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Floristic Composition of a Grassland Community of Gangraj in the District of Mayurbhanj, Odisha, India

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ABSTRACT

The floristic composition of a grassland community of Gangraj village was studied during June 2019 to December 2019, with a view to assess the phytodiversity of a grassland community of Mayurbhanj district in the state of Odisha. The experimental site is about 9 kms from North Orissa University and near about 4 kms from Baripada, the district head quarter of Mayurbhanj, Odisha. The climate of the locality was monsoonal with three distinct seasons i.e. summer (March to June), rainy (July to October) and winter (November to February). All the plant specimens encountered from the experimental grassland community were collected in flowering/fruiting stage and indentified taxonomically in consultation with various regional and national flora books. The community comprised of 23 species of which 9 species were grasses and 14 species were non-grasses. They belong to 9 families i.e. Asteraceae, Convolvulaceae, Cyperaceae, Fabaceae, Malvaceae, Onagraceae, Phyllanthaceae, Poaceae and Rubiaceae. Among them, the members of the family Poaceae showed high percentage contribution (39.13%) followed by Cyperaceae (13.04%), Asteraceae, Fabaceae, Malvaceae and Rubiaceae (8.69% each) whereas the rest three families i.e. Convolvulaceae, Onagraceae and Phyllanthaceae shared 4.35% each during the study period. This variation in floristic composition in the experimental site might be due to the topography, geographical distribution, soil characteristics, climatic conditions and biotic interference of the locality.

Keywords : Phytodiversity, Grassland, Community, Floristic.

I. INTRODUCTION

Man has been dependent on the grasses for food, fodder, shelter and medicines from the pre-historic times. Not only human population, but even the very survival of the animal kingdom is dependent on the grasses. Grassland communities supply food to livestock, provide oxygen to the surrounding,

maintain biodiversity, provide recreation, enhance soil fertility, prevent soil erosion, provide employment and contribute aesthetic beauty. Significant portions of the world's grasslands have been modified by grazing or tillage or have been converted to other purposes. The world's grasslands are now being change forcibly and it is a matter of concern for the scientists. The ecologists and environmentalists in both developed and developing countries are increasingly being engaged now-a-days to study the structure and function of various grassland communities with a view to conserve nature and for the betterment of human beings.

The population growth followed by human settlements, construction of roads and mega projects has chiefly affected the grasslands all over the world. Not only the grasslands, but also some forests are being cleared up day by day. Literature reviewed reveals a lot of work on grassland community in India and Abroad. Odum (1) studied on grassland in temperate region. Choudhury (2), Sant (3), Singh (4), Ambasht and Maurya (5) and Singh and Ambasht (6) studied the phytosociology, reproductive capacity and productivity in relation to ecological factor especially on grazing. Redmann (7) studied the productivity and distribution of grassland in West North Dakota. Misra and Misra (8) analyzed the biomass and primary productivity of Indian grassland. Tripathy (9) studied the effect of chipping and fertilization on the structure and function of a grassland community. Barik and Misra (10) studied the biological spectrum of grassland ecosystem of South Orissa. Ejrnaes and Bruun (11) assess the grassland vegetation in Denmark, whereas White et al.(12) analyzed the grassland ecosystem of Washington DC. The effect of grazing pressure on species richness, composition and productivity in north Adriatic Karst Pastures was studied by Skornik et al.(13). Loucougaray et al. (14) reported the grazing effects of horses and cattle on the diversity of coastal grasslands in western France. The origin and conservation stretergy of temperate European grassland was studied by Partel et al.(15). Tallowin et al. (16) analyzed impacts of grazing management on both species-rich and species-poor lowland neutral grassland. Batalha and Martins (17) studied the floristic composition and vegetation spectra of a Cerrado site. Ghani and Khalik (18) studied the floristic diversity and phyto geography of the Gebel Elba National park of South-East Egypt. Pytosociology and life form pattern of grazing lands under pine canopy in temperate zone of north-west Himalaya was carried out by Kukshal et al.(19). Mishra and Tiwari (20) studied the phytosociological characteristic of grassland ecosystem of Balrampur district of Uttar Pradesh. Ferreira et al. (21) analyzed the floristic and vegetation structure of a granitic grassland in southern Brazil. Kar et al. (22) worked on the floristic composition and biological spectrum of a grassland community of Rangamatia in the distirct of Mayurbhanj. Rahim et al. (23) analysed the phytosociology aspects of saline area of Tehsil Ferozewala, Pakistan. Pandey et al. (24) studied phytosociology of grassland in the vicinity of Pataratu Thermal Power, Hazaribagh, Jharkhand. The floristic study of Dadra and Nagar Haveli was carried out by Nair (25).

The primary productivity of a grassland community of Bilaspur district was studied by Baldau and Jaiswal (26). Dash and Barik (27) analyzed the net primary production of a grassland community of Mayurbhanj distirct. Barik et al. (28) reported the floral diversity of a grassland community of Similpal Biosphere Reserve. Rout and Barik (29) studied the above ground biomass of a grassland community of Bangriposi. Bhuyan and Barik (30) assess the floral diversity of a grassland community of Kaptipada forest range. Sahu and Barik (31) studied the life forms and biological spectrum of a grassland community of Similpal Biosphere Reserve. Mohanty and Barik (32) reported the floristic composition of a grassland community of Balasore district where as Barik and Barik (33) analyzed Biological spectrum of a

grassland community of Balasore district in Odisha. However, very little work has been done so far on the floral diversity of grassland community, especially in the north-east region of the state, Odisha. Keeping in view, an attempt has been made to study the floristic composition of a grassland community in this region.

The **aim and objectives** of this investigation is to find out the floristic composition of a grassland community of Gangraj in the district of Mayurbhanj, Odisha.

Study site and Environment: The experimental grassland was selected at (21˚58'37.8" N latitude and 86˚43'43.7" E longitude) situated at Gangraj, 9 kms away from the North Orissa University, Baripada in the district of Mayurbhanj, Odisha (Fig.-1).

Fig.- 1 Experimental site located at Gangraj in Odisha

The climate of the locality is predominantly monsoonal with three distinct seasons i.e. rainy (July to October), winter (November to February) and summer (March to June) The total precipitation during the year (Jan 2019 to Dec 2019) was 2086.6 mm of which 1194.6 mm was recorded during rainy season. The rainfall attained peak in August (322.4mm) and was minimum in December (16.8 mm). The monthly mean minimum and mean maximum atmospheric temperature ranged from 12.06˚C to 27.12˚C and 25˚C to 41.36˚C respectively (Table-1).

Table- 1. Mean minimum and mean maximum atmospheric temperature (^{0}C), number of rainy days and rainfall (mm) of the experimental site.

Month/ Year	Mean Min. Atmp. Temp (˚C)	Mean Max. Atmp. Temp (˚C)	No. of Rainy days	Rain fall (mm)
Jan-19	12.06	25.68	-	-
Feb-19	15.6	29.05	5	99
Mar-19	21.2	33	5	46
Apr-19	23.6	35.95	10	297.2
May-19	27.12	37.7	6	231
Jun-19	26.6	41.36	12	180
Jul-19	26.3	33.6	14	300.4
Aug-19	25.8	32.2	21	322.4
Sep-19	25.41	30.36	20	316.8
Oct-19	23.7	30.4	11	255
Nov-19	18.2	27.7	2	22
Dec-19	15	25	1	16.8
Total	**260.59**	**382.00**	**107**	**2086.6**

The soil of the experimental site was found to be strongly acidic (p^H < 5.0). The organic carbon (%), available phosphorus content and available potassium content (ppm) of the experimental site was very low. The available

potassium showed high in upper soil profile and gradually declined with the increase in soil depth whereas the phosphorous content revealed an inverse trend compared to potassium content of the soil (Table-2).

Table- 2 : The pH, organic carbon (%), available phosphorus and potassium content of the soil of the study site (values are mean of 5 samples each)

Surface depth (cm)	pH	Conductivity	Organic Carbon (%)	Available Phosphorus (ppm)	Available Potassium (ppm)
0 to 10	4.8	0.04	0.58	0.2	72
10 to 20	4.8	0.04	0.54	0.32	61
20 to 30	4.75	0.04	0.47	0.51	55

II. MATERIALS AND METHODS

The plant specimens preferably along with the reproductive parts were collected and brought to the laboratory for identification following Muller-Dombois and Ellenberg (34) and Jain and Rao (35). Identification of all the species were made in consultation with various Regional and National flora books i.e., The Botany of Bihar and Orissa by Haines (36), Supplement to the Botany of Bihar and Orissa by Mooney (37), The Flora of Similipal by Saxena and Brahman (38), Flora of Orissa by Saxena and Brahman (39), Flora of the Madras Presidency by Gamble (40) and Flora of Madhya Pradesh by Verma et al*.,* (41), Mudgal et al., (42) and Singh et al. (43). The voucher specimens were preserved and housed in the laboratory for future use and reference.

For the analysis of soil, soil samples were collected from three different depths i.e. 0 to 10, 10 to 20 and 20 to 30 cm with the help of a soil corer. Five samples were taken from each depth, labeled and were mixed thoroughly in order to make a composite soil sample. The samples were dried in the open, rolled and sent to the Soil Testing Laboratory, Department of Agriculture, Government of Odisha, District Headquarter Branch, Mayurbhanj, Baripada for the determination of soil pH, conductivity, organic carbon, available phosphorus and potassium content of the experimental site. The meteorological data i.e. atmospheric temperature, rainfall, and number of rainy days were collected from District Agriculture Office, Mayurbhanj, Baripada and incorporated in this investigation.

III. RESULTS AND DISCUSSION

The floristic list of an experimental grassland community in Gangraj, Mayurbhanj, has been enlisted with their respective families in Appendix- I. The grassland community comprises with 23 species, of which 9 species belonged to grass family i.e. Poaceae and the rest 14 species to the nongrass family i.e. two species each from the family Asteraceae, Malvaceae, Rubiaceae and Fabaceae, three species from Cyperaceae and one species each from the family Convolvulaceae, Onagraceae and Phyllanthaceae.

The percentage contribution of various families occurring in the study site revealed that, the community was dominated by the members of family Poaceae followed by Cyperaceae and Asteraceae /Malvaceae/ Rubiaceae/ Fabaceae. The family Convolvulaceae, Onagraceae and Phyllanthaceae

exhibited the lowest percentage contributing in the community.

Table - 3 Percentage contribution of the families occurring in the experimental grassland community.

Sl. No.	Name of the family	No. of species	Percentage contribution
1	Poaceae	09	39.13
2	Asteraceae	02	8.69
3	Convolvulaceae	01	4.35
4	Cyperaceae	03	13.04
5	Onagraceae	01	4.35
6	Malvaceae	02	8.69
7	Rubiaceae	02	8.69
8	Phyllanthaceae	01	4.35
9	Fabaceae	02	8.69
	Total	**23**	**99.98**

IV. SUMMARY AND CONCLUSION

The floral diversity of a grassland community of Gangraj in the district of Mayurbhanj, Odisha was studied from June 2019 to December 2019. The community comprised of 23 species, out of which 9 species belonged to grass family and the rest 14 species belonged to non-grass families. The community was dominated by the members of family Poaceae (39.13%) followed by Cyperaeae (13.04%). The species belonging to family Asteraceae, Malvaceae, Rubiaceae and Fabaceae contributed 8.69% each and the members of the family Convolvulaceae, Onagraceae and phyllanthaceae exhibited the lowest percentage contribution (4.35% each). The topography, geographical distribution, physico-chemical characteristics of soil, climatic condition and biotic interference do play a major role in variation in floral diversity of grassland community.

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VI. REFERENCES

[1]. E. P. Odum, Organic production and turnover in old field succession, Ecology, 41, 39-49, (1960).

[2]. V.B. Choudhury, Seasonal changes in the standing crop, annual, net production and energetics of Dichanthlum annulatum Stapf, Ph. D. Thesis. BHU, Varanasi, (1964).

[3]. H.R. Sant, Ecological studies in Dichanthium annulatum Stapf, with special reference to reproductive capacity in relation to grazing. Proc. Nat. Inst. Sci., 30 (B), 354-372, (1965).

[4]. J.S. Singh, Seasonal variation in composition, plant biomass and net community production in the grassland at Varanasi, Ph.D. Thesis, BHU, Varanasi, (1967).

[5]. R.S. Ambasht and A.N.Maurya, Reproductive capacity of Dichanthlum annulatum in relation to biotic factors, Trop. Ecol, 10 (2), 186-193, (1967).

[6]. U.N. Singh and R.S. Ambasht, Floristic composition and phytosociological analysis of three grass stands in Naugarh Forest of Varanasi Division, Ind. J.For., 3 (2), 143-147, (1980).

[7]. R.E. Redmann, Production Ecology of Grassland Communities in Western North Dakota, Ecol.Monogr., 45, 83-106, (1975).

[8]. M.K. Misra and B.N. Misra, Biomass and primary production in an Indian grassland, Trop. Ecol., 25; 239-247, (1984).

[9]. P.C. Tripathy, Effect of chipping and fertilization on the structure and function of a grassland ecosystem, Ph D. Thesis, Berhampur University, Berhampur, Orissa, India, (1989).

[10]. K.L. Barik and B.N. Misra, Biological spectrum of a grassland ecosystem of South Orissa, Ecoprint, 5 (1), 73-77, (1998).

[11]. R. Ejrnaes and H.H. Bruun,Gradient analysis of dry grassland vegetation in Denmark, J.Veg.Sci., 11, 573-584, (2000).

[12]. R.P. White, S, Murray and M. Rohweder, Pilot Analysis of Global Ecosystems: Grassland Ecosystems. Washington DC, World Resources Institute, (2000).

[13]. S. Skornik, M. Virdrih and M. Kaligaric, The effect of grazing pressure on species richness, composition and productivity in North Adriatic Karst pastures, Plant Biosystems, 144(2), 355-364,(2001).

[14]. G. Loucougaray, A. Bonis and J.B. Bouzille, Effects of grazing by horses and/or cattle on the diversity of coastal grasslands in western France, Biol. Conserv., 116,59-71,(2004).

[15]. M. Partel, M. Sammul and H.H. Bruun, Biodiversity in temperate European grasslands: origin and conservation, Grassland Sci. Eur., 10,1-14,(2005).

[16]. J.B.R. Tallowin, A.J. Rook and S.M. Rutter, Impact of grazing management on biodiversity of grasslands, Anim. Sci., 81,193-198,(2005).

[17]. M.A. Batalha and F.R. Martins, Floristic, frequency and vegetation – life form spectra of a Cerrado site, Braz. J.Biol., 64(2), 203-209, (2004).

[18]. M.M.A. Ghani and K.N.A. Khalik, Floristic diversity and phytogeography of the Gebel Elba National Park, South- East Egypt, Turk. J. Bot., 30, 121-136, (2006).

[19]. S. Kukshal, B.P. Nautiyal, I.A. Anthwa, A. Sharma and A.B. Bhatt, Phytosociological investigation and life form pattern of grazing lands under pine canopy in temperate zone, North-West Himalaya, India, Research Journal of Botany, 4, 55-69,(2006).

[20]. A.K. Mishra and D.D. Tiwari, Phytosociological analysis of grassland ecosystem of district Balrampur (UP), Int. J. of Plant Sciences, 1(2), 259-263,(2006).

[21]. P.M.A. Ferreira, S.C. Muller, I.I. Boldrini and L. Eggers, Floristic and vegetation structure of a granitic grassland in southern Brazil,Revista Brasileira de Botanica, 33(1), 21-36,(2010).

[22]. P.K. Kar, A.K. Biswal and K.L. Barik. (2010): Floristic composition and Biological spectrum of a grassland community of Rangamatia in the district of Mayurbhan), Odisha, J. Curr. Sc., 15 (2), 465-469.

[23]. S.M.A. Rahim, S. Hasnain, A.R. Shamsi and F. Jabeen, The Phytosociological analysis of saline area of Tehsil Ferozewala District Sheikhupura (Punjab), Pakistan, Afri. J. Environ. Sci. & Tech., 5 (4), 316-326, (2011).

[24]. D.D. Pandey, K. Pandey and S.S. Kumar, Phytosociological Studies of Grassland in the vicinity of Pataratu thermal power, Hazaribagh, Jharkhand, J. Phytology, 3 (12), 63-66, (2011).

[25]. R. Nair, Floristic study of Dadra and Nagar Havell, Life Sci. leaflets, 20, 872-875, (2011).

[26]. P.D. Baldau and M.L. Jaiswal, A study of primary productivity on grassland of Bilaspur district, Chhatisgarh, India, Int. J. Sci. Res., 4, 1-4, (2014),

[27]. A. Dash and K.L. Barik, Net Primary Production of a Grassland Community of Mayurbhanj District in Odisha, India, Indian, J. Appl. Res. 5 (7), 56-58, (2015).

[28]. K.L. Barik, A.K.Biswal, U.B.Mohapatra and J.R.Sahu, Floral diversity of a grassland community of Similipal Biosphere Reserve, Global J. Environ. Sci., & Res., 2 (3), 87-91, (2015).

[29]. P.K. Rout and K.L. Barik, Above ground biomass of a grassland community of

Bangriposi, Mayurbhanj, Odisha, Global J. of Environ. Sci. & Res. 3 (2), 85-89, (2016).

[30]. D.L. Bhuyan and K.L. Barik, Assessment of floral diversity of a grassland community of Kaptipada forest range of Mayurbhanj district in Odisha, India, Int. J. Sci. Res. 6(2), 663-665, (2017).

[31]. J. R. Sahu and KL. Barik, Life forms and biological spectrum of a grassland Community of Similipal Biosphere Reserve, Periodic Research, 5(3), 11-14, (2017).

[32]. S. Mohanty and K.L. Barik, Floristic Composition of a Grassland Community of Balasore District in Odisha, Int. J. of Scientific Res. & Review. 7 (7), 410-416 (2018).

[33]. S. Barik and K.L. Barik, Biological Spectrum of a Grassland Community of Balasore District in Odisha, Int. J. of Scientific Res. & Review. 7 (7), 478- 485, (2018).

[34]. D. Mueller-Dombols and H. Ellenberg, Aims and methods of vegetation ecology, John Willey and Sons, New York, (1974).

[35]. S.K. Jain and R. Rao, A handbook of field and herbarium methods, Today & Tomorrows Printers and Publishers, New Delhi, (1977).

[36]. H.H. Haines, The Botany of Bihar and Orissa, Adlar & Son Ltd. London, (1921-25).

[37]. H.F. Monney, Supplement to Botany of Bihar and Orissa, Catholic Press, Ranchi, (1950).

[38]. H.O. Saxena and M. Brahmam, The Flora of Similipal, Orissa, Regional Research Laboratory (CSIR), Bhubaneswar, (1989).

[39]. H.O. Saxena and M.Brahmam, The Flora of Orissa, Vol. I-IV, Regional Research Laboratory (CSIR), Bhubaneswar and Forest Development Corporation Ltd., Bhubaneswar, Orissa, (1994-96).

[40]. J.S. Gamble, Flora of the Presidency of Madras, Adlar & Son Ltd, London, (1915-36).

[41]. D.M. Verma N. P. Balaknshnan and R.D. Dixit-eds, Flora of Madhya Pradesh, Vol -1, Botanical Survey of India, Calcutta, (1993).

[42]. V. Mudgal, K.K. Khanna and P.K. Hajra-eds, Flora of Madhya Pradesh,Vol-ll, Botanical Survey of India,Calcutta, (1997).

[43]. N.P Singh, K.K Khanna, V. Mudgal and R.D. Dixit-eds, Flora of Madhya Pradesh, Botanical Survey of India, Vol-III, Calcutta, (2001).

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APPENDIX – I

Floristic list of experimental grassland community of Gangraj during the study period.

Sl. No	Name of the Plant	Family
Grasses		
1	*Chrysopogon gryllus* (L.) Trin.	Poaceae
2	*Cynodon dactylon* (L.) Pers.	Poaceae
3	*Dactyloctenium aegyptium* (L.) Willd.	Poaceae
4	*Eleusine indica* (L.) Gaertn.	Poaceae

5	*Eragrostis unioloides* (Retz.) Nees ex Steud.	Poaceae
6	*Isachne albens* Trin.	Poaceae
7	*Paspalum distichum* L.	Poaceae
8	*Rottboellia cochinchinensis* (Lour.) Clayton	Poaceae
9	*Sporobolus indicus* (L.) R.Br.	Poaceae
Non- Grasses		
10	*Cyanthillium cinereum* (L.) H. Rob	Asteraceae
11	*Elephantopus scaber* L.	Asteraceae
12	*Evolvulus nummularius* (L.) L.	Convolvulaceae
13	*Fimbristylis acuminata* Vahl	Cyperaceae
14	*Fimbristylis dichotoma (L.)* Vahl	Cyperaceae
15	*Ludwigia perennis* L.	Onagraceae
16	*Melochia corchorifolia* L.	Malvaceae
17	*Oldenlandia corymbosa* L. (L.) Lam	Rubiaceae
18	*Phyllanthus fraternus* webster	Phyllanthaceae
19	*Scleria lithosperma* (L.) SW	Cyperaceae
20	*Sida cordifolia* L	Malvaceae
21	*Spermacoce lasiocarpa* R.Br. ex Wall	Rubiaceae
22	*Tephrosia purpurea* (L.) Pers.	Fabaceae
23	*Zornia gibbosa* Span.	Fabaceae