herb	Wild
46.	*Oxalis corniculate* L.	Amrul	Oxalidaceae	Herb	Wild
47.	*Paederia foetida*L.	Gandhal	Rubiaceae	Climber	Wild
48.	*Paperomia pellucida*(L.) Kunth	Lochipata	Piperaceae	Herb	Wild
49.	*Parthenium*	Gajar ghas	Asteraceae	Herb	Wild

	*histerophorus*L.				
50.	*Phyllanthus fraternus*G.L. Webster	Bhui amla	Euphobiaceae	Herb	Wild
51.	*Pillea macrophylla* (L.) Liebm	Lata marich	Urticaceae	Herb	Wild
52.	*Polyalthia longifolia*(Sonn.) Thwaites	Debdaru	Annonaceae	Tree	Planted
53.	*Pouzolziazeylanica* (L.) Benn.	Kullaruki	Urticaceae	Herb	Planted
54.	*Pterislongifolia*L.	Fern	Pteridaceae	Herb	Wild
55.	*Rhoeospathacea*	Batobitashak	Commelinaceae	Herb	Planted
56.	*Salvia* sp.	Salvia	Labiatae	Herb	Planted
57.	*Scoparia dulcis*L.	Bon dhoney	Scrophulariaceae	Herb	Wild
58.	*Sida cordata*(Burm.f.) Borssum	Berela	Malvaceae	Herb	Wild
59.	*Sida cordifolia*L.	Berela	Malvaceae	Herb	Wild
60.	*Solanum nigrum*L.	Kakmachi	Solanaceae	Herb	Wild
61.	*Swetinea mahagoni*	Mehuguni	Meliaceae	Tree	Planted
62.	*Synedrella nodiflora*(L.) Gaertn	Relandi	Asteraceae	Herb	Wild
63.	*Tabernaemontana divaricata*(L.)R.Br.ex Roem & Schult.	Pati tagar	Apocynaceae	Shrub	Planted
64.	*Tinospora cordifolia*(Thunb.) Miers	Gulanch	Menispermaceae	Climber	Wild
65.	*Trianthemaprotulacastrum* L.	Gadabani	Aizoaceae	Herb	Wild
66.	*Tridax procumbens*L.	Tridakha	Asteraceae	Herb	Wild
67.	*Zingiber officinale* Roscoe	Chittaratha	Zingiberaceae	Herb	Planted
68.	*Zamiapygmaea*Sims	Not known	Zamiaceae	Herb	Planted
69.	*Hydrilla verticillata*(L.f.) Royle	Jhangi	Hydrocharitaceae	Herb	Planted
70.	*Typhonium trilobatum*Schott	Kharkol	Araceae	Herb	Wild
71.	*Tecoma stans* (L.) Juss. Ex Kunth	Chandraprabha	Bignoniaceae	Tree	Planted
72.	*Mikenia micrantha*Kunth	Japanilot	Asteraceae	Climber	Wild

Table 2 - Status of plant species in the College campus

Status of plants	Percentage(%)
Wild	54.28
Planted	45.71

Fig.1 Graphical presentation of the status of plant species

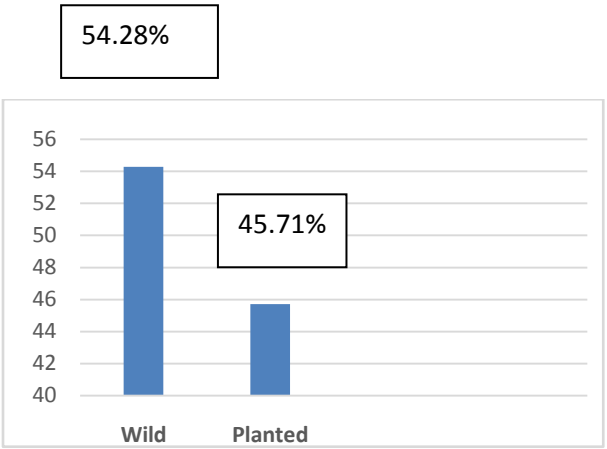

Table 3. Distribution of plants across the various life forms

Habit	Number	Percentage (%)
Herb	49	68.05
Shrub	8	16.32
Climber	7	14.28
Tree	8	16.32

Fig. 2 Graphical presentation of plants across the various life forms

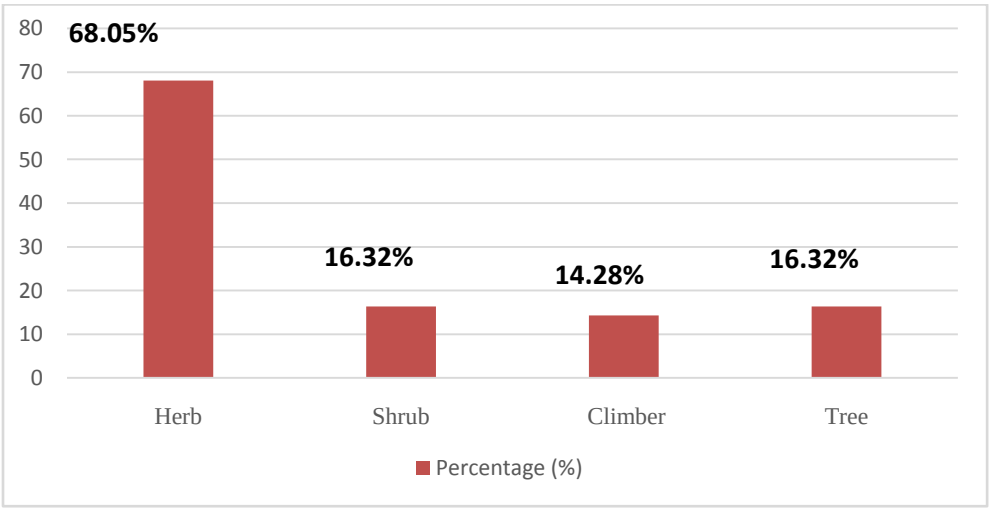

Table 4. Percentage composition of plant species belonging to different families

Families	Percentage(%)
Euphorbiaceae	18.88
Asteraceae	18.88
Malvaceae	9.09
Rubiaceae	9.09

Fig.3 Percentage composition of plant species belonging to different families

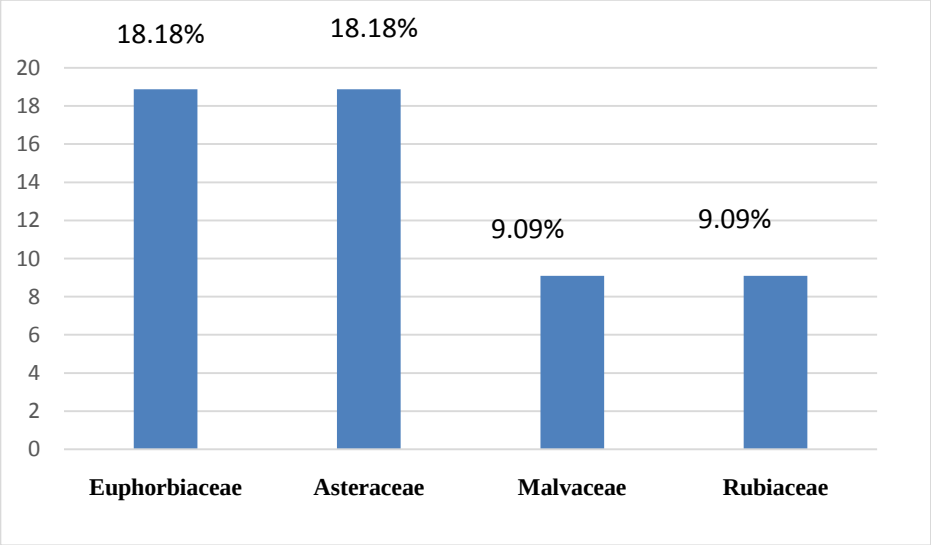

Table 5- Phytosociological analysis for the herb layer

Scientific name	**Relative abundance**	**Relative Density**	**Relative frequency**	**IVI**
Acalypha indica	3.01	3.58	3.70	**10.29**
Blumealacera	2.92	2.42	2.31	**7.65**
Scoparia dulcis	0.93	0.88	0.92	**2.73**
Sida cordata	4.42	4.46	4.92	**13.8**
Solanum nigrum	0.97	1.12	1.54	**3.63**
Andrographis paniculata	3.23	3.56	3.92	**10.71**
Ocimum sanctum	3.32	3.21	4.12	**10.65**
Oldenlandia cormbosa	1.93	1.95	1.87	**5.75**
Oxalis	1.65	1.62	1.89	**5.16**

corniculata				

Table 6- Phytosociological analysis for shrub and climber layer

Shrub and Climber	Relative abundance	Relative Density	Relative frequency	IVI
Clitoria ternatea	1.14	2.56	3.19	**6.89**
Coccinia indica	2.13	3.13	3.46	**8.72**
Commelina benghalensis	2.23	2.65	3.00	**7.88**
Tecoma stans	5.43	4.43	3.45	**13.31**
Justicia adhatoda	9.51	9.09	8.89	**27.49**
Justicia gendarussa	5.54	5.33	6.8	**17.67**

Conclusion

The college campus was chosen for this study to promote biodiversity conservation and protection from the grassroots level. Recognizing the importance of preserving biodiversity, this research emphasizes the need for continuous monitoring. The findings of this study will contribute to sustainable development, particularly in the face of rampant plant collection and exploitation. Furthermore, this research provides a comprehensive overview of the existing plant diversity in urban areas, with a focus on spermatophytes.

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Table 6.Photograph of Plant Conserved in our Botany Department (A – F)

A - *Cycas circinalis* (Cycadaceae), B-*Eclipta prostrate* (Asteraceae),C- *Catharanthus roseus*(Apocynaceae),D-*Morus alba*(Moraceae),E- *Hydrilla vercillata* (Hydrocharitaceae), F – *Zamia pygmaea* (Zamiaceae).