www.ThePharmaJournal.com

The Pharma Innovation

Ashish Shukla
M.Sc. Scholar, Department of
Environmental Sciences and
NRM, SHUATS, Prayagraj,
Uttar Pradesh, India

Dr. Ram Bharose
Assistant Professor, Department
of Environmental Sciences and
NRM, SHUATS, Prayagraj,
Uttar Pradesh, India

Phytosociological analysis of trees and plant species in Wajirganj block of the Gonda district in eastern Uttar Pradesh

Ashish Shukla and Dr. Ram Bharose

Abstract
The present study, titled "Phytosociological analysis of trees and plant species in Wajirganj Block, Gonda: Uttar Pradesh," was carried out in the Wajirganj Block of the Gonda District in Eastern Uttar Pradesh to examine the variation of diversity and community structure of plant and tree species. A total of 406 individual of 44 tree species belonging to 13 families and 887 individual of plant species belongings to 14 families were recorded from the study area. The results of the tree layered revealed that the dominant tree species in the study area is Albizia spp. Saccharum spontaneum is the most dominant plant species. Albizia spp. (53.86) has the highest Important Value Index among tree species, and Amaranthus viridis (52.34) has the highest Important Value Index among plant species. The majority of the trees in the study area belonged to the Fabaceae family, while the majority of the plant species were found in the Amaranthaceae family.

Keywords: Phytosociological, IVI, Dominant, Family, Tree, Wajirganj

Introduction
The diversity of plants and trees in an area reflects the strength of species diversity and the degree of interaction with other associated living organisms in the area. Higher species diversity increases the amplitude of the gene pool, and the ecosystem's stability is well maintained. The structure of any ecosystem is determined by its vegetation. (Gaur, 1999, Bhatt and Purohit, 2009 and Khali and Bhatt, 2014) [1]. Evaluating the species content in the area is the important factor in determining the status of biodiversity of a region. We can evaluate diversity and community structure of a region can be analyzed by the quantitative study of vegetation called phytosociology. It is often called "Braun-Blanquer approach" (Westhoff and Maarel, 1973) [11]. It is a branch of science dealing with the plant communities, their composition and development and the relationship between the species within them where its principal goal are delimitation and characterization of vegetation type based on the complete floristic composition. Various studies have been made to evaluate the diversity and community structure of the eastern UP. Despite numerous attempts, vegetation analysis in the Wajirganj Block of Gonda district remained lacking. Despite its modest size, this area is densely forested and has a diverse range of species. This paper deals with the detailed Phytosociological analysis plant and tree species which includes density, dominance, frequency, relative density, relative dominance, relative frequency and important value index.

Study Area
Uttar Pradesh is one of the largest state in the northern region of the country, with a geographical area of 24.32 million ha. This is about 9% of the land area of the country. The Gonda district is one of the important districts of Uttar Pradesh which have a global location between north latitude 26° 47' to 27° 20' and east longitude 81° 30' to 82°46'. The total geographical area of the district is 4448sq km. Wajirganj block is purposely selected among the 16 blocks of Gonda district due to it rich vegetation diversity.

Material and Methods
The study was carried out in Wajirganj block which was purposely selected to assess the tree and plant diversity and species richness of the given area. The vegetation analysis of the selected area was carried out through 30 quadrate of 1m x 1m for the plants and 40 quadrates of 10m x10m for the trees.

Corresponding Author:
Ashish Shukla
M.Sc. Scholar, Department of
Environmental Sciences and
NRM, SHUATS, Prayagraj,
Uttar Pradesh, India

The unidentified plants and trees were identified by the local people and cross checking by the internet.

The number of various tree and plant species found in each quadrant was counted. The vegetation was examined statistically for frequency, density, dominance, and the important value index of reported species. It thus incorporates three key characteristics that quantify each species' output and variety: relative frequency, relative density, and relative dominance.

Result and Discussion

Table 1: Structure and composition of the tree species in Wajirganj block of Gonda district.

S. No	Trees	Av. basal area (cm²)	Density	Frequency	Dominance	RD	RF	RDo	IVI
1.	*Acacia catechu*	1126.5	0.67	33.3	0.07	2.38	4.72	1.1	8.2
2.	*Acacia nilotica*	169.56	0.24	20.4	0.01	0.85	2.89	0.16	3.9
3.	*Albizia spp.*	4952.9	0.97	34.3	2.8	3.4	4.86	45.6	53.86
4.	*Alstoniascholaris*	1721.61	0.53	11.7	0.21	1.88	1.65	3.4	6.93
5.	*Alstonianschloris*	485.6	0.33	16.6	0.03	1.17	2.35	0.48	4
6.	*Anthocephaluscadamba*	1123.5	0.2	5.91	0.12	0.72	0.84	1.9	3.46
7.	*Azadirachta indica*	1133.3	2.17	25	0.07	7.71	3.54	1.1	12.35
8.	*Barringtonia acutangula*	644.96	0.06	5.88	0.04	0.23	0.83	0.65	1.71
9.	*Bauhinia variegata*	1930.4	0.67	33.3	0.12	2.38	4.72	2.01	9.11
10.	*Bischofiajauanica*	292.83	0.41	5.88	0.01	1.45	0.83	0.16	2.44
11.	*Bombex ceiba*	1753.9	1.92	33.3	0.11	6.82	4.72	2.13	13.67
12.	*Dalbergia latifolia*	485.6	0.33	16.6	0.09	1.117	2.35	1.4	4.867
13.	*Dalbergia sissoo*	2753.5	0.23	17.62	0.17	0.9	2.49	2.7	6.09
14.	*Delonix regia*	963.3	1.71	42.86	0.06	6.07	6.07	1.15	13.29
15.	*Eucalyptus globulus*	87.96	1.2	11.76	0.01	4.26	1.66	0.16	6.08
16.	*Ficus benghalensis*	1732.16	0.53	11.76	0.28	2	1.66	4.5	8.16
17.	*Ficus hispida*	354.9	0.31	16.6	0.02	1.1	2.35	0.32	3.77
18.	*Ficus riligosa*	1165.82	0.29	5.88	0.07	1.03	0.83	1.1	2.96
19.	*Ficus virens*	87.96	0.06	3.8	0.12	0.21	0.53	1.95	2.69
20.	*Grewia asiatica*	623.6	0.12	5.8	0.03	0.45	0.83	0.48	1.76
21.	*Jasminum spp.*	257.05	0.47	11.76	0.01	1.67	1.66	0.16	3.49
22.	*Lagerstroemia parviflora*	13.46	0.18	5.88	0.01	0.68	0.83	0.16	1.67
23.	*Leucaena leucocephala*	357.4	1	33.3	0.04	3.55	4.72	0.65	8.92
24.	*Magnifera indica*	4129.33	5.65	47.06	0.258	2	6.65	4.2	12.85
25.	*Medicago sativa*	1521.4	0.17	16.67	0.09	0.6	2.36	1.4	4.36
26.	*Melia azedarach*	60.9	0.08	8.3	0.01	0.3	1.17	0.16	1.63
27.	*Morindacitrifolia*	256.8	0.12	5.8	0.2	0.45	0.82	3.25	4.52
28.	*Moringa oleifera*	729.13	0.29	5.88	0.04	1.03	0.83	0.65	2.51
29.	*Morus alba*	72.9	0.08	8.3	0.01	0.28	1.17	0.16	1.61
30.	*Morus indica*	87.96	0.06	5.88	0.01	0.23	0.83	0.16	1.22
31.	*Pongamia pinnata*	492.8	0.33	16.6	0.09	1.117	2.35	1.4	4.867
32.	*Psidium guajava*	4129.33	1.46	50.66	0.25	5.18	7.18	4.07	16.43
33.	*Santalum album*	1753.9	0.92	25	0.11	3.26	3.54	2.13	8.93
34.	*Sesbeniasesban*	643.28	0.28	5.8	0.04	1.1	0.83	0.65	2.58
35.	*Syzygiumheyneanum*	509.5	0.12	5.88	0.03	0.45	0.83	0.48	1.76
36.	*Tamarindus indica*	1133.3	2.17	25	0.13	7.71	3.54	2.11	13.36
37.	*Tectona grandis*	2735.5	0.24	17.65	0.17	0.852	2.5	2.7	6.052
38.	*Terminalia alata*	152.82	0.29	5.88	0.01	1.13	0.83	0.16	2.12
39.	*Terminalia bellirica*	71.65	0.08	8.33	0.02	0.31	1.18	0.32	1.81
40.	*Terminilia arjuna*	500.5	0.12	5.68	0.03	0.45	0.8	0.48	1.73
41.	*Toona ciliata*	967.91	1.06	11.76	0.06	3.76	1.66	1.02	6.44
42.	*Trewia nudiflora*	262.35	0.12	5.66	0.02	0.44	0.8	0.32	1.56
43.	*Vitex negundo*	71.6	0.08	8.3	0.01	0.3	1.17	0.16	1.63
44.	*Ziziphus mauritiana*	535.35	0.12	5.8	0.05	0.45	0.82	1.04	2.31
	Total	45035.98	28.14	705.08	6.138	83.426	100	100	283.42

Table 1 illustrates that there are a total of 406 trees in the research area, comprising 44 different species. The maximum number of trees are of *Magnifera indica (68)* followed by *Tectona grandis* (33), *Azadirachta indica, Tamrindus indica* (26), whereas trees like *Morus alba, Barringtonia acutangula,* and *Vitex negundo* were recorded least in number. The density of *Magnifera indica* (5.65) was recorded highest followed by *Azadirachta indica* and *Tamrindus indica* (2.17), *Bombexcebia* (1.92), *Delonix regia* (1.71) and *Psidium guajava* (1.46). The tree having minimum diversity were *Morus indica* and *Ficus virens* (0.06) followed by *Melia*

azedarach (0.08), *Morindacitri folia* and *Grewia asiatica*. The frequency of *Psidium guajava* (50.66) was highest followed by *Magnifera indica* (47.06), *Delonix regia* (42.86), *Acecia catechu, Bauhinia variegate* and *Leucaena leucocephala* (33.3). Trees with the lowest frequency were *Ficus virens* followed by *Terminalia arjuna* (5.6), The most dominant species are *Albizia spp.* (2.8) followed by *Magnifera indica* (0.25), *Psidium guajava* (0.25), *Ficus benghalensis* (0.28) and *Alstonia schloris* (0.21). The least dominant speiecs of trees are *Bischofia jauanica* (0.01), *Eucalyptus globulus* (0.01), *Lagerstroemia parviflora* (0.01) and *Terminalia bellirica*

(0.01). The tree species with the highest IVI were Albizia spp. (53.86) followed by Psidium guajava (16.63), Bombex cebia (13.67), Delobix regia (13.29). The tree species with the least IVI Trewia nudiflora (1.56) followed by Morus alba (1.61), Melia azedarach (1.63).

Table 2: Structure and Composition of the Plant species

S.no	Plants	Total no of individual	Density	Frequency	RD	RF	RDo	IVI
1.	*Alternanthera sessillwas*	74	5.72	38.49	7.83	6.81	3.53	18.17
2.	*Amaranthus viridis*	350	25.77	85.0	35.62	15.80	0.92	52.34
3.	*Brachiaria ramose*	48	3.74	7.56	5.96	1.33	7.651	14.94
4.	*Caesuliaaxillaris*	20	1.22	37.46	2.6	6.636	0.099	9.335
5.	*Centella asiatica*	2	0.15	7.69	0.24	2.362	7.927	10.52
6.	*Clerodendrum indicum*	50	3.85	7.69	5.98	1.364	0.09	7.43
7.	*Commelinabenghalensis*	17	1.31	23.08	2.03	6.83	0.216	9.07
8.	*Cyperus iria*	25	1.92	30.77	2.99	5.450	0.99	9.43
9.	*Cyperus rotundus*	25	1.92	38.77	2.99	6.868	0.099	9.957
10.	*Cyperus spp.*	12	0.91	15.73	1.26	2.789	0.092	4.14
11.	*Desmodiumtriflorum*	13	1.00	15.38	1.55	2.72	0.127	4.39
12.	*Echinochloacrusgalli*	10	0.77	15.38	1.19	2.724	0.054	3.96
13.	*Gomphrena globosa*	3	0.23	7.69	0.35	1.36	0.036	1.74
14.	*Hemarthriacompressa*	13	1.00	15.38	1.55	2.824	0.129	4.503
15.	*Hyptis suaveolens*	3	0.23	7.69	0.35	1.36	0.036	1.74
16.	*Lantana camera*	26	2.00	30.80	3.11	5.456	0.084	8.65
17.	*Leea indica*	2	1.62	7.15	2.46	1.26	0.084	3.804
18.	*Moghaniachappar*	85	6.54	38.46	10.09	6.812	0.211	17.113
19.	*Rumex dentatus*	10	0.67	15.38	1.67	2.964	0.70	5.33
20.	*Saccharum spontaneum*	20	1.51	46.09	2.47	8.164	62.35	72.98
21.	*Sesslidiffusum*	22	1.67	38.46	2.63	6.923	13.65	23.203
22.	*Sorghum halepense*	40	3.08	7.69	4.79	1.36	0.431	6.581
23.	*Tridax procumbens*	2	0.15	7.69	0.24	1.367	1.022	2.62
	Total	887	66.98	564.49	100.00	100.00	100.0	300

Table 2 revealed that 887 individuals of 23 plant species were discovered in the Wajirganj block of the Gonda district. Amaranthus viridis has the most individual plant species (350), followed by Moghania chappar (85), and Althernanthera sessillis (74) Centella asiatica has the fewest individual plant species (2), followed by Tridax procumbens (2) and Gomphrena globose (2). Amranthus viridis has the highest density (25.7), followed by Moghania chappar (6.54), Althernanthera sessilis (5.72), and Sorghum halepense (5.72). Centella asiatica has the lowest density (0.15), followed by Tridax procumbens (0.15), and Gomphrena globose (0.23). Amaranthus viridis (85) has the highest frequency, followed by Saccharum spontaneum (46.09), Cyperus rotundus (38.77),and Alternanthera sessilis (38.48). Leea indica (7.15), Centela asiatica, and Clerodendrum indica are the plant species with the lowest frequency (7.69). Saccharum spontaneum is the most dominant plant species found here, followed by Caesulia axillaris, and Brachiaria ramosa is the most suppressed plant species, followed by Rumex dentatus. Amaranthus viridis has the highest Importance value index (52.34), followed by Sesslidiffusum (23.2), and Gomphrena globose (1.74) has the lowest followed by Hyptis suaveolens (1.74).

Understanding the diversity, composition, and structure of tree and plant species is critical for assessing village sustainability, species conservation, and ecosystem management (Kacholi, 2014) [7]. This study currently describes the state of the land cover, composition, and diversity of the tree and plant species community in the Wajirganj block. The density, abundance and distribution of individual species are measurable indicators of vegetation diversity (Wattenberg and Breckle, 1995) [10]. As the area was dominated by Albizia Spp., followed by Magnifera indica, this could be due to the well-suited environment and high economic values, whereas in the plants, Saccharum spontaneum was the dominant species due to its high economic value. Human interventions and climatic factors are to held responsible for the lower density of tree and plant species. The IVI is mainly used for species conservation whereby species with low IVI value need high conservation compared with the ones having high IVI (Kacholi, 2014) [7]. Many species with lower IVI values are found in this study area, including tree species as Trewia nudiflora, Morus alba, Melia azedarach, as well as the plant species Gomphrena globose and Hyptis suaveolens. The rarity could be attributed to various, such as poor distribution of species, anthropogenic disturbances, competition between species, etc. (Comita et al., 2007; Hubbell et al., 2001; Schwarz et al., 2003) [5, 6, 9]. However, the rarity of species is high which underlines the attention for conservation.

Conclusion
According to the study, the Wajirganj block in Gonda district comprises 406 trees of 44 distinct species and 887 plants of 23 different species. Magnifera indica has the highest number of individuals in tree species, followed by Tectona grandis, due to their high income generation and various benefits, while Amranthus viridis has the highest number of individuals in plant species. This demonstrates that the area has a large diversity of tree and plant species. This analysis gives fundamental information on plant and tree species variation in composition and structure. The diversity of the study region demonstrates the disturbance caused by variations in soil quality, environmental factors, and human intervention. The study's findings may be useful in taking various measures to protect valuable species and increase their population in the area.

References

1. Bhatt VP, Purohit VK. Floristic structure and Phyto diversity along an elevational gradient in Peepalkoti-Joshimath area of Garhwal Himalaya, India. Nat. Sci 2009;7(9):63-74.
2. Bhat DM, Murali KS. Phenology of under storey species of tropical moist forest of Western Ghats region of Uttara Kannada district in South India, Current Science 2001;81(7):799-805,
3. Criddle RS, Church JN, Smith BN, Hansen LD. Fundamental causes of the global patterns of species range and richness. Russian J Plant Physiol., 2003;50:192-199.
4. Curtis JT, McIntosh RP. The inter-relations of certain analytic and synthetic Phytosociological Characters. Ecology 1951;3:434-455.
5. Comita LS, Condit R, Hubbell SP. Developmental changes in habitat associations of tropical trees. Journal of Ecology 2007;95(3):482-492.
6. Hubbell SP, Ahumada JA, Condit R, Foster RB. Local neighborhood effects on long-term survival of individual trees in a neotropical forest. Ecological Research 2001;16(5):859-875.
7. Kacholi DS. Analysis of structure and diversity of the Kilengwe forest in the Morogoro region, Tanzania. International Journal of Biodiversity 2014.
8. Pandey SK, Shukla RP. Plant community and diversity patterns within the forested landscape of north-eastern U.P. Indian Forester 2005;131:1217-1226.
9. Schwarz PA, Fahey TJ, McCulloch CE. Factors controlling spatial variation of tree species abundance in a forested landscape. Ecology 2003;84(7):1862-1878.
10. Wattenberg I, Breckle S. Tree species diversity of a premontane rain forest in the Cordillera de Tilaren, Costa Rica. Biotropica 1995;1:21-30.
11. Westhoff V, Maarel EVD. The Braun-Blanquetapproach. In Handbook of Vegetation Science (Ed. R. Tüxen) Part V. Ordination and Classification of Communities (ed. R. H. Whittaker), Junk, The Hague 1973, 617-726.