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Phytosociological Studies on Certain Plants of Awarpur (M.S.)

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Abstract

Phytosociology is the study of the vegetation at a particular site is the result of interactions of the various climatic and bio-edaphic factors. The predominance of a particular plant species also indicates its adaptability on a particular site within a given set of environmental factors. Thus, the study of floristic composition of plant species at a site quantitative terms may give important insight about the complex dynamics of ecological changes taking place in space and time. The present paper deals with the study phytosociological aspets of 30 medicinal plants present is Awarpur study site of MH.

Key-Words: Phytosociology, Plants, Awarpur

Introduction

The knowledge of floristic composition and quantitative characteristics of plant vegetation is important for managing the forest ecosystem. It is an accepted fact that the vegetation at a particular site is the result of interactions of the various climatic and bio-edaphic factors. During the course of succession, many plant species compete with each other to establish their hold on the vacant niches. As a result, some of the plant species become dominant and occupied top position in the community in terms of social status and others are either eliminated from the ecosystem or content with their lower social status. The predominance of a particular plant species also indicates its adaptability on a particular site within a given set of environmental factors. Thus, the study of floristic composition of plant species at a site quantitative terms may give important insight about the complex dynamics of ecological changes taking place in space and time. The present text deals with the study of structure and composition of plant diversity of Awarpur.

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Material and Methods

Study on grass land was made for first time by Roy, 1984. They studied Phytosociological problems in plant community Bharucha, 1941 and his associate also contributed to the Phytosociological of grass land. Modern aspects have been studied by Grime, 1998. The Sampling procedure will be adopted as suggested by Mishra, 1987. The quantitative and qualitative characters of species will be recorded by counting the individuals. The formula for calculating frequency, density, basal area, relative frequency, relative density, and relative dominance is listed as under.

$$\textbf{Frequency}\ (\%) = \frac{\text{Number of Quadrates in which a species occurred}}{\text{Total Number of Quadrate sampled}}$$

$$\textbf{Density} = \frac{\text{Total Number of individuals of species in all Quadrates}}{\text{Total Number of Quadrates sampled}}$$

$$\textbf{Abundance} = \frac{\text{Total No. of individuals of a species in all Quadrates}}{\text{Total Number of Quadrates in which the species occurred}}$$

Basal area = pr2

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Where, p = 3.14
r = radius of stem at the point of emergence

Important value index of each species was calculated by summing the percentage value of relative frequency, relative density and relative dominance express in per 300.

$$\textbf{Relative Frequency } (\%) = \frac{\text{No. of occurrence of species}}{\text{No. of occurrence of all species}} \times 100$$

$$\textbf{Relative density } (\%) = \frac{\text{No. of indiv. of species in all quadrates}}{\text{No. of indiv. of all species in all quadrates}} \times 100$$

$$\textbf{Relative dominance } (\%) = \frac{\text{Total basal cover of a species in all Quadrate}}{\text{Total basal cover of all species in all Quadrates}} \times 100$$

Importance value index (IVI) = Relative Density+Relative Dominance+Relative Frequency

Species Diversity

The diversity of the vegetation is calculated using Shannon-Weaver information measure of species diversity (H) (Shannon-Weaver, 1949).

Shannon-Weaver information measure of diversity (H) is calculated as follows:

$$H = \sum_{i=1}^{s} Pi \log pi$$

Where, Pi=importance of the i^{th} species
S=number of species

Concentration of Dominance (CD)

Concentration of Dominance values were measured by Simpson's index (Simpson, 1949). It can be calculated as:

$$C = \sum (Ni/N)2$$

Where, Ni = Total no. of individual species
N = Total no. of individual of all species in the releve

Results, Discussion and Conclusions

A total 30 of plant species viz., *Azadirachta indica, Albizzia lebbeck, Aegle marmelous, Acacia catechu, Achyranthus aspera, Argemone Mexicana, Acacia nilotica, Bombax ceiba, Butea monosperma, Bauhinia racemosa, Cassia fistula, Cassia siamea, Cassia tora, Carica papaya, Cyperus difformis, Calotropis procera, Dalbergia sisso, Eclipta prostrate, Eucalyptus oblique, Ficus benghalensis, Ficus racemosa, Ficus religiosa, Lantana camara, Hibiscus rosa-sinensi, Mangifera indica, Madhuca longifolia, Pongamia pinnata, Ricinus communis, Tamarindus indica and Zizphus glaberrima* of herbs, shrubs and trees have been recorded for the present investigation from selected study sites of Awarpur of Chandrapur, Maharashtra. Table 1 shows analytical characteristics of vegetation of the selected sites. Some of the plant species like *Azadirachta indica, Dalbergia sisso, Eclipta prostrate, Eucalyptus oblique, Mangifera indica, Tamarindus indica* etc. exhited higher density in the forest. On the other hand *Achyranthus aspera, Argemone Mexicana, Butea monosperma, Ficus benghalensis, Ficus racemosa, Ficus religiosa* etc. have shown lesser density in the study site. Graph 1 and 2 shows the density of plant diversity of the study area.

The differences in plant species composition have been observed in relation to topographic features and frequency. The frequency of *Azadirachta indica, Dalbergia sisso, Eucalyptus oblique, Mangifera indica, Tamarindus indica* etc. were found to be maximum whereas of *Albizzia lebbeck, Acacia catechu, Ficus benghalensis, Ficus racemosa, Ficus religiosa* etc. have shown lesser in the study site. Graph 3 and 4 shows the density of plant diversity of the study area.

Similarly, the basal area, relative density, relative frequency and relative dominance were studied and reported in the present chapter (Graph 5-8). Table 2 shows total density of plant species was recorded as 318.40/ha. Per hectare basal are of the plant diversity was calculated as 62.741 m^2/ha. Plant species diversity was observed as 1.392. A high value of concentration of dominance was observed for the study area (3.5502). The plant diversity of Awarpur broadly fall under tropical dry deciduous forest (Champion and Seth, 1968). Analysis of floristics shows that *Dalbergia sisso* appeared to be the most dominant plant species in Awarpur. After critical examination of results, the Awarpur plant species diversity could be considered as *Dalbergia-Mangifera* community. Higher value of total plant species density and lower value of total basal area indicated an inverse relationship between density and basal area. This results is in agreement with the findings of Adhikari et al., 1991. The higher value of concentration of dominance in this study area could be attributed to the environmental stress (Connel and Orias, 1964). This indicates that the dominance is not shared by more species in selected the study area of Awarpur.

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Table 4.11: Phytosociological Studies of plant diversity of Awarpur

S./No.	Name of Plant Species	D	F	BA	RF	RD	RDo	IVI
1.	*Azadirachta indica*	16.2	18	0.788	5.249	6.218	1.343	12.81
2.	*Albizzia lebbeck*	0.5	0.76	0.051	0.221	0.191	0.086	0.498
3.	*Aegle marmelous*	1.0	1.5	0.151	0.437	0.383	0.257	1.077
4.	*Acacia catechu*	1.0	0.76	0.189	0.221	0.383	0.322	0.926
5.	*Achyranthus aspera*	0.23	0.7	0.094	0.204	0.088	0.160	0.452
6.	*Argemone mexicana*	0.21	0.5	0.070	0.201	0.080	0.120	0.401
7.	*Acacia nilotica*	1.0	0.76	0.187	0.223	0.382	0.320	0.925
8.	*Bombax ceiba*	0.46	1.3	0.201	0.379	0.176	0.034	0.589
9.	*Butea monosperma*	0.12	0.5	0.210	0.145	0.046	0.357	0.548
10.	*Bauhinia racemosa*	2.5	2	0.270	0.437	0.575	0.330	1.342
11.	*Cassia fistula*	1.5	1.5	0.194	0.437	0.575	0.330	1.342
12.	*Cassia siamea*	1.5	1.2	0.185	0.430	0.490	0.329	1.249
13.	*Cassia tora*	1.5	0.7	0.179	0.401	0.480	0.301	1.182
14.	*Carica papaya*	0.8	2	0.580	0.583	0.307	0.988	1.878
15.	*Cyperus difformis*	1.20	3	0.21	0.874	0.464	0.357	1.695

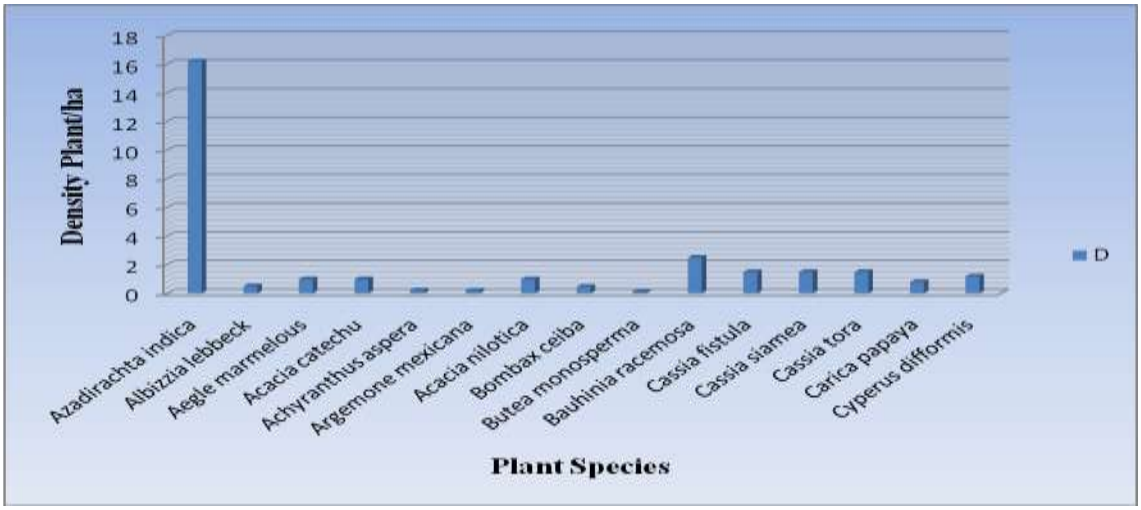
16.	*Calotropis procera*	6.5	7	2.91	2.210	2.516	3.916	8.642
17.	*Dalbergia sisso*	43.1	41	2.910	13.121	16.770	5.081	34.972
18.	*Eclipta prostrate*	10.5	9	1.681	2.333	3.990	2.864	9.187
19.	*Eucalyptus oblique*	23.1	32	7.104	9.331	8.956	12.103	30.39
20.	*Ficus benghalensis*	0.11	0.6	0.701	0.174	0.042	1.193	1.409
21.	*Ficus racemosa*	0.13	0.7	0.521	0.204	0.049	0.852	1.105
22.	*Ficus religiosa*	0.12	0.8	0.603	0.213	0.051	0.961	1.225
23.	*Lantana camara*	8.6	12	0.035	3.449	3.301	0.059	6.809
24.	*Hibiscus rosa-sinensis*	3.9	10	0.916	2.134	1.696	2.468	6.298
25.	*Mangifera indica*	22.9	24	2.726	6.989	8.752	4.606	20.347
26.	*Madhuca longifolia*	3.6	4	2.335	1.166	1.381	3.980	6.527
27.	*Pongamia pinnata*	0.8	2	0.580	0.583	0.307	0.985	1.875
28.	*Ricinus communis*	4.07	9.10	1.507	2.977	1.598	2.571	7.146
29.	*Tamarindus indica*	14.1	20	4.670	5.813	5.466	8.130	19.409
30.	*Zizphus glaberrima*	2.81	7	0.392	2.041	1.078	0.668	3.787

Abbr.: D=Density; F=Frequency; BA=Basal Area; RF=Relative Frequency; RD=Relative Density; RDo=Relative Dominance; IVI=Important Value Index

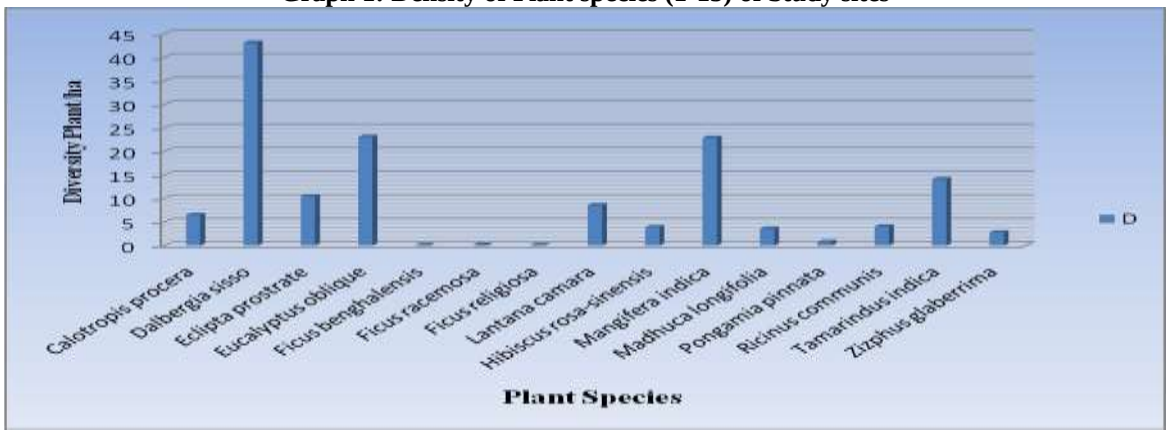
Table 2: Phytosociological parameters of plant diversity of Awarpur

Study Area	R	H	CD	TD (Per/Ha)	TBA (m^2/ha)
Awarpur	30	1.392	3.5502	318.40	62.741

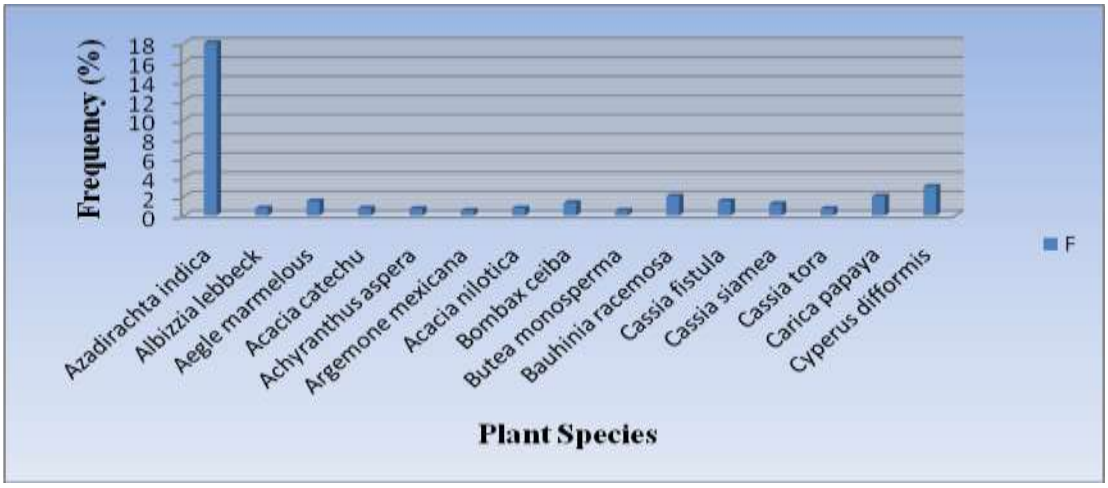
Abbr.: R=Species Richness; H=Species Diveristy; CD=Concentration of Dominance; TD=Total Density; TBA=Total Basal Area



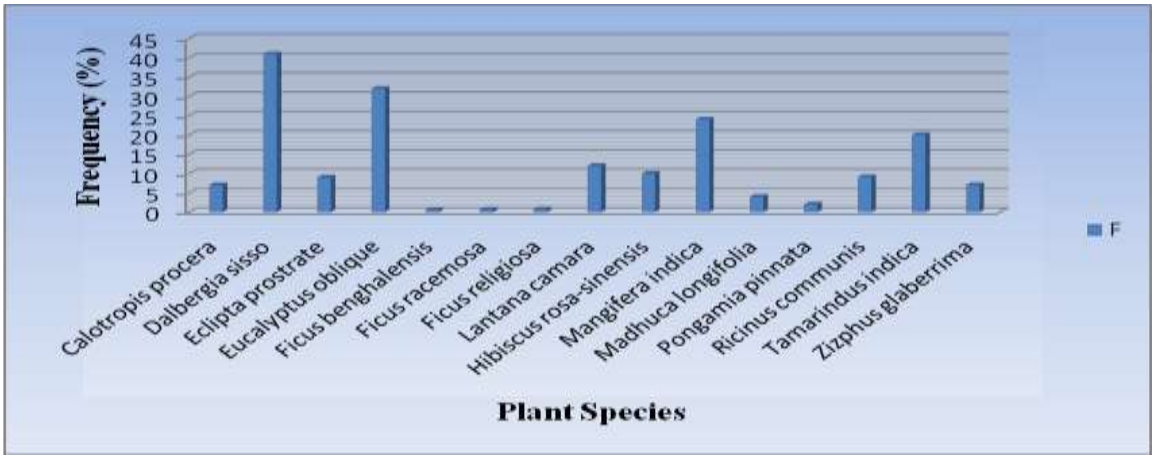
Graph 1: Density of Plant species (1-15) of Study sites



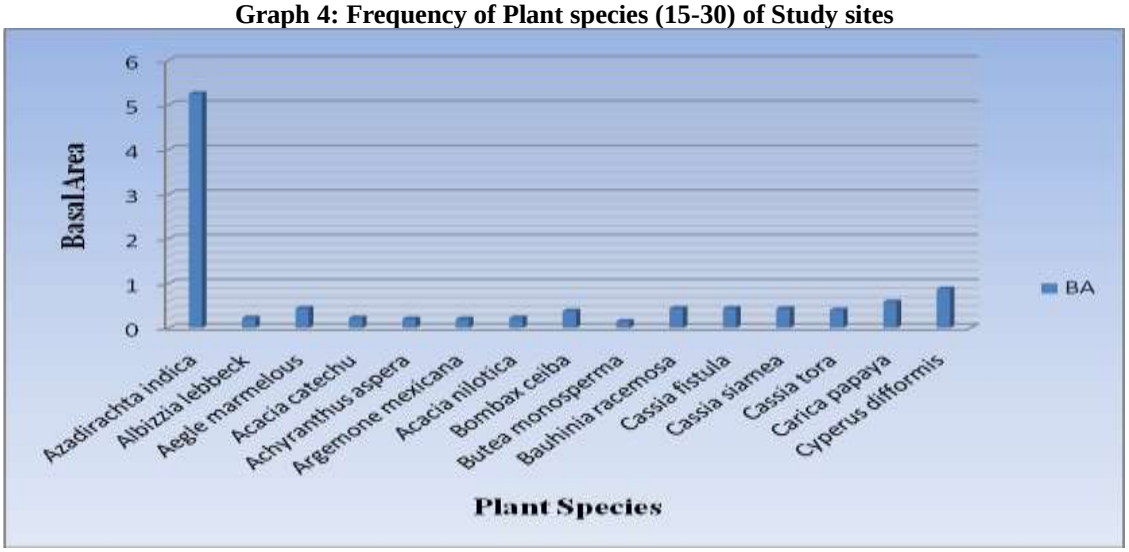
Graph 2: Density of Plant species (15-30) of Study sites



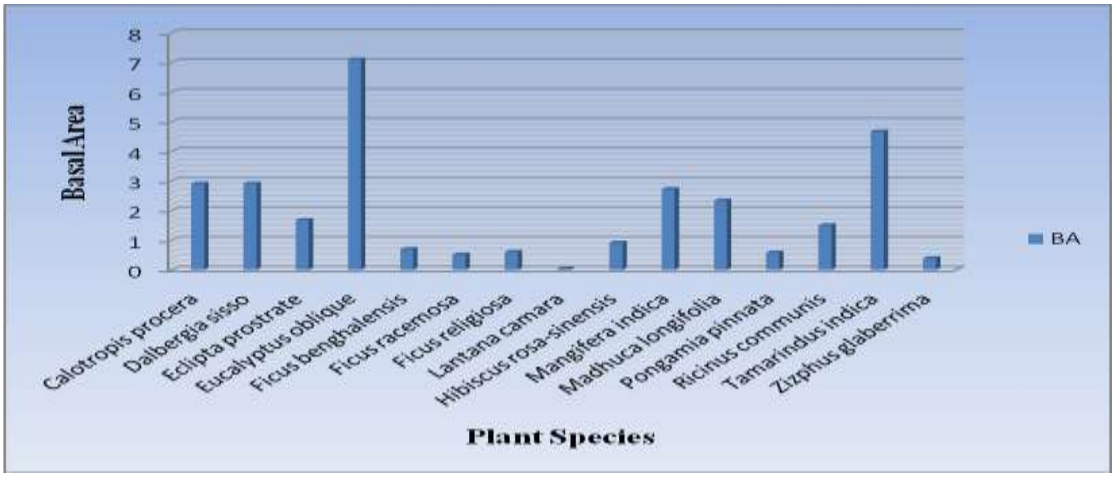
Graph 3: Frequency of Plant species (1-15) of Study sites



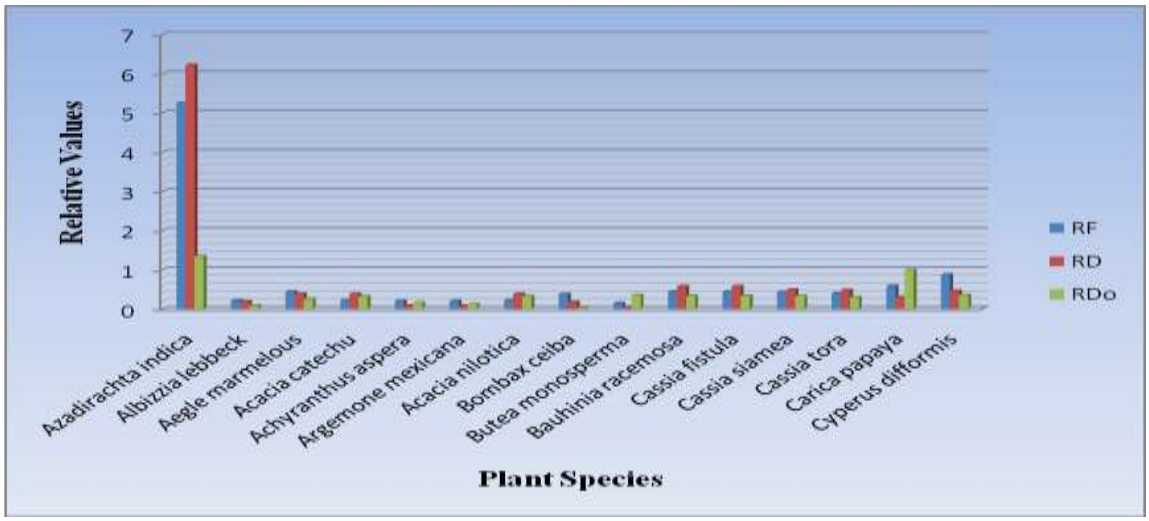
Graph 4: Frequency of Plant species (15-30) of Study sites



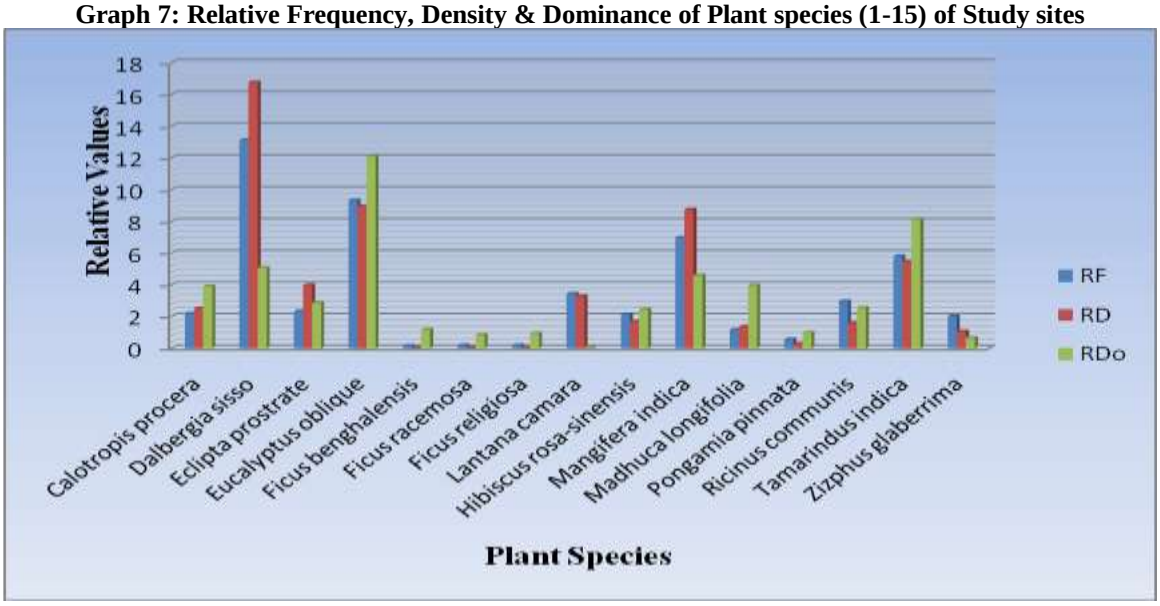
Graph 5: Basal Area of Plant species (1-15) of Study sites



Graph 6: Basal Area of Plant species (15-30) of Study sites



Graph 7: Relative Frequency, Density & Dominance of Plant species (1-15) of Study sites



Graph 8: Relative Frequency, Density & Dominance of Plant species (15-30) of Study sites

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