

# Diversity of Forest Herbs during Winters in the Reserve Forest of Bhupdeopur of District Raigarh Chhattisgarh

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**Abstract:** *The present work is concerned with the study of herb layer vegetation during winter season in Bhupdeopur reserve forest of Raigarh district of Chhattisgarh as the exclusive studies on herb layer vegetation in different seasons in forest ecosystems are the need of present ecological time. An extensive survey has been conducted to find out the various steps of forest flora. 60 herb species belonging to 22 families, their local names and various uses by the local inhabitants including medicinal values were recorded during survey, took place in winter season. The parameters such as frequency, density and abundance were also undertaken.*

**Keywords:** Bhupdeopur reserve forest, Raigarh district, Chhattisgarh, Frequency, Density, Abundance, Forest herbs

## 1. Introduction

India is recognized as a country rich in all aspects of Biodiversity and Ecosystem. For any one country in the world, it has perhaps the largest array of environmental stipulations by virtue of its tropical location. Forests are one of the most important recognized ecosystems in the biosphere and India is rich in all aspects of Biodiversity and Ecosystems. Forests are 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 herb storey or under storey vegetation considered an important component of forest ecosystem. These plant strata are integral part of food chain for mammals and birds and control microclimate of the site. The herb layer biomass generally plays an important role in the recycling of nutrients. In forest ecosystem under storey studies have not been given a proper weightage like the tree constituents. No systematic documentation have been made so far to know the floristic composition and ethnobotanical knowledge of the area, that how many types of herb species are found in winter season and how many of them are endangered and at the verge of extinction. In light of the above information present study was planned to study the floristic composition with reference to plant diversity in the forest of Bhupdeopur and ethnobotanical study of the area.

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 composition of two different plant communities. The present study was conducted in Bhupdeopur reserve forest of district Raigarh Chhattisgarh. (Table 1)

## Aim/ Purpose

- 1) Identification of herb species of Bhupdeopur reserve forest, during winter season.
- 2) To study the winter season herb diversity of Bhupdeopur reserve forest.
- 3) Identification of endangered herb species which is of promising value.
- 4) To study the floristic composition of Bhupdeopur reserve forest.
- 5) To enlist ethnobotanical uses of herbs specifically of health and livelihood security.

## 2. Materials and Methods

### 1) Selection of study sites

The present study was conducted in Bhupdeopur Reserve forest of district Raigarh, Chhattisgarh. The study area was divided into 4 circles named as Naharpali, Kerajhar, 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 is spread over in 25 km of North West of Raigarh city. The area comes under Raigarh forest range of Raigarh forest division in Raigarh and Kharsia administrative block.

### 2) Method of sampling

In the present study Phytosociological diversity analysis was carried out by quadrat method. Random sampling of study area was done by Quadrat method following Oosting, (1958). 1mtr sq. circular quadrates were used for the sampling of herb layer. On the basis of the data obtained from the quadrat samples the structural distribution of forest herbs (in the winter season) were analysed. The parameters such as percentage frequency, density, abundance were obtained and were calculated from the data as follows.

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

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

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

### 3. Result and Discussion

40 herb species of dicotyledonae, 19 of monocotyledonae and 01 plant species of pteridophyte in winter season were recorded. In winter season, Poaceae was found to be the dominant family. The maximum number of Herb species (09) was noted for family Poaceae, while, (08) of family Fabaceae, (06) each of family Asteraceae, Acanthaceae and Cyperaceae, 04 of Malvaceae, (02) each of Lamiaceae, Oxalidaceae, Euphorbiaceae, Convolvulaceae, and Rhamnaceae. The minimum number of species (01) was recorded for 13 of the families like Apiaceae, Vitaceae, Zingiberaceae, Amaryllidaceae, Commelinaceae, Asclepiadaceae, Onagraceae, Schizaeaceae, Rubiaceae, Scrophulariaceae, Tiliaceae, Cleomaceae and Colchicaceae. Out of 60 herb recorded during winter season 57 species were wild and 03 were noted as wild / cultivated. (Table-1).

#### Seasonal distribution of Herbs

- % Frequency of herbs:** In winter season, 55 plant species were under the frequency range of 1% to 20% 02 plant species belonging to the range of 21% to 40% 03 plant species belonging to the range of 41% to 60% and none of plant species recorded in the range of 61% to 80% and 81% to 100%. The maximum % frequency (57%) was recorded for the plant species *Merremia emarginata* Burm. H. Hallier F. and the minimum frequency (3%) was recorded for 5 plant species like *Crotalaria burhia* Buch-Ham., *Cyanotis oxillaris* (L.) D. Donex sweet, *Euphorbia hirta* Linn., *Lygodium flexuosum* (L.), and *Oxalis corniculata* Linn. (Fig-1).
- Density of herbs:** In winter, the study of the density showed that total 57 plant species belonging to the density range 0.00 – 0.28, 02 plant species belonging to the range of 2.81 – 5.6, while none of the plant species were recorded in the range of 5.7 – 8.4 and 01 plant species belonged to the rang of 8.5 – 11.2. The maximum density (11.2) was calculated for the plant speices *Hyptis suaveolens* (L.) poit. And the minimum density (0.05) was observed for *Euphorbia hirta* Linn. (Fig.-1).
- Abundance of Herbs:** In winter season, abundance of 54 plant species was in the range of 0.00 – 2.50, 04

plant species in the range of 2.51 – 5.00, 01 plant species in the range of 5.01 – 7.50 and 01 in the range of 7.51 to 10.00. The maximum abundance 20.64 was calculated for the plant species *Hyptis suaveolens* (L.) and the minimum 0.16 for the *Fimbristylis miliacea* (L.) Vahl. (Fig-1).

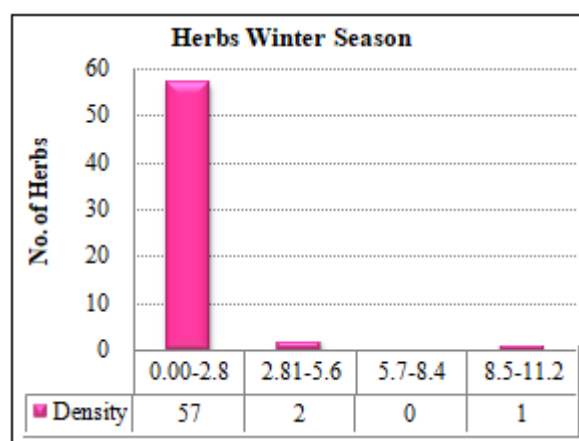
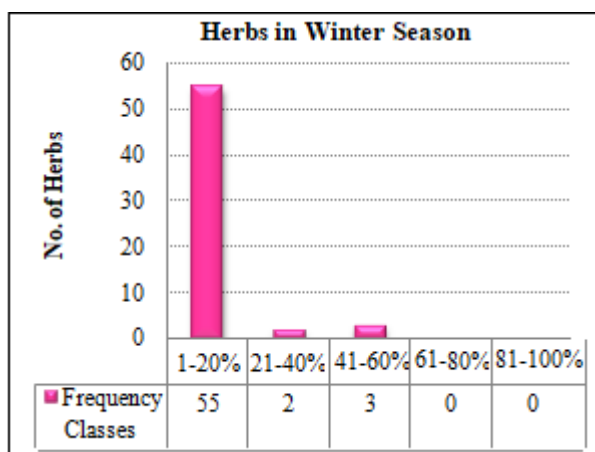
- Relative frequency of herbs:** In winter season relative frequency was determined for 52 plant species in the range of 0.00 to 2.25, 05 plant species in the range of 2.26–6.75 and 03 plant species in the range of 6.76–9.00. The maximum relative frequency was calculated 8.24 for *Merremia emarginata* Burn. F. Hallier F. and minimum 0.43 for 5 plant species like *Crotalaria pallida*, Aiton., *Cyanotis oxillaris* (L.) D Don ex. Sweet, *Euphorbia hirta* Linn., *Lygodium flexuosum* (L.) Sw. and *Oxalis cuniculata* L. (Table-1, Fig2).
- Relative density of herbs:** In winter season, relative density was determined for 54 plant species in the range of 0.00 to 5.25, 04 plant species in the range of 5.26 to 10.50, 01 plant species in the range of 10.51 to 15.75 and 01 plant species in the range of 15.76 to 21.00. The maximum relative density was calculated 25.10 for *Hyptis suaveolens* (L.) Poit. and the minimum relative density 0.17 was obtained for *Oxalis corniculata* Linn. (Table-1, Fig-2).
- Relative Abundance of herbs:** In winter season, Relative abundance was determined for 54 plant species in the range of 0.00 to 2.50, 04 plant species in the range of 2.51 to 5.00, 01 plant species in the range of 5.01 to 7.50 and 01 plant species in the range of 7.51 to 10.00. The maximum Relative abundance 9.26 was calculated for the plant species *Hyptis suaveolens* (L.) Poit and the minimum 0.11 for the *Fimbristylis monostachya*. (Table-1, Fig-2).
- Important value index of herbs:** In winter season, important value index was calculated for 57 plant species in the range of 0.00 to 10.75, none of the plant species in the range of 10.76 to 21.50, 02 plant species in the range of 21.51 to 32.25, 01 plant species in the range of 32.26 to 43.00. The maximum important value index 42.17 was recorded for the plant species *Hyptis suaveolens* (L.) Poit. and the minimum 1.28 for the *Euphorbia hirta* Linn. (Table-1, Fig-3).

**Table 1:** Phytosociological study of Herbs in Bhupdeopur Reserve forest area of district Raigarh during Winter season investigated during the year 2009-2011.

S. No.	Botanical Name	Local / Vernacular Name	Family	Habitat	% Frequency	Density	Abundance	Relative Frequency	Relative Density	Relative Abundance	Important Value Index
1	<i>Abutilon indicum</i> (Link.) Sweet.	Atibala	Malvaceae	Wild	7	0.14	2.00	1.01	0.31	0.89	2.21
2	<i>Aeschynomene indica</i> Linn.	Langaun	Fabaceae	Wild	5	0.32	6.40	0.72	0.71	2.87	4.30
3	<i>Ageratum conyzoides</i> Linn.	Lango	Asteraceae	Wild	11	0.33	3.00	1.59	0.73	1.34	3.60
4	<i>Alloteropsis cimicina</i> (L.) Stapf	Ghass	Poaceae	Wild	11	0.42	3.81	1.59	0.94	1.71	4.24

5	<i>Alysicarpus vaginalis</i> DC.	Latkana	Fabaceae	Wild	11	0.51	4.63	1.59	1.14	2.07	4.80
6	<i>Andrographis echoides</i> (L.) Nees.	Kala Bhui Neem	Acanthaceae	Wild	5	0.13	2.60	0.72	0.29	1.16	2.17
7	<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees	Bhui Neem	Acanthaceae	Wild	12	0.60	5.00	1.73	1.34	2.24	5.31
8	<i>Anisomeles indica</i> (L.) Aunzte.	Van Tulsa	Lamiaceae	Wild	4	0.14	3.50	0.57	0.31	1.57	2.45
9	<i>Biophytum sensitivum</i> (Linn.) DC. Edgew & Hook F.	Laxmana	Oxalidaceae	Wild	6	0.14	2.33	0.86	0.31	1.04	2.21
10	<i>Cayratia carnosa</i> (Lam) Gagnep	Ram chana	Vitaceae	Wild	5	0.08	1.6	0.72	0.17	0.71	1.60
11	<i>Centella asiatica</i> (L.) Urban	Brahmi	Apiaceae	Wild	6	0.26	4.33	0.86	0.58	1.94	3.38
12	<i>Chloris dolichostachya</i> Lag.	Vengoli	Poaceae	Wild	7	0.21	3.00	1.01	0.47	1.34	2.82
13	<i>Corchorus acutangulus</i> Lag.	Nalta	Malvaceae	Wild	5	0.54	0.33	0.72	1.21	0.14	2.07
14	<i>Cleome viscosa</i> L.	Hurhur	Cleomaceae	Wild	8	0.87	0.20	1.15	1.94	0.08	3.17
15	<i>Clitoria ternatea</i> L.	Aparajita	Fabaceae	Wild / Cultivated	5	0.10	2.00	0.72	0.22	0.89	1.83
16	<i>Cenchrus setigerus</i> Vahl.	Dhaman Ghass	Poaceae	Wild	7	0.19	2.71	1.01	0.42	1.21	2.64
17	<i>Costus speciosus</i> (Koenig) Sm.	Keokand	Zingiberaceae	Wild	10	0.36	3.60	1.44	0.80	1.61	3.85
18	<i>Crotalaria pallida</i> Aiton	Junglisan	Fabaceae	Wild	3	0.14	4.66	0.43	0.31	2.09	2.83
19	<i>Curculigo orchioideis</i> Gaertn	Kalimusli	Amaryllidaceae	Wild / Cultivated	18	1.40	7.77	2.60	3.13	3.48	9.21
20	<i>Cyanotis oxillaris</i> (L.) D. Don ex sweet	Baghanulla	Commelinaceae	Wild	3	0.07	2.33	0.43	0.15	1.04	1.62
21	<i>Cynodon dactylon</i> Pers.	Dub ghass	Poaceae	Wild	8	0.42	5.25	1.15	0.94	2.35	4.44
22	<i>Cyperus bulbosus</i> Vahl.	Junglipyaz	Cyperaceae	Wild	12	0.42	3.50	1.73	0.94	1.57	4.24
23	<i>Cyperus compressus</i> (L.)	Ghass	Cyperaceae	Wild	9	0.35	3.88	1.30	0.78	1.74	3.82
24	<i>Cyperus iria</i> Linn.	Tarajughass	Cyperaceae	Wild	5	0.25	5.00	0.72	0.56	2.24	3.52
25	<i>Cyperus rotundus</i> L.	Nagarmotha	Cyperaceae	Wild	11	0.53	4.81	1.59	1.18	2.15	4.92
26	<i>Cyperus scariosus</i> R.Br.	Motha	Cyperaceae	Wild	9	0.98	0.75	1.30	2.19	0.33	3.82
27	<i>Cyperus triceps</i> (Roxb.) Endl.	Nirbisi	Cyperaceae	Wild	10	0.52	5.20	1.44	1.16	2.33	4.93
28	<i>Desmodium triflorum</i> DC.	Kaldali	Fabaceae	Wild	48	5.55	11.56	6.94	12.43	5.18	24.55
29	<i>Desmodium gangeticum</i> DC.	Salparni	Fabaceae	Wild	14	0.32	2.28	2.02	0.71	1.02	3.75
30	<i>Elephantopus scaber</i> L.	Mayur chundi	Asteraceae	Wild	10	0.22	2.20	1.44	0.49	0.98	2.91
31	<i>Elytraria acaulis</i> (L.f.) Lindau	Dasmori	Acanthaceae	Wild	6	0.14	2.33	0.86	0.31	1.04	2.21
32	<i>Eragrostis ciliaris</i> Linn.	Grass	Poaceae	Wild	6	0.24	4.00	0.86	0.53	1.79	3.18
33	<i>Euphorbia hirta</i> Linn.	Dudhi	Euphorbiaceae	Wild	3	0.05	1.66	0.43	0.11	0.74	1.28
34	<i>Evolvulus alsinoides</i> Linn.	Shankha Pushpi	Convolvulaceae	Wild	14	0.50	3.57	2.02	0.71	1.60	4.33
35	<i>Fimbristylis miliacea</i> (L.) Vahl	Mutha	Cyperaceae	Wild	8	0.87	0.16	1.15	1.94	0.11	3.20
36	<i>Gloriosa superba</i> Linn.	Kalihari	Colchicaceae	Wild	9	0.24	2.66	1.30	0.53	1.19	3.02
37	<i>Hemidesmus indicus</i> (L.) R. Br.	Anantmool	Asclepiadaceae	Wild	29	0.65	2.24	4.19	1.45	1.00	6.64
38	<i>Heteropogon contortus</i> (Linn.) Beauv. Ex Roem & Schw.	Shupla kanta	Poaceae	Wild	17	1.40	8.23	2.46	3.13	3.69	9.28
39	<i>Hyptis svaveolens</i> (L.) Poit.	Ban Tulsa	Lamiaceae	Wild	54	11.2	20.64	7.81	25.10	9.26	42.17

40	<i>Ludwigia perennis</i> Linn.	Jal Dhawai	Onagraceae	Wild	5	0.14	2.80	0.72	0.86	1.25	2.83
41	<i>Lygodium flexuosum</i> (L.) Sw.	Indra raj	Schizaeaceae	Wild	3	0.08	2.66	0.43	0.17	1.19	1.79
42	<i>Malva parviflora</i> Linn.	Panirak	Malvaceae	Wild	10	0.22	2.20	1.44	0.49	0.98	2.91
43	<i>Malvestrum coromendelianum</i> (L.) Garcke	Jhadu Ghass	Malvaceae	Wild	15	0.28	1.86	2.17	0.62	0.83	3.62
44	<i>Meremmia emarginata</i> Burm. F.	Musakani	Convolvulaceae	Wild	57	5.60	9.82	8.24	12.55	4.40	25.19
45	<i>Oldenlandia corymbosa</i> Linn.	Pit Papara	Rubiaceae	Wild	7	0.17	2.42	1.01	0.38	1.08	2.47
46	<i>Oxalis corniculata</i> Linn.	Chuka tripati	Oxalidaceae	Wild	3	0.08	2.66	0.43	0.17	1.19	1.79
47	<i>Peristrophe bicalyculata</i> (Rete.) Nees.	Atrilal	Acanthaceae	Wild	7	0.19	2.71	1.01	0.42	1.21	2.64
48	<i>Phyllanthus niruri</i> Hook. F.	Bhui Amla	Euphorbiaceae	Wild	8	0.38	4.75	1.15	0.85	2.13	4.13
49	<i>Rungia pectinata</i> (L.) Nees.	Tavashu	Acanthaceae	Wild	15	0.38	2.53	2.17	0.85	1.13	4.15
50	<i>Rungia repens</i> Nees.	Kharmar	Acanthaceae	Wild	10	0.28	2.80	1.44	0.62	1.25	3.31
51	<i>Scoparia dulcis</i> Linn.	Ghoda Tulsi	Scrophulariaceae	Wild	8	0.30	3.75	1.15	0.67	1.68	3.50
52	<i>Setaria glauca</i> (L.) Beauv.	Lapetra	Poaceae	Wild	13	0.24	1.84	1.88	0.53	0.82	3.23
53	<i>Sida rhombifolia</i> Linn.	Lal Barela	Malvaceae	Wild	8	0.36	4.50	1.15	0.80	2.01	3.96
54	<i>Tephrosia purpurea</i> (L.) Pers.	Sarponkh	Fabaceae	Wild	15	1.64	1.36	2.17	3.67	0.61	6.45
55	<i>Thysanolaena maxima</i> (Roxb.)	Phool Baheri	Poaceae	Wild	23	1.00	4.34	3.32	2.24	1.94	7.50
56	<i>Tridax procumbens</i> Linn.	Khargosh ghass/ Pok sunala	Asteraceae	Wild	15	0.56	3.73	2.17	1.25	1.67	5.09
57	<i>Vernonia cinerea</i> Nees.	Sahdevi	Asteraceae	Wild	20	0.45	2.25	2.89	1.00	1.00	4.89
58	<i>Vicoa vestita</i> Benth. (Wall. ex DC.)	Pila Rasna	Asteraceae	Wild	8	0.12	1.50	1.15	0.26	0.67	2.08
59	<i>Youngia japonica</i> (Linn.) DC.	Mauli	Asteraceae	Wild	4	0.09	2.25	0.57	0.20	1.00	1.77
60	<i>Zornia gibbosa</i> Spanoghe	Samarpani	Fabaceae	Wild	6	0.26	4.33	0.86	0.58	1.94	3.38



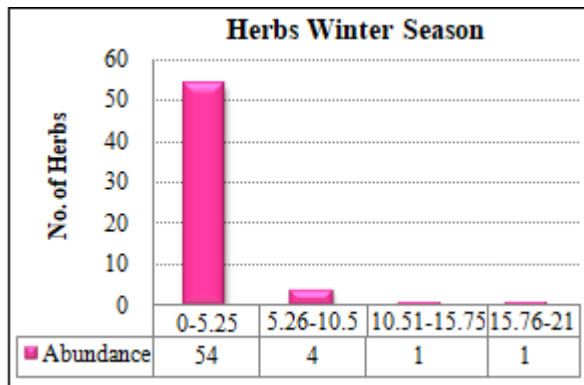


Figure 1: Frequency, density and abundance of Herbs in winter determined in Bhupdeopur Reserve forest area of district Raigarh

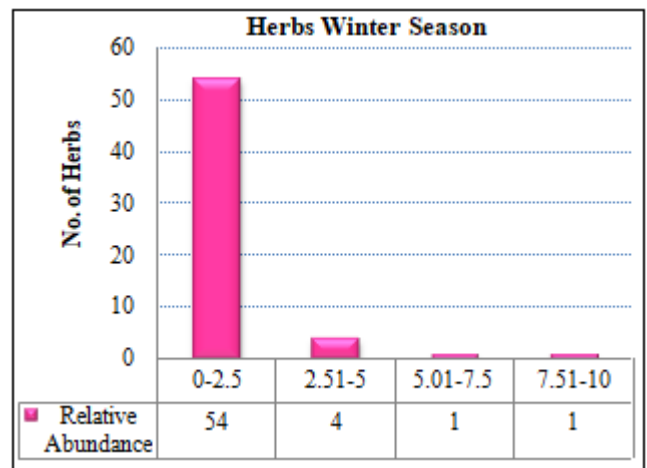


Figure 2: Relative Frequency, Relative density, Relative Abundance of Herbs determined in Bhupdeopur Reserve forest area of district Raigarh

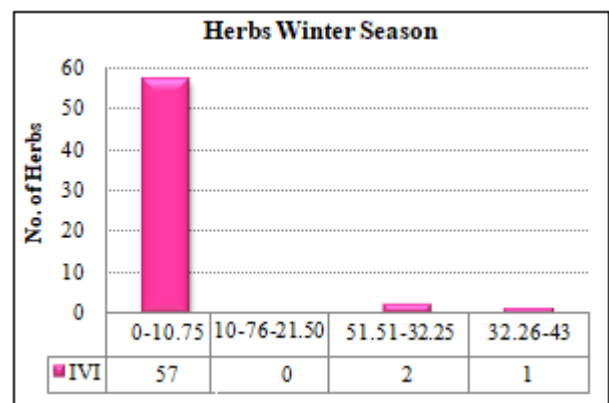
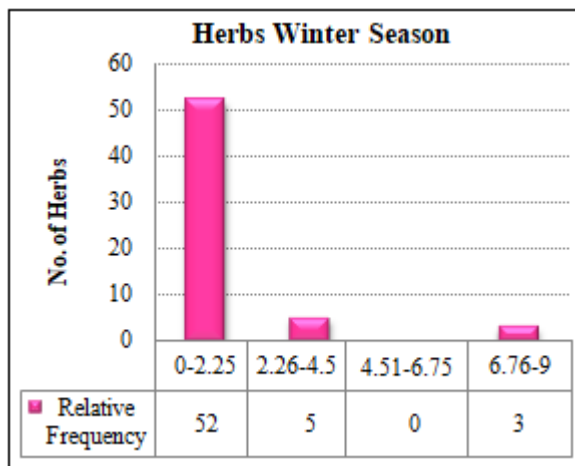
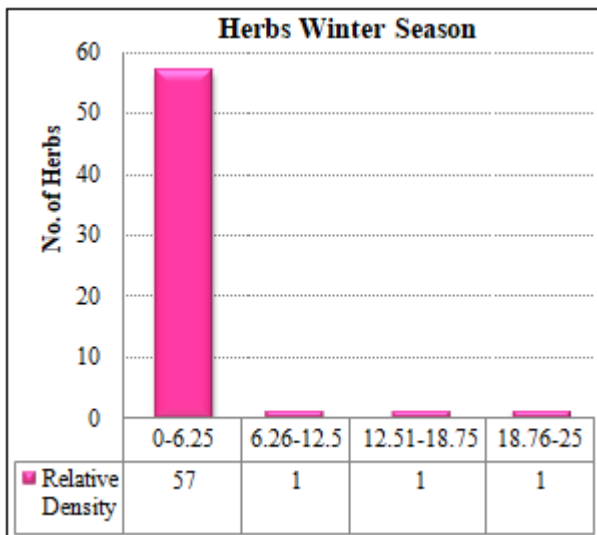


Figure 3: Important Value Index (IVI) of Herbs determined in Bhupdeopur Reserve forest area of district Raigarh



#### 4. Conclusion

The Phytosociological diversity analysis of herb layer vegetation during winter season clearly indicates that Bhupdeopur Reserve Forest is an extremely important ecosystem by the virtue to richness of forest health and diversity of herb species. The species which are threatened need more attention and care.

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