

Diversity of forest shrubs in the reserve forest of Bhupdeopur of District Raigarh , Chhattisgarh

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ABSTRACT

In the present study the emphasis is given on the study of shrub layer vegetation in Bhupdeopur reserve forest of Raigarh dist. of Chhattisgarh as the exclusive studies on shrub layer in forest ecosystems are the need of present ecological time. An extensive survey has been conducted to find out the various types of forest flora 44 shrub species belonging to 22 families, their local names and various uses by the local inhabitants including medicinal values were recorded during the survey . The parameters such as frequency, density and abundance were also undertaken .

Figures : 07

References : 07

Table : 01

KEY WORDS : Abundance, Bhupdeopur reserve forest, Biodiversity, Chhattisgarh, Density, Forest shrubs, Frequency.

Introduction

India is recognized as a country rich in all aspects of Biodiversity and Ecosystem. Forests are one of the most easily recognizable ecosystems in the biosphere and generally considered as assemblage of trees but in actual sense it is a multistoried vegetation system in which vegetation can be classified into three main storeys tree storey, shrub storey and herb storey. The shrubs, herb storeys or under storey vegetation constitutes an important component of forest ecosystem. These plant strata are integral part of food chain for mammals and birds and control micro climate of the site. The shrub layer (under storey vegetation) biomass particularly in younger strands generally plays an important role in the recycling of nutrients. In forest ecosystem under storey vegetation studies have not been given a proper weightage like the tree constituents. Hence only a few studies on the role of under storey vegetation in different types of plantation ecosystems are known.

For any country in the world, it has perhaps the largest array of environmental stipulations by virtue of its tropical location, varied physical features and climate types. Forests contribute substantially to the economic development of the country through providing goods service to people and industries³. Phytosociological analysis of a plant community is an important aspect of ecological study of any piece of vegetation. Species composition is one of the important characters of plant community. Analytical character *viz.* Frequency, density and abundance are very useful in the comparison of two different plant communities. The present study was

conducted in Bhupdeopur Reserve forest of district Raigarh Chhattisgarh (Table-01).

Aim / Purpose :-

1. Identification of shrub species of Bhupdeopur reserve forest.
2. To study the shrub diversity of Bhupdeopur reserve forest
3. To study the floristic composition of Bhupdeopur reserve forest .
4. Identification of endangered shrub species which is of promising value.
5. To enlist ethnobotanical uses of shrubs specifically of health and livelihood security .

Materials and Methods

The study area was divided into 4 circles named as Naharpali, Kerajher, Delari and Khairpur. Each circle was further divided into beats and a total of 20 beats in 16 villages were considered for the study. The study site was spread over in 25 km of North West of Raigarh, Bhupdeopur reserve forest is rich in its forest resources.

In the present study, phytosociological diversity analysis was carried out by quadrat method. Random sampling of study area was done by Quadrat method⁵. 100 quadrates of size 30x30 meter were randomly laid down in the study area for the study of shrubs. On the basis of the data obtained from the quadrat samples, the structural distribution of forest shrubs were analyzed. The parameters such as % Frequency, Abundance and Density were obtained and were calculated^{1,2,4,6} from the data as follow:-

TABLE - 1 : Diversity of shrubs in reserve forest of Bhupdeopur, Raigarh (C.G.) India

S. No.	Botanical Name	Local / Vernacular Name	Family	Habitat	% Frequency	Density	Abundance	Relative Frequency	Relative Density	Relative Abundance	Important Value Index
1.	<i>Abrus precatorius</i>	Gunja	Fabaceae	Wild	5	0.10	2.00	0.96	0.40	1.13	2.49
2.	<i>Acacia armata</i>	Magardatti	Fabaceae	Wild	9	0.36	4.00	1.74	1.46	2.27	5.47
3.	<i>Achyranthes aspera</i>	Lajira	Amaranthaceae	Wild	28	1.20	4.28	5.41	4.89	2.43	12.73
4.	<i>Adhatoda vasica</i>	Adusa	Acanthaceae	Wild	15	0.75	5.00	2.90	3.05	2.84	8.79
5.	<i>Agave mexicana</i>	Morba	Agavaceae	Wild	20	0.96	4.80	3.80	3.91	2.73	10.44
6.	<i>Argemone mexicana</i>	Pilikantali	Papaveraceae	Wild	20	0.96	4.80	3.80	3.91	2.73	10.44
7.	<i>Barleria cristata</i>	Van Malati	Acanthaceae	Wild	8	0.87	0.20	1.54	3.54	0.11	5.19
8.	<i>Barleria prionitis</i>	Kanta phool	Acanthaceae	Wild	1	0.05	5.00	0.19	0.20	2.84	3.23
9.	<i>Blepharispermum subsessile</i>	Kharenth	Asteraceae	Wild	9	0.25	2.77	1.74	1.01	1.57	4.32
10.	<i>Caesalpinia bonduc</i>	Kat karanj	Fabaceae	Wild	9	0.16	1.77	1.74	0.65	1.00	3.39
11.	<i>Calotropis procera</i>	Aak	Asclepiadaceae	Wild	4	0.16	1.03	0.95	0.67	0.58	2.2
12.	<i>Cassia occidentalis</i>	Barachakoda	Fabaceae	Wild	10	0.44	4.40	1.93	1.79	2.50	6.22
13.	<i>Catharanthus roseus</i>	Sadabahar	Apocynaceae	Wild	16	0.40	2.81	3.09	1.63	1.60	6.32

S. No.	Botanical Name	Local / Vernacular Name	Family	Habitat	% Frequency	Density	Abundance	Relative Frequency	Relative Density	Relative Abundance	Important Value Index
14.	<i>Clerodendrum inerme</i>	Bharangi	Verbenaceae	Wild	3	0.26	8.66	0.54	1.06	4.93	6.50
15.	<i>Dendrocalamus strictus</i>	Bans	Poaceae	Wild	12	0.49	2.82	2.32	2.01	1.60	5.93
16.	<i>Datura metel</i>	Dhatura	Solanaceae	Wild	28	1.40	5.00	5.41	5.71	2.84	15.96
17.	<i>Euphorbia nerifolia</i>	Sehund	Euphorbiaceae	Wild	9	0.24	2.66	1.74	0.97	1.51	4.22
18.	<i>Euphorbia tirucalli</i>	Badi dudhi	Euphorbiaceae	Wild	8	0.29	3.62	1.54	1.18	2.06	4.78
19.	<i>Grewia hirsuta</i>	Nagbala	Malvaceae	Wild	13	0.85	6.53	2.50	3.46	3.71	9.67
20.	<i>Hibiscus rosa sinensis</i>	Gurhal	Malvaceae	Wild/	10	0.36	3.60	1.93	1.46	2.04	5.43
21.	<i>Jatropha gossypifolia</i>	Bearand	Euphorbiaceae	Wild	12	0.60	5.00	2.32	2.44	2.84	7.60
22.	<i>Justicia gendarussa</i>	Udisabhala	Acanthaceae	Wild	15	0.65	4.33	2.90	2.65	2.46	8.01
23.	<i>Lagerstroemia parviflora</i>	Senha	Lythraceae	Wild	9	0.25	2.76	1.74	1.01	1.57	4.32
24.	<i>Lantana camara</i>	Putus	Verbenaceae	Wild	10	0.44	4.40	1.93	1.79	2.50	6.22
25.	<i>Lawsonia inermis</i>	Mehndi	Lythraceae	Wild	12	0.68	5.66	2.32	2.77	3.22	8.31
26.	<i>Murraya koenigii</i>	Mitha	Rutaceae	Wild /	12	0.48	4.00	2.32	1.95	2.27	6.54

S. No.	Botanical Name	Local / Vernacular Name	Family	Habitat	% Frequency	Density	Abundance	Relative Frequency	Relative Density	Relative Abundance	Important Value Index
27.	<i>Nyctanthes arbortristis</i>	Harsingar	Oleaceae	Wild / Cultivated	16	0.64	4.00	3.09	2.61	2.27	7.97
28.	<i>Ocimum sanctum</i>	Tulsi	Lamiaceae	Wild / Cultivated	5	0.45	9.00	0.96	1.83	5.12	7.91
29.	<i>Olax imbricata</i>	Khisora	Olcaceae	Wild	4	0.14	3.50	0.77	0.57	1.99	3.33
30.	<i>Phyllanthus fraternus</i>	Bhui amla	Euphorbiaceae	Wild	6	0.26	4.33	1.16	1.06	2.46	4.68
31.	<i>Plumbago zeylanica</i>	Chitwar	Plumbaginaceae	Wild	14	0.96	6.85	2.70	3.91	3.90	10.51
32.	<i>Rauwolfia serpentina</i>	Sarpagandha	Apocynaceae	Wild	20	1.18	5.90	3.8	4.81	3.35	11.96
33.	<i>Leucas aspera</i>	Gumasag	Lamiaceae	Wild	5	0.16	3.20	0.96	0.65	1.82	3.43
34.	<i>Ricinus communis</i>	Arand	Euphorbiaceae	Wild	4	0.80	5.85	2.70	3.26	3.33	9.29
35.	<i>Sida acuta</i>	Bariara	Malvaceae	Wild	9	0.36	4.00	1.74	1.46	2.27	5.47
36.	<i>Sida cordifolia</i>	Bala/ Kangyi	Malvaceae	Wild	41	2.42	5.90	7.93	9.87	3.35	21.15
37.	<i>Smilax zeylanica</i>	Ramdaton	Liliaceae	Wild	4	0.22	5.50	0.77	0.89	3.13	4.79
38.	<i>Streblus asper</i>	Magnic	Moraceae	Wild	16	0.60	3.75	3.09	2.44	2.13	7.66
39.	<i>Urena lobata</i>	Pithia	Malvaceae	Wild	5	0.45	9.00	0.96	1.83	5.12	7.91
40.	<i>Ventilago denticulata</i>	Kewati	Rhamnaceae	Wild	6	0.22	3.60	1.16	0.89	2.04	4.09
41.	<i>Vitex negundo</i>	Nirgundi	Verbenaceae	Wild	4	0.08	2.00	0.77	0.32	1.13	2.22
42.	<i>Woodfordia fruticosa</i>	Dhawai	Lythraceae	Wild	32	1.40	4.37	6.18	5.71	2.48	14.37
43.	<i>Ziziphus nummularia</i>	Banber	Rhamnaceae	Wild	6	0.09	1.50	1.16	0.36	0.85	2.37
44.	<i>Ziziphus oenoplia</i>	Makoia	Rhamnaceae	Wild	3	0.26	8.66	0.58	1.06	4.93	6.57

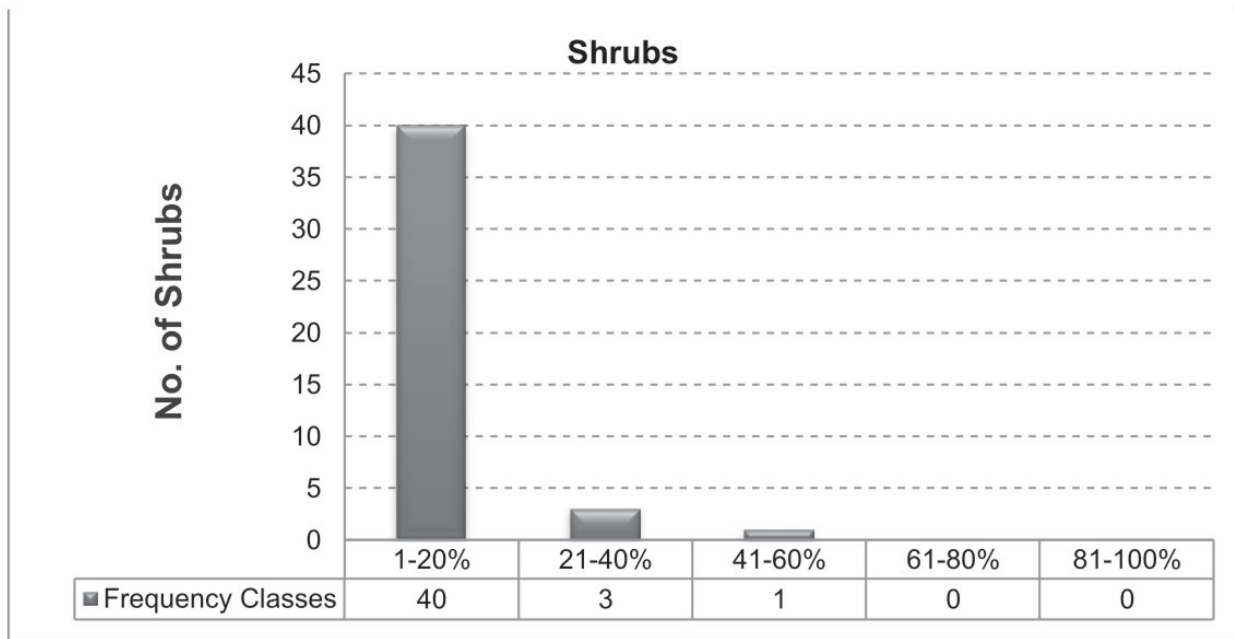


Fig. 1 : Shrubs in relation to Frequency

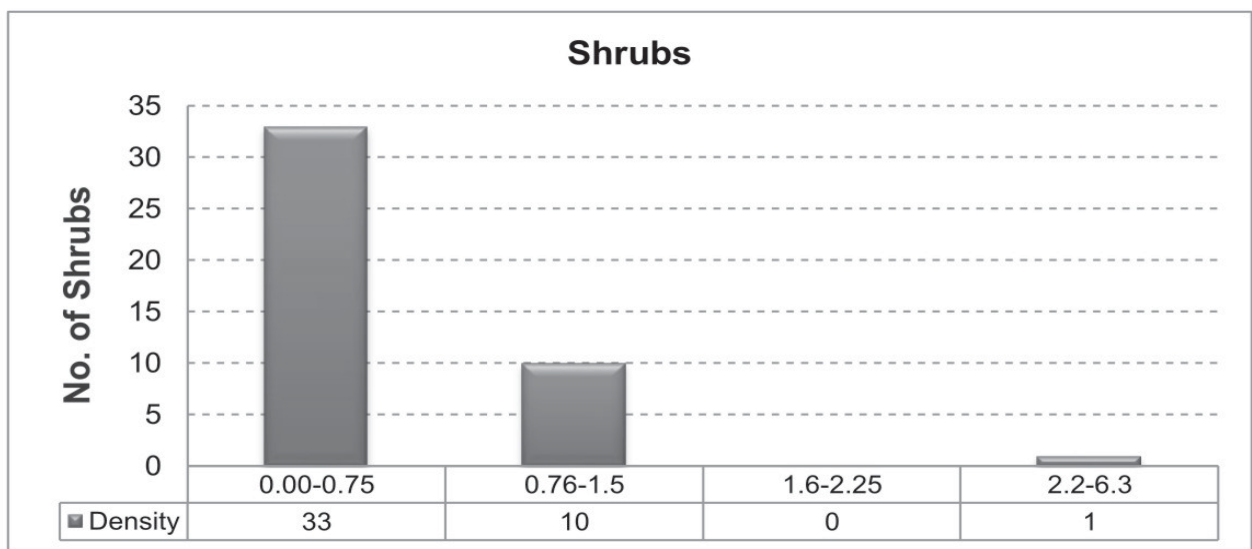


Fig. 2 : Shrubs in relation to Density

$$\% F = \frac{\text{Number of sampling units in which plant species occurred} \times 100}{\text{Total number of sampling units studied}}$$

$$\text{Density} = \frac{\text{Total number of individuals of a plant species in all sampling units}}{\text{Total number of sampling units studied}}$$

$$\text{Abundance} = \frac{\text{Total number of individuals plant species in all sampling units}}{\text{Total number of sampling units of occurrence}}$$

Result and Discussion

A total of 44 shrub species belonging to 40 genera of 22 families, were recorded. Out of them, 41 species belonged to dicotyledonae and 03 to monocotyledonae.

Euphorbiaceae and Malvaceae were found to be the dominant families. The maximum number of shrub species (05) were noted to belong to family Euphorbiaceae and Malvaceae, (04) species each belonged to family

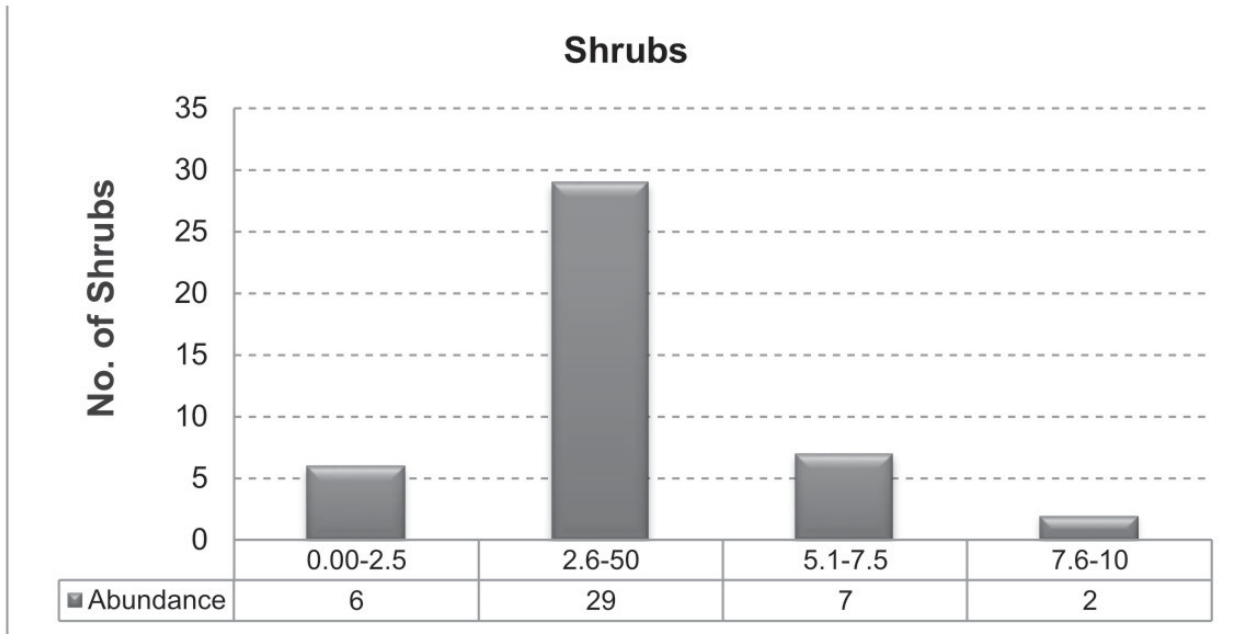


Fig. 3 : Shrubs in relation to Abundance

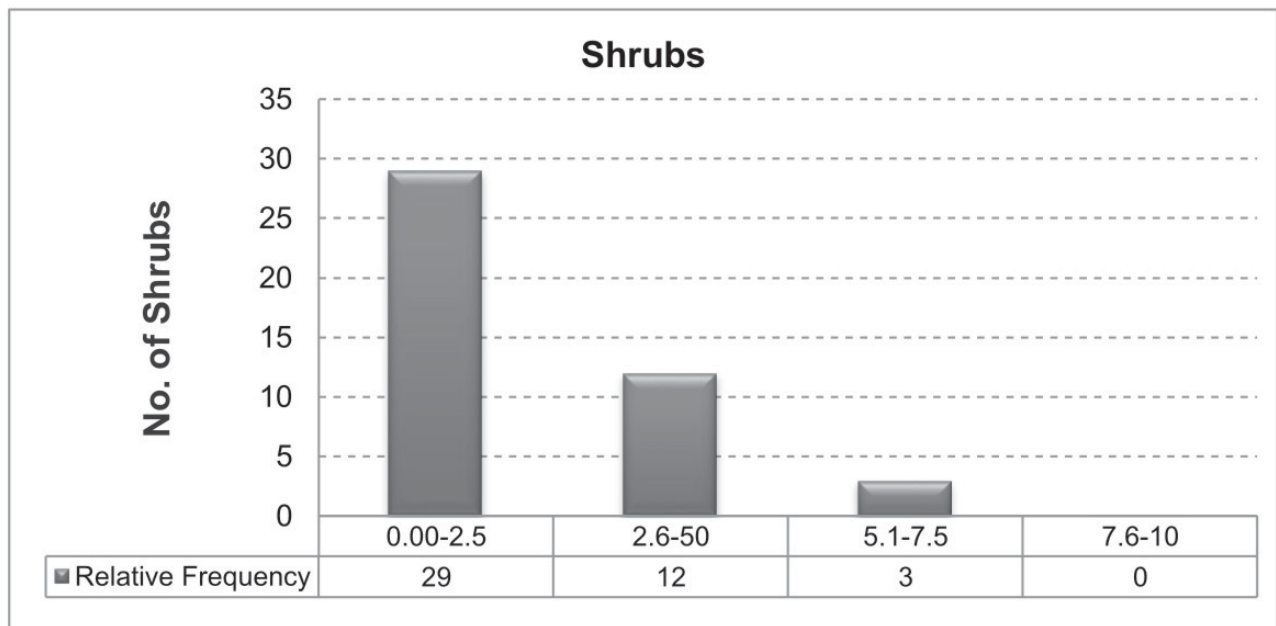


Fig. 4 : Shrubs in relation to Relative Frequency

Acanthaceae and Fabaceae, (03) species each belonged to family Verbenaceae, Rhamnaceae and Lythraceae, (02) each belonged to Apocynaceae and Lamiaceae, while minimum number of species (01) each was recorded for (13) of the families like Moraceae, Papaveraceae, Rutaceae, Plumbaginaceae, Solanaceae, Amaranthaceae, Liliaceae, Poaceae, Agavaceae, Asteraceae, Oleaceae, Olacaceae and Asclepiadaceae. Out of 44 shrub species recorded in Bhupdeopur Reserve forest area, 40 species were wild and 04 were both wild

and cultivated.

Distribution of shrubs

All the plant species were classified into 5 frequency classes⁶.

1. % Frequency of shrubs- % frequency determined was estimated for 40 plant species in the range of 1% to 20%, 03 plant species in the range of 21% to 40%, 01 plant species in the range of 41% to 60% and for none of the plant species % frequency was estimated >60%.The

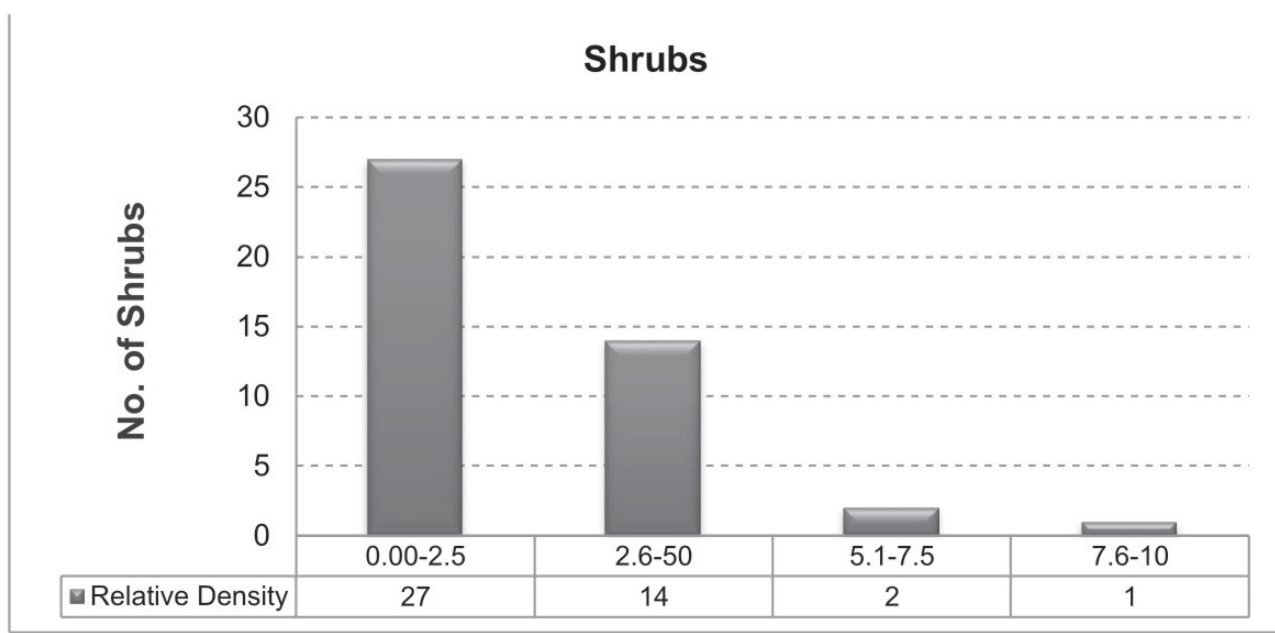


Fig. 5 : Shrubs in relation to Relative Density

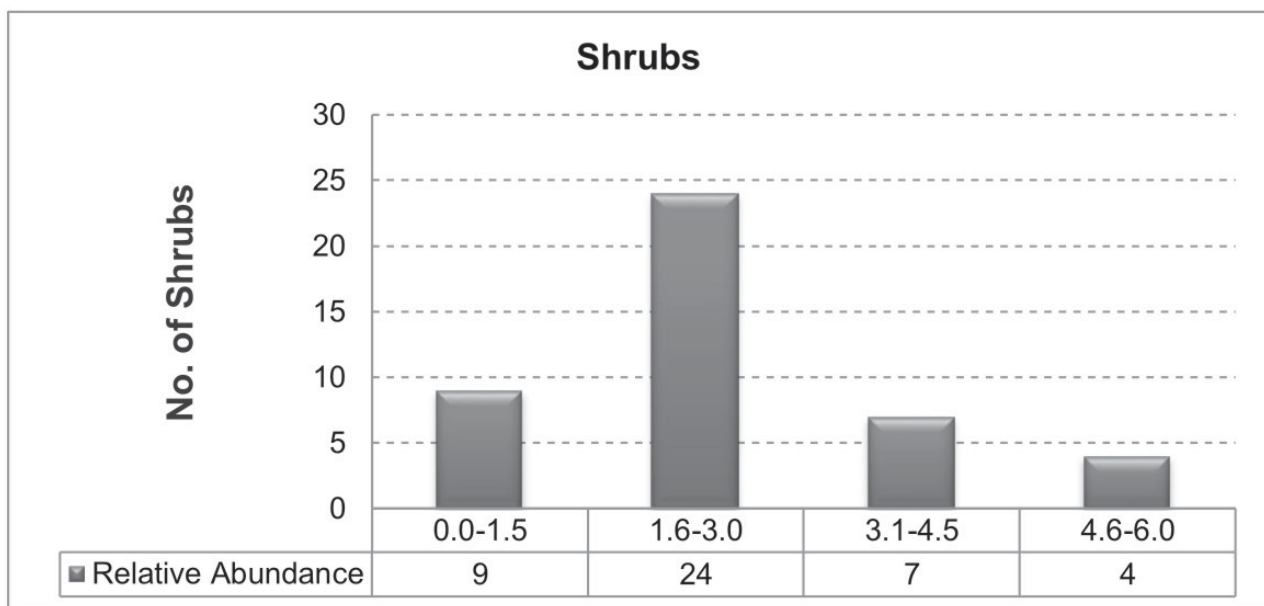


Fig. 6 : Shrubs in relation to Relative Abundance

maximum % frequency 41% was determined for the plant species *Sida cordifolia* and the minimum (01%) for *Barleria prionitis* (Fig.1).

2. Density of shrub- Density was determined for the 33 plant species in the range of 0.00 to 0.75, 10 plant species in the range of 0.76 to 1.50, where as none of the plant species belonged to the range of 1.60 to 2.25 and 01 plant species in the range of 2.26 to 3.00. The maximum density 2.42 was determined for the plant species *Sida cordifolia* and the minimum density (0.05) for *Barleria prionitis* (Fig.2).

3. Abundance of shrub- The abundance was calculated

for the 06 plant species under the range of 0.00 to 2.5, 29 plant species in the range of 2.6 to 5.0, 07 plant species in the range of 5.1 to 7.5 and 02 plant species in the range of 7.6 to 10.0. The maximum abundance (9.00) was determined for the plant species *Urena lobata* and *Ocimum sanctum* and the minimum abundance(0.20) for *Barleria cristata* (Fig.3).

4. Relative frequency of shrubs- Relative frequency was estimated for 29 plant species under the range of 0.00 to 2.5, 12 plant species in the range of 2.6 to 5.0, 03 plant species in the range of 5.10 to 7.50 and none of the plant species was determined for the 7.6 to 10.0. The maximum relative frequency 7.93 was determined for the

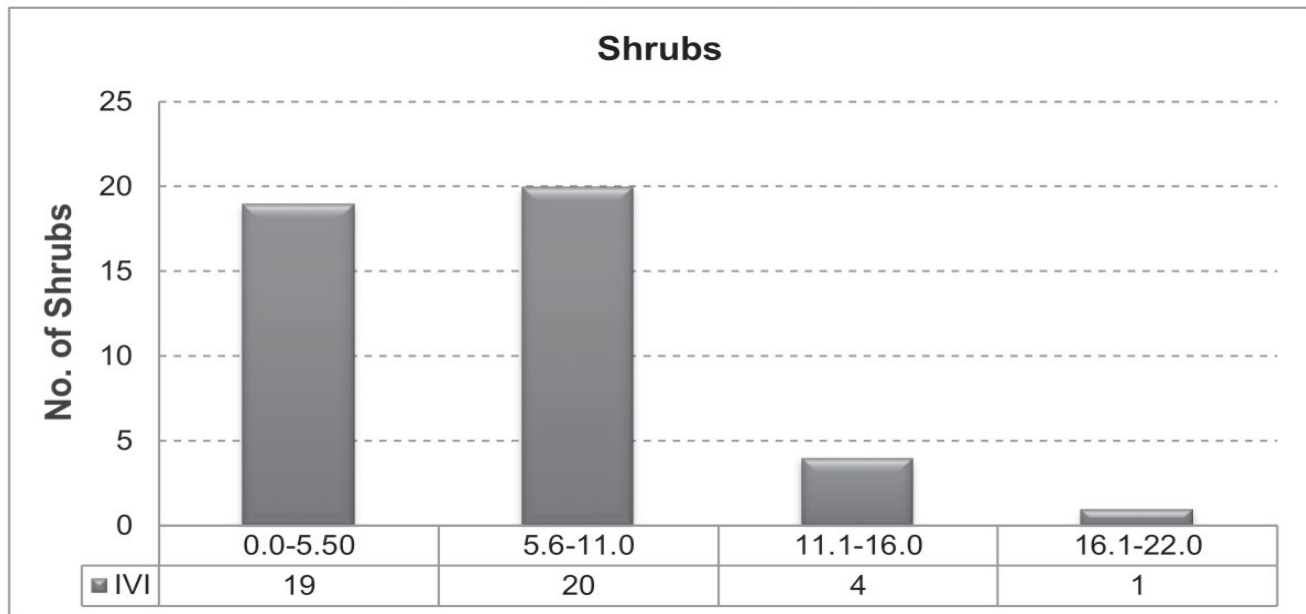


Fig. 7 : Shrubs in relation to Important Value Index

plant species *Sida cordifolia* and the minimum (0.19) for *Barleria prionitis* (Fig.4).

5. Relative density of shrubs- Relative density was determined for 27 plant species in the range of 0.00 to 2.50, 14 plant species in the range of 2.60 to 5.00, 02 plant species in the range of 5.10 to 7.50 and 01 plant species in the range of 7.60 to 10.00. The maximum relative density (9.87) was calculated for the plant species *Sida cordifolia* and the minimum (0.20) for *Barleria prionitis* (Fig.5).

6. Relative Abundance of Shrubs- Relative abundance was calculated for 09 plant species in the range of 0.00 to 1.50, 24 plant species in the range of 1.60 to 3.00, 07 plant species in the range of 3.10 to 4.50 and 04 plant species in the range of 4.60 to 6.00. The maximum relative abundance 5.12 was estimated for the plant species *Urena lobata* and *Ocimum sanctum* while, the minimum 0.11 was determined for *Barleria cirstata* (Fig.6).

7. Important value Index (IVI) of shrubs- Important Value Index (IVI) was calculated for the 19 plant species

in the range of 0.00 to 5.00, 20 plant species in the range of 5.10 to 11.00, 4 plant species in the range of 11.10 to 16.00 and 1 plant in the range of 16.10 to 22.00. The maximum IVI 21.15 was calculated for the plant species *Sida cordifolia*, while minimum 2.22 for *Vitex negundo* and *Calotropis procera*. The results of present study revealed that Bhupdeopur Reserve forest is rich in terms of shrub species despite the disturbance like fire, grazing, extraction of medicinal plants and invasion of exotic species (Fig.7).

Conclusion

The distribution and phytosociological studies clearly indicate that Bhupdeopur reserve forest is an extremely important ecosystem by the virtue of richness of forest wealth and diversity of tree species with mixed dominance and favorable regeneration. However, controlled quantities of fuel wood can be removed from the forest. The species which are threatened, need more attention and care is required.

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