Explorer Research Article [Bhagat *et al.*, 5(6): June, 2014:3627-3630]
CODEN (USA): IJPLCP ISSN: 0976-7126

INTERNATIONAL JOURNAL OF PHARMACY & LIFE SCIENCES
(Int. J. of Pharm. Life Sci.)

Plant species diversity and phytosociological analysis in forest of Jaljali Mainpat, Ambikapur, (C.G.)

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Abstract

The present study was carried out to analyze the species diversity, structure, composition and tree vegetation in dry tropical forest of sal dominant forest of Jaljali Manpat, Ambikapur (C.G.) during the period 2013. The study sites of forests representing 12 species of tree species reported ≥ 30 cm GBH, and number of seedling and sapling species were observed 4 for each, resulting in a total of forty two plots. In present study measured the important value index trees species, species diversity, basal cover and relative density of sapling and seedling of Mainpat Ambikapur CG. The maximum basal cover area was observed in Sal and the data reveals that maximum IVI of sapling was observed in *Shorea robusta* in most of the sites.

Key-Words: Diversity, Phytosociological analysis, Sal, Mainpat

Introduction

Tropical forest is characterized by high species richness, standing biomass and productivity (Jordan 1983) and their diversity has attracted much attention in recent years (Sagar *et al.*, 2003). In Chhattisgarh about 44% of the land area is under forest cover. The species composition of forests depends on the regeneration of species composing the forest in space and time. The phyto sociology is one of the important aspects for analyzing the structure, composition and phyto diversity for thoroughly understanding the vegetation dynamics. Both structure and diversity of vegetation have strong functional role in controlling ecosystem processes like biomass production, cycling of water and nutrients (Gower et al. 1992). The strong correlation also exists between structural diversity and species diversity (Sahu et al. 2008). In the present study was carried out to analyze the structure, composition and diversity of tree vegetation in degraded dry tropical forest in Chhattisgarh plain. The present study will be focusing on the species diversity and density of woody plant and shrubs in sal dominant forest of Jaljali Manpat, Ambikapur, (C.G.) during the period 2012-2013 to study the measure the important value index of woody trees & shrubs species.

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Material and Methods

Study area

The present work was carried out in Jaljali Mainpat Ambikapur C.G. is an experience a typical monsoon climate, with three distinct seasons: summer from March- June, rainy monsoon period from July - October and winter from November-February. The soils are generally lateritic, nutrient-poor and characterized by excessive amounts of iron oxide. The soils are alluvial found along the streams and rivers. The rock types are schist's and gneisses with granite intrusion, sandstones, shales, limestone, basaltic lava and laterite with bauxite. The forests constitute ca. 66% of the area against 34% areas with other land uses, including agriculture. Champion & Seth (1968) found the forest is seasonally dry tropical and includes extensive tracts of old growth *Shorea robusta* forest.

The Jaljali Mainpat area is situated in Surguja district of Chattishgarh. The average temperatures in winter and summer are 11-15^{0}C and 22-25^{0}C respectively. Its lattitute and longitude vary from 22^{0}45'-22^{0}53' to 83^{0}18'-83^{0}25'. It is spread over 29 km in length and 12km breadth. Its peak height is 1152m and height from sea area shore is 990m. It is the main tourist spot of Chattishgarh. There is place called "bouncing land" or "Jaljali" in local language. The specialty of this place is that if a person jumps in one place, things in the whole area shake and the ground appears to be like a trampoline.

Data analysis

The vegetation was sampled from 14 sites by lying Jaljali Mainpat area is situated in Surguja district of

Chattishgarh, three randomly selected circulars plots were lay down. In each 10 m radius plot for tree species, trees 30 cm gbh and sapling (<3.8cm. and <9.6 cm Gbh) and established tree seedling (<3.5cm diameter). Diameter at breast height for trees and sapling is recorded for each individual detailed of species discussed. In the case of herbs, only number of individuals was counted. The girth at breast height (GBH) of each adult tree and shrub, was recorded for each individual was measured in all quadrats and tallied by species.

Density (D) = Total no. of individuals of a species in all the quadrats / Total no. of quadrats studied

Frequency = Total number of quadrats in which the species occurred / Total number of quadrats studied ×100

Basal cover area (BC)

It is and expression of girth of different species in a community per quadrates in which they occur, it is calculated as

Basal area (BC) = BC of Q1 + Q2 + Q3 / 3

Relative Density (RD) = Total no. of individual of a species in all the quadrates/ Total no. of individual of all species in all quadrates * 100

Relative basal cover area (RBC) = Total no. of Basal area of a species in all the quadrates / Total no. of basal area of all species in all quadrates ×100

Important Value Index

The importance value index was determine on the basis of relative frequency, relative density, and relative basal cover area.IVI = Relative Density+ Relative Frequency+ Relative basal area

Results and Discussion

The study sites of forests representing 12 species of tree species reported ≥ 30 cm GBH, and number of seedling and sapling was observed 4 in each resulting in a total of forty two plots in the. On the basis of basal cover area, the fifteen sites differed in the combination of dominant, co-dominant species and minimum species (Table 1). The minimum Basal cover area of tree species was observed in *Zizyphus mauritiana* (site 1) and maximum was observed in *Shorea robusta* (all 14 sites) but in 7 sites only single species was observed. *Shorea robusta* was found one of the most dominant tree species and observed maximum sapling and seedling density of tree species (Table 2).

Table 1: Representing the diversity in basal cover area of tree species in Jaljali, Ambikapur, CG

S.N	Plant Species	Site1	Site2	Site3	Site4	Site5	Site6	Site7	Site8	Site9	Site10	Site11	Site12	Site13	Site14
1	*Shorea robusta*	58.87	87.46	95.53	96.13	88.35	90.94	91.15	100	100	100	100	100	100	100
2	*Buchanania lanzan*	-	4.56	-	-	-	-	4.63							
3	*Syzyyium cumini*	1.95	-	-	-	-	5.81	-							
4	*Schleichera oleosa*	-	-			4.9	-	-							
5	*Cassia fistula*	-	-			3.56	-								
6	*Terminalia belerica*	2.84	-			-	-	4.2							
7	*Zizyphus mauuritiana*	1.73	-			3.16	3.23								
8	*Phyllanthus emblica*	-	-	4.46		-		-							
9	*Terminalia Chebula*	-	7.97			-		-							
10	*Aegle marmelos*	-	-		3.86	-	-								
11	*Diospyros melanoxylon*	2.57	-			-	-	-							
12	*Ficus benghalensis*	32.37	-				-	-							

In Manpat Jaljali sites, data reveals that maximum RD of sapling was observed in *Shorea robusta* (in 8 sites) whereas minimum RD in *Syzygium cumini* (In site 9). In Manpat Jaljali site, data reveals that maximum IVI of sapling was observed in *Shorea robusta* (In 8 sites) (Table 2)

Table 2: Representing the diversity in relative density of sapling and relative basal cover area of seedling of tree in Jaljali, Ambikapur, CG

S.N	Plant species	$Site_1$	$Site_2$	$Site_3$	$Site_4$	$Site_5$	$Site_6$	$Site_7$	$Site_8$	$Site_9$	$Site_{10}$	$Site_{11}$	$Site_{12}$	$Site_{13}$	$Site_{14}$
1	*Shorea robusta*	90	80	100	100	90	90	100	100	92.2	100	85.71	100	100	100
2	*Syzygium cumini*	9.99	-							7.69					
3	*Zizyphus mauritiana*	-	9.99				9.99					14.28			
4	*Phyllanthus emblica*	-	9.99			9.99									
	Seedling														
1	*Shorea robusta*	77.35	49.96	45.03	73.95	58.61		76.92	54.23	74.98	85.28	76.46	62.5	45.45	100
2	*Syzygium cumini*		4.99			41.38				25.01			30	9.08	
3	*Zizyiphus mauritiana*	22.64		38.05			100		45.76			23.53	7.49	45.45	
4	*Aegle marmelos*	-	45.3	16.91	26.04			23.07			14.71				

Floristic inventory and diversity studies help us understand the species composition and diversity status of forests, which also offer vital information for forest conservation. In the Volcan Barva, Costa Rica tropical forest, Shannon's diversity and species richness (number of species per plot) were also negatively associated with altitudinal gradient (Lieberman et al. 1996). Condit et al. (1996) reported a positive correlation between tree density and diversity in both dry and moist tropical forests. The decrease in evenness exhibits increasing dominance of a single species, in this case, *Shorea robusta*.

Ren et al. (2006) found, tree species richness decreased with increasing elevation that in Dongling Mountains, Beijing. Total species diversity in dry forest, however, is normally reduced when disturbance is severe (Sabogal 1992; Jayasingam & Vivikanantharaja 1994), as reported by Sagar & Singh (2005) for dry tropical forests of India. Jha & Singh 1990; Sagar et al., 2003; Sagar & Singh 2005 suggested that the heterogeneity of the environment and disturbance are prime factors in the regulation of floristic composition. *Shorea robusta* is considered the climax species of the Indian northern tropical moist deciduous forest (Champion & Seth 1968).

Timilsina et al. (2007) identified in three different community types in *Shorea robusta* forest in Nepal and concluded the rainfall and past disturbances (fire and anthropogenic use) are mainly responsible for the occurrence of these communities which may represent different stages of Shorea forest development. Jha and Singh (1990) reported the basal cover area of dry tropical forest communities in Vindhya region. Sahu, et al., (2008) reported that species diversity of tropical forest structure in relation to altitude and disturbance in a Biosphere Reserve in central India. In Present study it was observed that out of 12 plant species of tree, only four species of seedling and sapling were found. It means regeneration capacity of all species is not good. Randey and Shukla (2001) also reported the regeneration strategy and plant diversity status in degraded sal forests.

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How to cite this article

Bhagat M., Sahu P.K., Shah R. P. and Soni M. (2014) Plant species diversity and phytosociological analysis in forest of Jaljali Mainpat, Ambikapur, (C.G.). *Int. J. Pharm. Life Sci.*, 5(6):3627-3630.

Source of Support: Nil; Conflict of Interest: None declared

Received: 01.06.14; Revised: 07.06.14; Accepted:10.06.14