



## Ecological investigation of some selected medicinal plants with special reference to phytosociological aspect at renukoot forest division of Sonbhadra district

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### Abstract

The present paper deals with the Ecological investigation of some selected medicinal plants at Renukoot Forest Division of Sonbhadra District in this study 16 medicinal plants such as *Andrographis paniculata*, *Achyranthus aspera*, *Adhatoda Vasica*, *Boerhaavia diffusa*, *Casia tora*, *Euphorbia hirta*, *Euphorbia thymifolia*, *eclypta alba*, *phyllanthus niruri*, *sida cardifolia*, *Solanum nigrum*, *Sphaeranthus indicus*, *Tephrosia perpurea*, *Vernonia cinerea* have been studied during rainy season from June 2021 to September 2021 with special reference to their phytosociological aspect *Viz.*, Density, Abundance as well as Frequency. In this investigation we found that out of Sixteen medicinal plants *Cynodon dactylon* have maximum value of Density (9.2) as well as abundance (9.2). Whereas *Solanum nigrum* have minimum value of density (1.1) and abundance (1.8), on the other hand in the respect of frequency the *Cynodon dactylon*, have maximum percentage of frequency (90%) and *Solanum nigrum* minimum percentage of frequency (10%) respectively.

**Keywords:** phytosociological, medicinal plants, density, frequency, abundance, renukoot forest division, ecological study

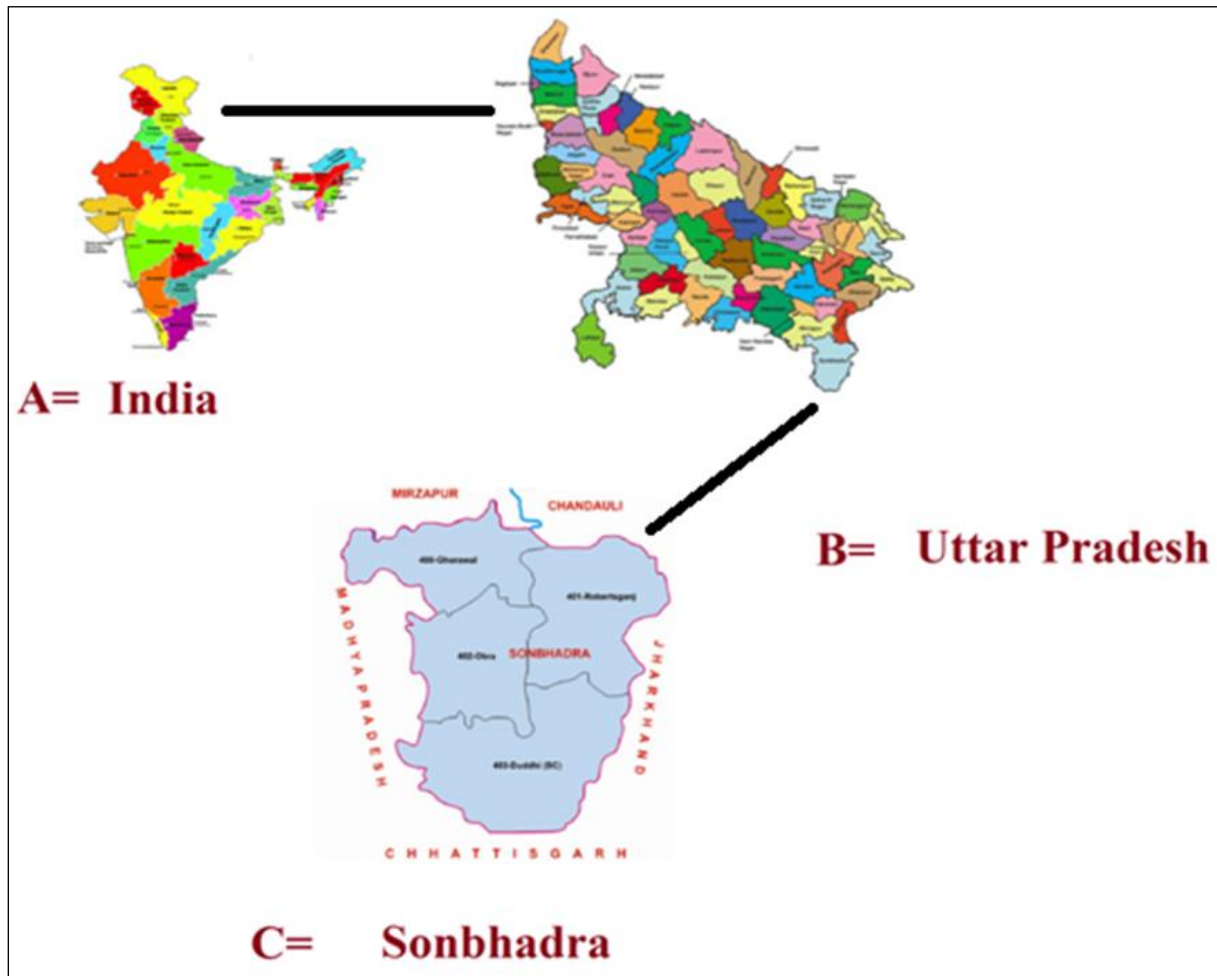
### Introduction

The word 'Ecology' (oekologie) was first proposed by a zoologist H. Reiter in 1865. It is derived from two Greek word 'oikos' which means dwelling place or 'home' and 'logos' means discourse or study.

Thus the word 'ecology' means the study of living organism both plants and animals in their natural habitats or homes. Ecology the study of structure and function nature (Odum, 1969) [10]. The investigation concern with the Ecology is called as Ecological investigation.

Phytosociology may be defined as, "The discipline which is concerned itself with the study of vegetation as such along with floristic composition, structure, development as well as distribution" (Jain 1967, Kala 2005, Singh *et al.* 2018) [5, 6, 16]. The Sociological analysis of plant is the key component of vegetation study with the aid of sampling technique in order to understand the structure, function as well as vegetation (Bishwas, 1967, Verma and Singh 2019) [2, 17]. Some region of the India have been explored quantitatively in term of phytosociological study (Ahmad *et al.* 2009; Khare *et al.* 1985, Negi and Nautiyal, 2005, Singh *et al.* 2006) [1, 7, 9, 14]. In present day Medicinal plants are also considered important component of ecology, the product of these plant collected from nature can be cultivated in the field. The habitat is one of the most important aspect of a plant where the plants grow, develop as well as compete with other neighboring one. (Rai and Singh. 2020, Piper, 1950) [13, 11].

The Area under investigation of ecological study of some selected medicinal plants with special reference to phytosociological aspect at 'Renukoot Forest Division of Sonbhadra district, Uttar Pradesh, India is located at 24.2<sup>o</sup> to 83.03<sup>o</sup>E. It has an average elevation of 283 meters (931 feet). Renukoot lies in the Southern East most part of the Uttar Pradesh and sitted next to Shaktinagar, Anpara and Obara place of Sonbhadra District. The district Sonbhadra came into existence on 04<sup>th</sup> March, 1989 after the division of district Mirzapur. The Sonbhadra district is situated in the Vindhyan plateau lying between 23<sup>o</sup> 45' to 24<sup>o</sup>34' N latitude and 82<sup>o</sup>45' to 83<sup>o</sup>23' E longitude covering an area of 6788 Km<sup>2</sup>. It is bounded by Mirzapur district in the north- west and Chandauli district of Uttar Pradesh in the north, Kamoor and Rohats district of Bihar in the north east, Garhawa district of Jharkhand state in the east, Korea and Sarguja district of Chhattisgarh state in the South and Singrauli district of Madhya Pradesh in the west (Fig. : 1).The elevation above the mean Sea level ranges between 315m to 485m<sup>2</sup>. Climatically the area of Sonbhadra is dry and tropical type. The summer temperature ranges between 22.8 to 45<sup>o</sup> C and winter between 8 to 17.5<sup>o</sup>C The temperature in summer may reach upto 45<sup>o</sup>C and in winter below 5<sup>o</sup>C (upto 2<sup>o</sup>C). The annual rainfall in this area ranges from 150cm. to 160 cm. The forest of Sobhadra district is tropical and dry deciduous types covering an area of 2447. Km<sup>2</sup> (Where dense forest area is 1078 Km<sup>2</sup> and Open forest area is 1369 Km<sup>2</sup>)



**Fig 1:** Map of Study Area

The plant material i.e. medicinal plants were collected for investigation during rainy season from June to September 2021.

### Material and Methods

An extensive survey has been done for Ecological study of some selected medicinal plants with special reference to Physiosociological aspect at Renukoot Forest Division of Sonbhadra District, Uttar Pradesh, India during rainy season from June to September 2021. In this respect the plant species were identified according to (Sharma and Upadhyay 2002) [15], (Gaur 1999) [4]. The Phytosociological study was carried out by quadrates methods. 50x50 Cm. sized quadrates were used in order to study the medicinal plants at Renukoot forest division of Sonbhadra district during rainy season lying 25 cm<sup>2</sup> quadrates randomly at different sites. The number of species and number of individual in each quadrates were recorded. The data were quantitatively analyzed for Density Frequency and basal cover according to Curtish and MC Intosh 1951 [3].

The Ecological Density, Abundance and Frequency may be calculated by using flowing formula-

$$1. \text{ Density (D)} = \frac{P}{Q}$$

Where P = Total number of individual of plant species in all quadrates  
Q = Total number of quadrates studied

$$2. \text{ Abundance (A)} = \frac{T}{F}$$

Where T = Total number of individual of plant of particular plant species

F = Total number quadrates in which species occurred

$$3. \text{ Frequency (F)} = \frac{P}{R}$$

Where P = Total number of quadrates in which particular specie occurred

R = Total number of quadrates studied

### Determination of Frequency Classes

**Table 1:** Frequency classes can be determined by the following way (Raunkiaer, 1934<sup>12</sup>).

S.N.	Frequency for Percentage	Frequency Class
1	0-20 %	A
2	21-40 %	B
3	41-60 %	C
4	61-80 %	D
5	81-100 %	E

### Observation

The survey conducted during rainy season from June to September 2021 at Renukoot Forest Division of Sonbhadra, District U.P. India total sixteen medicinal plants were observed whose physiological aspect has been represented below in the tabulated form (Table 1 and Table 2). The figure of studied Sixteen medicinal plants are given as photo plate (Fig 2)

**Table 2:** Phytosociology of Some Selected Medicinal Plants During Rainy Season from June to September 2021 at Renukoot Forest Division of Sonbhadra, District U.P. India (Details of Density and Abundance)

S.No.	Name of Plant Species	Number of Individual per quadrate										Total Number of Individual	Total Number of Individual Studied	Number of Quadrate in which Species occurred	Density	Abundance
		1	2	3	4	5	6	7	8	9	10					
1	<i>Andrographis paniculata</i>	1	0	3	0	0	6	0	0	4	0	14	10	7	1.4	2.1
2	<i>Adhatoda vasica</i>	4	7	8	6	0	3	6	7	0	5	46	10	8	4.6	5.7
3	<i>Achyranthes aspera</i>	6	2	1	4	2	3	7	4	5	8	42	10	5	4.2	8.4
4	<i>Boerhaavia diffusa</i>	6	7	11	5	0	0	3	9	7	5	53	10	8	5.3	6.6
5	<i>Cassia tora</i>	3	5	2	0	0	6	0	0	4	2	22	10	6	2.2	3.6
6	<i>Convolvulus microphyllus</i>	2	4	6	3	0	0	0	7	0	2	24	10	3	2.4	8.0
7	<i>Cynodon dactylon</i>	9	12	8	9	14	6	13	15	2	4	92	10	10	9.2	9.2
8	<i>Eclipta alba</i>	2	5	0	0	3	7	0	9	0	6	32	10	9	3.2	3.5
9	<i>Fuphoriba hirta</i>	5	3	2	0	4	0	0	3	7	0	24	10	3	2.4	8.0
10	<i>Euphorbia thymifolia</i>	6	3	0	0	5	0	7	4	0	8	33	10	8	3.3	4.1
11	<i>Phyllanthus niruri</i>	7	0	9	0	0	2	0	0	5	0	23	10	5	2.3	4.6
12	<i>Solanum nigrum</i>	0	0	4	0	0	0	5	0	0	2	11	10	6	1.1	1.8
13	<i>Sida cordifolia</i>	9	0	8	2	3	0	7	0	8	0	37	10	7	3.7	5.2
14	<i>Sphaeronthes indicus</i>	6	3	0	0	0	5	0	4	9		27	10	5	2.7	5.4
15	<i>Tephrosia perpeurea</i>	12	9	8	3	6	4	7	0	0	7	56	10	8	5.6	7.00
16	<i>Vernonia cinerea</i>	0	0	3	0	0	5	4	9	0	3	24	10	4	2.4	6.00

**Table 3:** Phytosociology of Some Selected Medicinal Plants During Rainy Season from June to September 2021 at Renukoot Forest Division of Sonbhadra, District U.P. India (Details of Frequency and Frequency classes)

S.No.	Name of Plant Species (1)	(2) Number of Individual per quadrate										Total Number of Individual		Frequency % (4/3)×100	Frequency Class
		1	2	3	4	5	6	7	8	9	10	Studied (3)	Occurrence (4)		
1	<i>Andrographis</i>	+	-	+	+	-	+	-	+	+	+	10	7	7/10×100=70%	D

	<i>paniculata</i>																
2	<i>Adhatoda vasica</i>	-	+	+	-	+	-	+	+	-	-	10	5	5/10×100=50%	C		
3	<i>Achyranthes aspera</i>	+	-	-	+	-	+	-	-	+	-	10	4	4/10×100=40%	B		
4	<i>Boerhaavia diffusa</i>	+	-	+	-	+	-	-	+	-	+	10	5	5/10×100=50%	C		
5	<i>Cassia tora</i>	-	+	+	-	+	-	+	-	+	+	10	6	6/10×100=60%	C		
6	<i>Convolvulus microphylus</i>	-	-	-	+	-	-	-	+		-	10	2	2/10×100=20%	A		
7	<i>Cynodon dactylon</i>	+	+	+	+	+	+	+	-	+	+	10	9	9/10×100=80%	E		
8	<i>Eclipta alba</i>	-	-	-	-	-	+	+	-	-	+	10	3	3/10×100=30%	B		
9	<i>Euphorbia hirta</i>	+	+	+	-	-	-	-	+	-	-	10	4	4/10×100=40%	B		
10	<i>Euphorbia thymifolia</i>	+	+	+	-	+	-	+	-	+	-	10	6	6/10×100=60%	C		
11	<i>Phyllanthus niruri</i>	-	-	-	+	-	+	-	+	+	+	10	5	5/10×100=50%	C		
12	<i>Solanum nigrum</i>	-	-	+	-	-	-	-	-	-	-	10	1	1/10×100=10%	A		
13	<i>Sida cordifolia</i>	+	+	-	-	+	-	-	-	-	-	10	3	3/10×100=30%	B		
14	<i>Sphaeranthus indicas</i>	-	-	+	-	+	-	+	-	+	-	10	4	4/10×100=40%	B		
15	<i>Tephrosia perpeurea</i>	+	+	+	+	+	+	-	+	-	+	10	8	8/10×100=80%	D		
16	<i>Vernonia cinerea</i>	-	+	-	-	-	-	-	-	+	-	10	2	2/10×100=20%	A		

*Andrographis paniculata**Adhatoda vasica**Achyranthes aspera**Boerhaavia diffusa*



*Cassia tora*



*Convolvulus microphylus*



*Cynodon dactylon*



*Eclipta alba*



*Euphorbia hirta*



*Euphorbia thymifolia*



*Phyllanthus niruri*



*Solanum nigrum*



**Fig 2:** Photo Plate of Medicinal plants

### Result and Discussion

From the above observation it is clear that out of Sixteen selected Medicinal plant studied regarding to phytosociological aspect, the *Cynodon dactylon* have maximum value of Density (9.2), as well as Abundance (9.2) in comparison to that of all other studied medicinal plants at Renukoot Forest Division Forest at Sonbhadra District Uttar Pradesh, India.

*Solanum nigurm* have minimum value of density (1.1) as well as abundance (1.8). *Cynodon dactylon* have maximum percentage of frequency (90%) and *Sida cordifolia* have minimum percentage of frequency (10%) out of sixteen studied Medicinal plant in the respects of Phyto-sociological aspect. Instead of this, it was also found that medicinal plants growing at 'Renukoot Forest Division Forest' were in very pleasant conditions.

### Conclusion

It was found that most of the medicinal plants in the study area were safe out of 16 studied medicinal plants growing in their natural habitats at Renukoot forest division of Sonbhadra district. The diversity of medicinal flora were in pleasant condition in this area.

All 16 medicinal plants have great economic value and they are useful for the treatment of different types of diseases in human beings. Such as fevers enlargement of liver & spleen, cough, skin diseases, mental problems, wound treatment, leucorrhoea, Spermatorrhea and so on.

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**Reference**

1. Ahmed M, Hussain T, Sheikh AHS, Husain SS, Siddique M. Phytosociology and structure of Himalayan forest from different climatic zones of Pakistan Pak. J. Bot, 2006;38(2):361-383.
2. Bishwas R. Ecology of Medicinal plants *Rauvolfia phyllia* and *Ranvolfia serpentine*. Ph.D. Thesis Banaras Hindu University, 1964.
3. Curtish JT, Mc Intosh RP. The interrelation of certain analytic and synthetic Phytosociological characters. Ecology, 1950;31:434-455.
4. Gaur RD. Flora of the district Garhwal North West Himalaya, Journal of Ecology, 1999;67:893-921.
5. Jain HK. Ecosystem analysis of grassland near Rajkot, Ph.D. Thesis, Banaras Hindu University, 1967.
6. Kala CP. Current of medicinal plants used by traditional Vaidyas in Uttarakhand state of India. Ethnobotany Research and Application, 2005, 267-278.
7. Khare PK, Yadav VK, Mishra GP. Phytosociological structure of some Forest communities in Central India J. Trap. For, 1985;1(4):321-326.
8. Muller-Dombois D, Ellenberg H. Aim and methods of vegetation Ecology. Wiley, New York, 1974.
9. Negi CS, Nautiyal S. Phytosociological studies of a traditional reserve forest "Thal Kedhar", Pithoragarh, Central Himalaya, India. Indian Forestry, 2005, 519-534.
10. Odum EP. The strategy of Ecosystem development science, 1969;164:264-270.
11. Piper CS. Soil and Plant Analysis. Inter Science Publication, Inc. New York, U.S.A, 1944.
12. Raunkiaer C. The life forms of plant and statically plant geography. Oxford Calendar Press, 1934, 632.
13. Rai PK, Singh JS. Invasive alien plant species, their impact on environment, ecosystem services and human health. Ecological indicators, 2020;111:1060:20.
14. Singh JS, Singh SP, Gupta SR. Ecological, Environmental Resources and conservation. Anamaya Publishers, New Delhi, 2006, 668.
15. Sharma KP, Upadhyay BP. Phyto-sociology, Primary production and Nutrient Retention in Herbaceous Vegetation of Forestry arboretum on Arawali hills at Jaipur community. Ecology, 2002;43(2):325-335.
16. Singh AK, Singh H, Singh JS. Plant Diversity in Cities: Call for assessment and conservation. Current Science, 2018;115:428-43.
17. Verma P, Sagar R. Responses of diversity productivity and stability to the nitrogen input in a tropical grassland. Ecological Application, 2019;30(2):1-19.