Preliminary Study on Angiospermic Flora of Lalgarh Government College Campus In West Bengal

Dr. Debabrata Das[1]
[1] Department of Botany
[1] Lalgarh Government College, Lalgarh, Jhargram-721 516, West Bengal, India

Abstract- *The present article reflects a compilation of floristic account available in a Government General Degree College Campus, Lalgarh in Jhargram District of West Bengal, India. The campus is newly designed and construction work is going on which started its journey since 2014 with faculties of Humanities though later on Bio-sciences introduced in the last year for academic session 2016-2017 with General degree courses affiliated to Vidyasagar University, Midnapore, West Bengal, India. The campus is scenic and harbours grassy cover admixed with a few tree species scattered here and there. Succession of pioneer stages changes the vegetation pattern hitherto to establish different floral elements by different means in the campus habitat. Now, a general study on floral composition has been encountered to know about the botany of plants in the said campus.*

Keywords- Lalgarh Government College campus- Floral composition-Botany.

I. INTRODUCTION

College campus flora is available in some cases though it is not complete in all cases, because of the fragility of the habitat excluding the conservational sites created artificially in and around the campus. But for general consideration, it is essential to know the plants or ecology available in the campus even to study the different aspects later on to know the altered condition in near future. In West Bengal, our area have a large number of Institutions including Universities like Kalyani University, Vidyasagar University and Indian Institute of Technology where floristic study have been done earlier by authors time to time (Ghosh and Dutta, 2000; Das and Ghosh, 1999; Das et al. 2002 and Anonymous, 2001). Ghosh et al. (1999) have done on campus flora of Raja Narendra Lal Khan Womens' College, Gope Palace Midnapore, to record the floral elements. Similarly, the present author has done campus flora of Jhargram Raj College (Das et al., 2009) and ecology of herbaceous vegetation of Darjeeling Govt. College campus (Das, 2017). In other areas over the country college campus flora were studied by some authors (Sharma and Malik, 2005; Dubey, 2017) time to time to record the floral elements but actually no proper records have been gathered. The recent study aims to get importance on Botany in and around the Lalgarh Govt. College campus (Fig. A) for enriching knowledge on Botany for students and other academicians interested in Botany. Therefore, the compilation is a treatise on taxonomy and some aspects on Botany in the campus flora for Lalgarh Govt. College Campus (Fig. B). The present study therefore obviously will reflect the study of landscape regionally but may be included later in global way or to incorporate the same in a global literature. The present investigation is therefore a preliminary study to docket species in a College campus under Jhargram District, West Bengal. In this study, 36 plant families have been placed under which 103 plant species was recorded. All plant species and the landscape have their great importance on ecological stand point in near future to develop the local environment eco-friendly.

When it comes to the planning which is the prominent step in the industry it helps in the defining the needs and the objectives and functional causes of the systems and supporting technologies, the planning is done by the consultants and the developers in the team association with the plant management and engineering and finance and operation departments. In order to improve the operational efficiency, the material handling it should be deployed with sturdy consistency and predictability.

II. MATERIALS AND METHODS

Survey of campus flora was started from July 2016 to till date with the help of our departmental students to gather knowledge based on the plants available locally in and around the locality, Lalgarh under earlier district Paschim Medinipur. Now, it is under Jhargram District of West Bengal State since 4th April, 2017. Previously it was under the Paschim Medinipur District of the same state that demarcated under the Community Development Block Binpur-I. During monsoon, winter and in summer regular field visits were conducted from Botany Department of the same College with the assistance of some students. The plant specimens were collected, carried out, and critically studied at laboratory for species identification. Phenological and ecological data were collected and record photographs were stored in hard disc device of computer. Floras, monographs, reference books and literature

were consulted available in our Library, library of Vidyasagar University, Midnapore to compare the data collected from field. Results on other studies, including study of soil and ecological parameters were recorded to know more about the flexibility of species in an ecosystem. Seasonal studies on propagules and vegetative growth of the plants were determined using photographic camera and measured in terms of day basis study. The similar study was also conducted from the basin of Kansai river (Fig. C) nearer to College campus which is 1/4th Km apart from the Department. To record the local names of plants, knowledge of local people, mainly people of Sankhakhula village were consulted. To study the succession, marked plots were used randomly in the area specified nearer to the college canteen. Seasonal pattern and phenology of plants have been made using floras published time to time including website of the different institutes. Overall collections on plant species was housed in departmental herbarium for ready reference and study for future generations.

III. RESULTS AND DISCUSSIONS

This campus includes 103 species under 85 genera and 36 families (Table 1). Family Poaceae (Graminae) showed highest number (12) of species in monocots while Fabaceae showed highest number (12) in dicots which present round the year. The campus has a least number of tree species than herbs than shrubs. The campus is newly constructed in which trees are mainly planted by College authority while some tree species are dispersed by natural and artificial means. Herbs are scattered here and there and dispersed by several means. A lees number of climbers are growing in the campus (Figure 41) but all are medicinal.

Table 1. Plants in Lalgarh Government College Campus of Jhargram District, West Bengal

Sl. No.	Scientific Name	Family	Plate No.
1	**Acathospermum hispidum DC.**	Asteraceae	
2	**Achyranthes aspera L.**	Amarantha ceae	
3	**Aeschynomene indica L.**	Fabaceae	
4	**Alstonia scholaris (L.) R. Br.**	Apocynace ae	
5	**Alternanthera sessilis (L.) R. Br. ex DC.**	Amarantha ceae	
6	**Alysicarpus vaginalis (L.) DC.**	Fabaceae	Fig. 17
7	**Amaranthus blitum L.**	Amarantha ceae	
8	**Amaranthus spinosus L.**	Amarantha ceae	
9	**Amaranthus viridis L.**	Amarantha ceae	Fig. 27
10	**Andrographis paniculta (Burm. f.) Wall. ex Ness**	Acanthacea e	
11	**Aristida adscensinoides**	Poaceae	
12	**Azadirachta indica J. Juss.**	Meliaceae	
13	**Bauhinia variegate L.**	Fabaceae	Fig. 40
14	**Biophytum sensitivum (L.) DC.**	Oxalidacea e	
15	**Blumea oxyodonta DC .**	Asteraceae	Fig. 13
16	**Bryophyllum calycinum Salisb.**	Crassulace ae	
17	**Calotropis gigantea (L.) Ait.**	Asclepiada ceae	
18	**Cassia alata L.**	Caesalpina ceae	Fig. 1
19	**Cassia occidentalis L.**	Caesalpinia ceae	
20	**Cassia tora L.**	Caesalpina ceae	
21	**Chloris barbata Sw.**	Poaceae	
22	**Chrozophora rottleri (Geiseler) A. Juss. ex Spreng.**	Euphorbiac eae	
23	**Chrysopogon aciculatus (Retz.) Trin.**	Poaceae	
24	**Cleome viscose L.**	Capparacea	

		e	
25	Coccinia grandis (L.) Voigt.	Cucurbitaceae	
26	Cocculus hirsutus (L.) Diels	Menispermaceae	
27	Commelina diffusa Burm. f.	Commelinaceae	
28	Corchorus aestuans L.	Tiliaceae	
29	Crotalaria pallid Aiton	Fabaceae	Fig. 33
30	Crotlaria prostrata Rottler ex Willd.	Fabaceae	Fig. 36
31	Croton bonplandianum Bail.	Euphorbiaceae	Fig. 10
32	Cryptolepis buchanani Roem. & Schult.	Asclepiadaceae	
33	Cynodon dactylon (L.) Pers.	Poaceae	Fig. 3
34	Cyperus rotundus L.	Cyperaceae	
35	Daemia extensa (Jacq.) R. Br. ex Schult.	Asclepiadaceae	Fig. 35
36	Dalbergia sissoo Miq.	Fabaceae	
37	Datura metel L.	Solanaceae	
38	Dentella repens (L.) J. R. Forst & G. Forst	Solanaceae	
39	Desmodium gangeticum (L.) DC.	Fabaceae	Fig. 21
40	Desmodium triflorum (L.) DC.	Fabacaea	Fig. 4
41	Desmostachya bipinnata (L.) Stapf	Poaceae	
42	Eclipta prostrate L.	Asteraceae	
43	Eleusine indica (L.) Gaertn.	Poaceae	
44	Eragrostis coarctata Stapf	Poaceae	
45	Eragrostis tenella (A. Rich.) Hochst. ex Steud.	Poaceae	
46	Eupatorium odoratum L.	Asteraceae	Fig. 14
47	Euphorbia hirta L.	Euphorbiaceae	Fig. 16
48	Euphorbia macrophlla Pax.	Euphorbiaceae	
49	Euphorbia microphylla Lam.	Euphorbiaceae	Fig 5
50	Evolvulus nummularius L.	Convolvulaceae	Fig. 2
51	Ficus benghalensis L.	Moraceae	
52	Ficus glomerata Roxb.	Moraceae	
53	Ficus hispida L. f.	Moraceae	
54	Flacourtia indica (Burm. f.) Merr.	Flacourtiaceae	
55	Gnephalium luteoalbum L.	Asteraceae	
56	Indigofera linifolia (L. f.) Retz.	Fabaceae	Fig. 8
57	Indigofera suffruticosa Mill.	Fabaceae	
58	Ipomoea aquatica Forsskal	Convolvulaceae	
59	Jatropha gossypifolia L.	Euphorbiaceae	Fig. 31
60	Kyllinga brevifolia Roth.	Cyperaceae	
61	Lantana camara L.	Verbenaceae	
62	Leucaena leucocephala (Lam.) de Wit.	Mimosaceae	
63	Lippia geminate Kunth	Verbenaceae	

64	Ludwigia adscendens (L.) Hara.	Onagraceae	
65	Mecardonia procumbens (Mill.) Small	Scrophulariaceae	
66	Melochia corchorifolia L.	Sterculiaceae	
67	Mikania micrantha Kunth.	Asteraceae	
68	Mimusops elengi	Sapoptaceae	
69	Morinda angustifolia Roxb.	Rubiaceae	
70	Moringa oleifera Lam	Moringiaceae	
71	Myrtacarpus verticillatus	Rubiaceae	
72	Ocimum americanum L.	Lamiaceae	
73	Oldenlandia affinis (R & S) DC.	Rubiaceae	
74	Oldenlandia corymbosa L.	Rubiaceae	
75	Oplesmenus burmannii (Retz.) P. Beauv.	Poaceae	Fig. 37
76	Oxalis corniculta L.	Oxalidaceae	
77	Peninsetum setaceum (Forssk.) Chiov.	Poaceae	
78	Phyllanthus simplex Retz.	Euphorbiaceae	
79	Physalis minima L.	Solanaceae	
80	Plumbago zeylanica L.	Plumbaginaceae	Fig. 39
81	Prosopis juliflora (Sw.) DC.	Mimosaceae	Fig. 9
82	*Saccharum spontaneum* L.	Poaceae	Fig. 18
83	Seteria glauca (L.) Beauv.	Poaceae	
84	Sida acuta Burm. f.	Malvaceae	Fig. 34
85	Sida rhomboidea Roxb.	Malvaceae	
86	Solanum nigrum L.	Solanaceae	
87	Solanum sisymbrifolium L.	Solanaceae	Fig. 22
88	Solanum xanthocarpum Schard & Wendl.	Solanaceae	Fig. 11
89	Spermacoce hispida L.	Rubiaceae	Fig. 15
90	Spilathesd acmella (L.) Murr.	Asteraceae	
91	Stephania japonica (Thunb.) Miers	Menispermaceae	
92	Streblus asper Lour.	Moraceae	
93	Swietenia macrophylla King	Meliaceae	Fig. 19
94	Tephrosia purpura (L.) Pers.	Fabaceae	Fig. 29
95	Tragia involucrate L.	Euphorbiaceae	Fig. 38
96	Tridax procumbens L.	Asteraceae	Fig. 7
97	Typhonium trilobatum (L.) Schott	Araceae	
98	Vachelia nilotica (L.) Hurter & Mabb.	Mimosaceae	Fig. 12
99	Vernonia cinerera (L.) Less.	Asteraceae	
100	Xanthium strumarium L.	Asteraceae	Fig. 23
101	Ziziphus jujuba Mill.	Rhamnaceae	
102	Ziziphus oenoplea (L.) Miller	Rhamnaceae	
103	Zornia diphylla (L.)	Fabaceae	

	Pers.		

PHOTOGRAPHS

Figure A. Back side of College campus (Aerial View), 2017

Figure B. Students and author in College campus during field, 2016

Figure C. Rice field near Kansai (Kanswabati) River aside the College

Figure 1. **Cassia alata**

Figure 2. **Evolvulus nummularious**

Figure 3. **Cynodon dactylon**

Figure 4. **Desmodium triflorum**

Figure 5. **Euphorbia microphylla**

Figure 6. **Calotropis gigantea**

Figure 7. **Tridax procumbens**

Figure 8. **Indigofera linifolia**

Figure 9. **Prosopis julifera**

Figure 10. **Croton bonplndianum**

Figure 11 **Solanum xanthocarpum**

Figure 12. **Acacia nilotica**

Figure 13. **Blumea lacera**

Figure 14. **Eupatorium odoratum**

Figure 15. **Spermacoce hispida**

Figure 16. **Euphorbia hirta**

Figure 17. **Alysicarpus vaginalis**

Figure 18 **Saccharum spontaneum**

Figure 19. **Swertenia macrophylla**

Figure 20 **Ricinus communis**

Figure 21. **Desmodium gangeticum**

Figure 22. **Solanum sisymbrifolium**

Figure 23. **Xanthium strumarium**

Figure 24. **Pterocarpus marsupium**

Figure 25. Unknown plant (No Flower)

Figure 26. **Cyperus rotundus**

Figure 27. **Amaranthus viridis**

Figure 28. **Mikania micrantha**

Figure 29. **Tephrosia purpurea**

Figure 30. **Coccinia cordifolia**

Figure 31. **Jatropha gossypifolia**

Figure 32. **Pedilanthus tithymeloides**

Figure 33. **Crotalaria pallida**

Figure 34. **Sida acuta**

Figure 35. **Daemia extensa**

Figure 36. **Crotlaria prostrata**

Figure 37. **Oplismenus burmannii**

Figure 38. **Tragia involucrata**

Figure 39. **Plumbago zeylanica**

Figure 40. **Bauhinia purpurea**

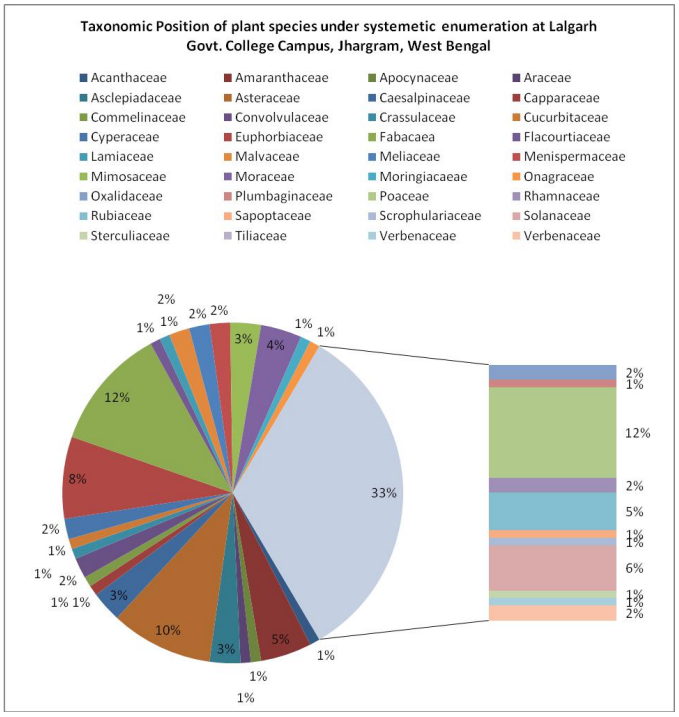

Figure 41. Position of plant Family

IV. CONCLUSION

The college campus is situated under Binpur-I community Development Block of Jhargram District. It situated nearer to Kanswabati River with a fantastic natural beauty. Some sacred groves are nearby. Forest of sal (Shorea robusta) dominated kind is distantly located. College campus is confined and nearby field is degraded land including rice field. So, it harbours a large number of herbs than shrubs. Tree species found here as a least number due to newly filled habitat which is changing under succession stages. Most of the tree species found here is planted while some are naturally settled down due to rapid seed dispersal mechanisms governed by wind and animals. Plants species like Acacia nilotica or Vachelia nilotica (Babla), Prosopis juliflora (Gue Babla), Leucaena leucocephala (subabul), Ziziphus jujuba (Kul), Ficus benghalensis (Bot) are very reluctant to settle here and there as these species have stress tolerance characters. Some species are planted one which change the College campus slowly either for beautification or to deploy shed thereby. Examples are Bauhinia (Kanchan), Mimusops (Bakul), Dalbergia (Sissoo), Sterculisa (Baksa Badam), Pterocarpus santalinum (Rakta Chandan) etc.1

REFERENCES

[1] Abasht, R. S., Singh, M. P. and Sharma, E. 1984. An environment study of soil and water conservation through herbaceous plants, National Academy of Science Letters, 6 (5): 143.

[2] Anonymous. 1997. Flora of West Bengal, Vol.-I , BSI, Kolkata, Flora of India, Series-2

[3] Anonymous. 2005. Medicinal Plant Resources of South West Bengal, Vol.-I, Research Wing, Directorate of Forests, Govt. of West Bengal.

[4] Anonymous. 2010. Medicinal Plant Resources of South West Bengal, Vol.-II, Research Wing, Directorate of Forests, Govt. of West Bengal.

[5] Bandyopadhyay, K. B. 2009. Amader Rajya (Bengali Version), Kishore Gyan Vigyan Prakashani, Spectrum Offset, Kolkata-37, pp. 76.

[6] Banerjee, L. K., Rao T. A., Sastry, A. R. K. and Ghosh, D. 2002. Diversity of the Coastal Plant communities in India. ENVIS & EMCBTAB, Botanical Survey of India, Kolkata.

[7] Basak R. K. and Guhabakshi, D. N. 1977. Floristic studies on the state of West Bengal: Present status and future strategies. Bull. Bot. Surv. India, 19 (14): 42-48.

[8] Bentham, G and Hooker, J. D (1862-1883). Genera Plantarum. London: Reeve & Co.1-3. Bestelmeyer, B.T., Trujillo, D.A., Tugel, A. J., and Havstad, K. M. 2006. A Multi-Scale classification of Vegetation dynamics in arid lands: What is the right scale for models, monitoring, and restoration?, Journal of Arid Environments, 65: 296-318.

[9] Bilgrami, K. S. 1919. The Living Ganga, Narendra Publishing House, Delhi.

[10] Das, A. A. and Das, D. 2016. Preliminary Studies on Common Birds of West Bengal with Special Reference to Vegetation Spectrum, India , IOSR-JESTFT, 10 (11): 12-34.

[11] Das, D and Das, A.A. 2016. New Destination to Kuldiha-an interesting Bird watching spot in West Bengal, India, IJSART, 3(2): 12-17.

[12] Das, D. 2017. Kansai basin flora at Lalgarh of Binpur-I Community Development Block in Jhargram sub-division of Paschim Medinipur District in West Bengal, India, IJSART, 3(2): 1-11

[13] Das, D. 2017. Flora of Kansai Basin at Lalgarh of Paschim Medinipur District in West Bengal with special reference to Eco-degradation in India, IOSR-JPBS, 12(1): 28-51

[14] Das, D. 2014. Community study of plants species in coastal areas of Mohana and old Digha of Purba Medinipur District with special reference to Eco-sustenance, Indian Journal of Applied and Pure Biology, 29 (2): 255-266.

[15] Das, D. 2009. Ecological status of plants in sacred groves of southwest Bengal (Midnapore, Bankura and Purulia District) of West Bengal, Final UGC-Project Report, 2009, PSW-160/06-07(ERO) dated 19.02.2007.

[16] Das, D. 2015. Final Project Report on 'Ecological studies of Vegetation in coastal areas of Purba Medinipur under stress for sustenance of life', UGC-Project report (No. PSW-087/11-12 (ERO), Kolkata, dated 23.04.2013.

[17] Das, D. 2016. Ecological Studies on Jhitka forest under Medinipur Forest Division, IJSART, 2(12): 296-302.

[18] Das, D. 2016. Eco-tourism and Eco-degradation in Darjeeling Himalaya, West Bengal, Abstract and Full Length Paper in a seminar-Variation and prospects of Eco-Tourism at Darjeeling and Dooars, 20th December, 2016, funded by Higher Education Department, Govt. of W.B., at Gorubathan Govt. College, Darjeeling.

[19] Dash, M.C. and Das, S.P. 2010. Fundamentals of Ecology, Third Edition, The McGrew-Hill Companies, Tata McGrew-Hill Education Private Limited, New Delhi., 2010, pp.1-562.

[20] De, D. K. 2002. Grass Flora of Medinipur District, Ph. D. Thesis, Vidyasagar University, West Bengal. 2002.

[21] Gripson, S. 2011. Restoration Ecology, Jones & Bartlett Learning, USA, pp-387.

[22] Groom, M. J., Mmeffe, G. K., Vcarroll, C. R. and Contributors. 2006. Principles of Conservation Biology, Third Edition, Sinauer Associates, Inc. Publishers, USA. pp.-793.

[23] Haines, H. H. (1921-25). The Botany of Bihar and Orissa, Vol. I-IV, BSI, Calcutta.

[24] Holland, M. M., Risser, P. G. and Naiman, R. J. 1991. Ecotones: The role of land scape boundaries in the

management and restoration of changing environments, Chapman & Hall., New Delhi.

[25]Hooker, J. D. 1892-1897. Hooker, J. D. Flora of British India, Vol. 1-VII, BSI, Calcutta.

[26]Jorgensen, S.E., Xu, fu-liu and Costanza, R. 2010. Hand Book of Ecological Indicators for Assessment of Ecosystem Health, Second Edition, CRC Press, New-York, pp.-484.

[27]Maji, S. and Sikdar, J. K. 1984. Sedges and grasses of Midnapore district, West Bengal. J Econ Taxon Bot. 4 (1): 233-254.

[28]Mishra, R. 1968. Ecology Work Book, Oxford and IBH Publishing Company, New Delhi.

[29]Mitsch, W.J. and Gosselink, J. G. 1993. The role of riparian corridors in maintaining regional Bio-diversity, Ecol. Appl. 3: 209-212.

[30]Popradit, A., Srisatit, T., Kiratiprayoon, S., Yoshimura, J., Ishida, A., Shiyomi, M., Murayama, T., Chantaranothai, P., Outtaranakorm, S; and Phromma, I. 2015. Anthropogenic effects on a tropical forest according to the distance from human Settlements, Scientific Reports, 5-14689: pp. 1-10 doi.: 10.1038/srep14689.

[31]Rao, T. A., Mukherjee, A. K., Banerjee, L. K. 1970. Vascular plants of the coastal Midnapur District, West Bengal, Indian For., 96 :668-677.

[32]Rao, R. R. and Sharma, B. D. 1990. A Manual for Herbarium Collections, BSI, Brabourne Road, 1990, Kolkata-1.

[33]Raunkiaer, C. 1934. The-life forms of plants and statistical plant Geography, Oxford University Press, Oxford.

[34]Gottschling, M., Miller, J. S., Weigened, M and Hilger, H.H. 2005. Congruence of a Phylogeny of Cordiaceae (Boraginaceae) inferred from ITS sequence Data with morphology, Ecology and Biogeography, Annals of the Missouri Botanical Garden, 92 (3): 425-437.

[35]Das, D. 2014. Singhabahini Sacred Grove A 1000 Years Old Sacred Grove Represents Nature Made Nursery of Forest Plants for Future Study, Int. J. Pure. App. Biosci, 2(5): 239-245.

[36]Bhakat, R. K. 2003. Socio religious and ecological perspectives of a sacred grove from Midnapore District, West Bengal, Science & Cult., 69: 371-374.

[37]Bennet, S.S.R. 1987. Name Changes in flowering plants of India and adjacent regions, Triseas Publishers, Dehra Dun, India.

[38]Cooke, T. 1908. The Flora of the Presidency of Bombay, Vol.-I, II, III, B.S.I., Calcutta.

[39]Curtis, J.T. 1959. The Vegetation of Wisconsin, University of Wisconsin Press, Madison, WI, pp. 657.

[40]Das, D. 2007. Vegetation Ecology of Forests of South West Bengal with special reference to Non Timber Forest Produce (NTFPs) Productivity, Ph. D Thesis awarded from Vidyasagar University, West Bengal (Work from CNH, Botanical Survey of India, Shibpore, Howrah, West Bengal).

[41]Das, D. and M. Das. 2014. Vegetation Ecology of Coastal belt of Khejuri area of Purba Medinipur District with special reference to Hijli Coast, West Bengal, India, IOSR-Jour of Pharmacy, 4(2): 2319-4219.

[42]Das, D.2014. Ecological Studies of Ecosystem Health Indicators at Nayagram of Paschim Medinipur District in Lateritic forests of Southwest Bengal, India; IOSR-JESTFT, 8(5/1): 1-17.

[43]Ghosh, P. and Das, D. 2014. Some medicinal Plants of Joypore forest Range of Bankura, West Bengal, India, Environment & Ecology, Kalyani, Nadia, W.B, 32(2): 465-470.

[44]Gadgil, M. and Vartak, V. D. 1975. Sacred groves of India-a plea for continued conservation, J. Bombay Nat. Hist. Soc., 72: 314-321.

[45]Ghosh, P. 2014. Preliminary studies on Ethno-botanically important Non Timber Forest Produces (NTFPs) in Jamboni Block of Paschim Medinipur District of West Bengal, IOSR-Journal of Pharmacy and Biological Sciences, 9 (5): 59-66.

[46]Muller-Dombois, D. and Ellenberg, H. 1974. Aims and methods of Vegetation Ecology, NY: Wiley and Sons.

[47]Margalef, R. 1958. Perspective in Ecological theory, University of Chicago Press.

[48]Mabberley, D. J. 1997. A Portable dictionary of the Vascular Plants, Cambridge University Press.

[49]Shannon, C. E and Wiener, W. 1963. The Mathematical theory of Communication, University Illinois Press, Urban.

[50]Oostings, H. J. 1956. The structure of plant communities, W. H Freeman Company., San Francisco, California, USA, pp.32-51.

[51]Pielou, E.C. 1966. Species Diversity and pattern diversity of in the study of Ecological; Succession, Jour. of theoretical Biology, 10: 370-383.

[52]Prain, D. 1903. Bengal Plants, Vol.-I, (Revised Edn, 1963), BSI, Calcutta.

[53]Prain, D. 1903. Bengal Plants, Vol.-II, (Revised Edn, 1963), BSI, Calcutta.

[54]Simpson, E. H. 1949. Measurement of Diversity, Nature, 163, pp. 688.

[55]Sorensen, T. A. 1948. Method of establishing Groups of equal amplitude in plant sociology based on similarity of species and its application to analyses of the vegetation on Danish commons, Kongelige Danske Videnskabemes Selskab, 5(4): 1-34.

[56]Vartak, V. D. and Kumbhojkar, M. S.1985. Notes on trees and lianas of some sacred groves in Western Maharashtra, Biovigyanam, 11: 214-215.

[57]Whittaker, R.H. 1972. Evolution and measurement of species diversity, Taxon, 21: 213-251.

[58]Das, D. 2017. Sacred groves and ecology in proposed Jhargram District of West Bengal, India, IJSART, 3(3): 221-229.

[59]Das, D. 2017. Phyto-sociological study of herbaceous vegetation of Darjeeling Govt. College Campus in West Bengal, India, India J. Applied & Pure Bio., 32(1): 101-104.

[60]Ghosh, P and Das, D. 2017. VAMF spore diversity of Jhitka Forest floor under proposed Jhargram District in West Bengal, India, IJSART, 3(2): 227-232.

[61]Ghosh, R. B and Das, D. 2000. A preliminary census and taxonomic survey of wild and cultivated Aroids of the District Midnapore, West Bengal, Indian J. Applied & Pure Bio. 15(2): 199-122.

[62]Ghosh, R. B and Das, D. 1998b. Seasonal distribution of the wall vegetation of Midnapore District, W. Bengal, Indian J. Applied & Pure Bio. 13(2): 107-113.

[63]Ghosh, R. B and Dutta, B. K. 2000. A Preliminary survey and taxonomic census of Rubiaceous taxa of the campus of Kalyani University, West Bengal, Indian J. Applied & Pure Bio. 15(2): 143-146.

[64]Das, D; Ghosh, R. B and Mishra, T. K. 2002. Biological spectrum of the vegetation in the Campus of Vidyasagar University, Midnapore, West Bengal, Vidyasagar University Journal of Biological Sciences, 8: 87-91.

[65]Das, D and R. B. Ghosh. 1999. A Preliminary survey and Taxonomic Census of flowering trees of angiosperms of the campus of Vidyasagar University, Midnapore, West Bengal, India, Indian J. Applied & Pure Bio. 14(1): 56-68.

[66]Ghosh, P. 2012. Studies on some ethno-botanically important plants of Jhargram Block, West Midnapore, West Bengal, Indian J. Applied & Pure Bio. 27(2): 195-197.

[67]Das, D and Ghosh, P. 2006. A Contribution to the medicinal plant diversity in the territory of Gopegarh heritage and Nature Eco-tourism centre, West Midnapore, W.B., Mahishadal Jour. of Biology, Purba Medinipur, 1: 30-33.

[68]Das, D. 2016. Eco-tourism and Eco-degradation with special reference to community study at coastal areas of Talsari and Udaipur areas of Balasore, Odisha, India, IJIRD, II (5th Yr.): 5-13

[69]Das, D; Das, M and Ghosh, P. 2009. Phytodiversity of Jhargram Raj College Campus and its vicinity with special reference to economically important plants, Indian J. Applied & Pure Bio. 24(2): 337-346.

[70]Ghosh, P and Das, D. 2014. Ethno-botanical use of plants

as living fence in and around Radhanagar village of Jhargram Block, Paschim Medinipur District, West Bengal, Indian J. Applied & Pure Bio. 29(2): 223-229.

[71]Sharma, S. C and Malik, S. A. 2005. A study on the flora of G. F. College campus, Shahjahanpur U.P (India), Indian J. Applied & Pure Bio. 15(2): 199-122.

[72]Das, D; Mishra, T. K. and Ghosh, R. B. 2004. Pendulous horticultural plants – A material for landscaping and beautification, Proceedings, Impact of Civilization on Environment, UGC Sponsored State level Seminar, 27th & 28th November, 2004, Jhargram Raj College & WBGCTA, at Jhargram Raj College, pp. 165-166.

[73]Saha, R; Das, D and De, R. P. 2004. Some plant bio-indicator species-A useful tool for environmental monitoring, UGC Sponsored State level Seminar, 27th & 28th November, 2004, pp. 159-161.

[74]Ali, S. I. 1980. The subspecies of Calotropis procera-Notes of Royal Botanical Garden, Edinburg, 38(2): 287-290.

[75]E-FLORA. 2015. Published on the internet. http://www.eflora.org. (Accessed 01 June, 2015) Missouri Botanical Garden, St. Louis, Mo & Harvard University Herbarium, Cambridge, MA).

[76]Gamble, J. S & C. E. C. Fisher. 1921. Flora of the Presidency of the Madras (Reprint). Vol-II, Bishen Singh Mahendra Pal Singh, Dehra Dun, India, 573-1346 p.

[77]Hooker, J. D. 1894. The Flora of British India, Vol. IV, Asclepiadaceae to Amaranthaceae, L. Reeve & Co. Ltd., London.

[78]Kader, S. A and Chellakumar, M. 2015. Calotropis (L.) R. Br. (Apocynaceae) Diversity, J. Econ. Taxon. Bot. Vol. 39 (2): 327-334.

[79]Kanjilal, U. N. 2005. Flora of Assam, Vol. III. Caprifoliaceae to Plantaginaceae, Omsons Publications, New Delhi, 578p.

[80]Patole, A. M. 2013. Study of illustrated key to the species of Genus Calotropis for easy Identification, Global Research Analysis, 2(2): 135-137.

[81]Quattrochi, U. 2012. CRC World Dictionary of Medicinal and Poisonous plants: Common Names, Scientific Names, Eponyms, Synonyms and Etymology, Vol. 5, CRC Press.

[82]Rahman, M. A and C. C. Wilcock. 1991. A taxonomic revision of Calotropis (Asclepiadaceae), Nordic Journal of Botany, 11: 301-308.

[83]Reshi, M. I; Chadhar, B. L. and Khere, P. K. 2017. Alien invasive plants of Central Indian Tropical Dry deciduous forests of Sagar District, Madhya Pradesh, India, Indian Forester, 143(2): 157-164.

[84]Suthari, S; Kandagetla, R; Ragan, A and Raju, S. 2016. Asteraceae in Telangana and residual Andhra Pradesh and possible ecological implications, Current Science, 110(7): 1337-1343.

[85]Anonymous. 2001. Floral Spectrum [Vegetation and Utility of IIT (Kharagpur) campus], Compiled and Presented by Mishra, T; Ghosh, J; Mandal, D; Maiti, S. K and Das, Debabrata, Centre for Natural Studies, published by Nehru Museum of Science and Technology, IIT, Kharagpur, pp 86.

[86]Anoymous, 2000. Prangan Bikshan, CNS, Midnapore, Giri Printers and Computer Centre, Abas, Midnapore, pp. 55

[87]Ghosh, R. B; Das, Debabrata and Hazra, R. 1999. Preliminary systematic census and taxonomic survey of Tree flora in Gope College campus, Midnapore, West Bengal, Indian J. Applied & Pure Bio. 14(1): 77-81.

[88]Anonymous. 1994. Indian Medicinal Plants-A compendium of 500 species: Arya Vidyasala, Orient Longman; Annasalai, Madras, Vol. I-V

[89]Rastogi, T. R and Mehrotra, B. N. 1995. Compendium of Indian Medicinal Plants, CDRI, Lucknow, Vol. I-IV

[90]Sanyal, M. N. 1991. A Handbook of Excursion Flora of the Gangetic Plains and Adjoining Hills, Mittal Publications, New Delhi-110059.

[91]Dubey, K. 2017. Biodiversity of cultivated plants in Khandwa Girls' College Campus, Indian J. Applied & Pure Bio. 32(1): 27-30.