International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

Diversity of Forest Tree in the Forest of Sarguja District, Chhattisgarh, India

Ashok K. Shukla[1], Annu Singh[2]

[1]Department of microbiology, Holy Cross Women's College Ambikapur, Chhattisgarh, India

Abstract: ***Surguja district is considered as rural, tribal and backward district of Chhattisgarh. The Surguja is cover with dense forest and rain based agriculture system, and most of the people are agriculture labourer or depends upon forest and their products directly or indirectly. About 58% of the area in the district lies under the forest. The total geographical area being 18,188.44 sq km., and the forest cover about 10,849 sq km. The climatic factors such as soils, temperature, weather and rain fall are favoring the natural flora and vegetation to survive. The Surguja has immense forest and minerals deposition including lime stone, iron ores copper ores, rock phosphate, manganese, bauxite, coal and mica. The central Surguja located in low basin through which the Rihand and its tributaries are flow toward south, including Hasdeo, Kanhar, and Mahan River. In winter the temperature lower down below 05 ^{0}C and in summer it rises about 46^{0}C. Due to the favorable climatic and weather conditions, Surguja is rich in its forest resources especially dry deciduous forest trees including Teak (Tectona grandis), Sal (Shorea robusta), Bija (Pterocarpus marsupium), Saja (Terminalia tomentosa), Dhawarda (Anogeissus latifolia), Bamboo (Dendrocalamus strictus), Tendu (Diospyrus melanoxylon), Mahua (Madhuka indica) and Ambla (Embilica officinalis) are dominating species. In the present study an extensive survey has been conducted to find out the various types of forest flora. More than 79 forest tree species belonging to thirty two families, their local name and various uses by the local inhabitant including medicinal value were recorded during the survey. The parameters such as Frequency, Density and Abundance were also under taken.***

Keywords: Biodiversity, Forest Tree, Frequency, Density and Abundance.

1. Introduction

Forest is considered as a complex ecosystem which is predominantly composed of trees, shrubs, herbs and climbers and has closed canopy of plants and, are the natural storehouse of large variety of various life forms including plants, animals, birds, insects, reptiles and micro-organism (bacteria, actinomycetes, fungi, protozoa, algae etc.)The forest ecosystem consist with two major components are abiotic and biotic components. Both the component affect the forest growth, development, extension, productivity, succession and their regeneration to save existence etc.The term forest generally implies to the natural vegetation of the prescribe area which have their existing history from hundreds of hundred years and supported by a variety of diversity and finally forming a complex ecosystem. According to the champion and Seth (1968), six major group of forest, 16 sub types group and finally 200 types including subtypes and variations of forest are formed in Indian forest scenario. India has a long diversified range of forest from the rainforest in south to alpine pastures of Laddakh, and in north from deserts of Rajasthan to the west the evergreen forest, middle region covered by deciduous forest (Singh and Panda, 1999; Sinha and Sinha, 2013; Subrahmanyam and Sambamurty, 2000 and Uniyal et.al., 2010)

2. Study Site

A major part of Chhattisgarh was known as Dandakaranya in the ancient Indian history. Besides, one part was also known as Dakshina koushala and in medieval period. The region of Chhattisgarh which located in south of vindhyas, now come to known as gondwana. Surguja district is located in the northern part of Chhattisgarh and spread over plateaus, highlands, plain lands and hills with a large portion of total area of district covered by the forests. About 58% of the area in district lies under the forests. The area of district is 18,188.44 km^2 and out of which the forest occupy 10,849.079 km^2. Most of the terrain of the district is forests and hilly. The climate of the district basically hot in summer where temperature reaches up to 46^{0}C and in winter temperature lowered up to 1.3^{0}C. Distributed rain fall in the monsoon seasons and rain fall about 200-300cm. The highlands of Surguja district have peculiar 'Pat formation' and high land with small tablelands the average height of the area is above 600meters (2000ft).There are a numbers of peaks, in north-west Surguja is hilly in nature, and moving westwards, three distinct land mark are their first from Srinagar on the east to the low lands of Patna and khargawan, The second upland of sonhat and third beyond sonhat to above height of 1,033 meters (3389ft). The central Surguja has a low basin through which the River Rihand and their tributaries are flow. Hasdeo and Kanhar are also flow through Surguja basin.

2.1 Climate

Surguja district comes under the subtropical monsoon climate with three season winter (October to February) summer (February to June) and Rainy (July to September) Annual rainfall 1314mm.The maximum temperature was recorded in the month of May and June. Besides, the minimum temperature recorded during winter (December to January). The relative humidity range from 76-92%, throughout of the year. Wind speed below always less than 20 km/hrs. These all the aforesaid conditions favored the growth and development of subtropical climatic deciduous forest. These are further divide in deciduous moist forest and deciduous dry forest.

2.2 Soil

Soil is consider as natural product and consisting with various soil horizons, those are composed of minerals and mixed with other organic materials produced by animal or plants. Besides it differ from the parental substances on the basis of colour, pH, texture, structure, consistency, chemical and biological composition and other characteristics. Generally soil is formed by the particles of rock and altered by the influence of various factor including physical, chemical as well as biological and interaction of various sphere including lithosphere, hydrosphere, atmosphere and biospheres, most soils have density between 1and 2g/cm^2. The soils of Surguja district can be classified in four major categories including (1). Red and yellow soils, (2) Alluvial soils,(3) Laterite soils, and (4) Medium blue Soils.

3. Material and Methods

In the present study, Phytosociological diversity analysis carried out by quadrate method as suggested by Mishra, (1968) Kershaw (1973), Cintron and Novelli (1984), Snedaker and Snedaker (1984). For this, Rajpur block was selected as the study site, and 67 quadrate of 15 m × 20 m size ware laid out at the study sites. Each sites, further divided into five sub segments of 2 km along the road side of Ambikapur-Balrampur road. On the basis of the data obtained from the quadrate sampler, the structural distribution of forest trees, were analyzed. The parameters such as Frequency, Abundance, and Density obtained during the study as suggested by Phillips (1959) and Mishra (1965), were calculated from the data, under as follow:

$$Frequency = \frac{Number\ of\ samples\ in\ which\ species\ present}{Total\ number\ of\ sample\ studied}$$

$$Density = \frac{Number\ of\ individual\ of\ species}{Total\ number\ of\ sample\ studied}$$

$$Abundance = \frac{Number\ of\ individuals\ of\ the\ species}{Total\ number\ of\ sample\ in\ which\ species\ present}$$

4. Result and Discussion

The Rajpur block of Surguja district of Chhattisgarh contained good diversity of trees in contrast to other areas of Chhattisgarh. (Chatterjee, 2015; Jhariya and Oraon, 2012; Sinha and Sinha, 2013). It is located under the Sanjay national park area and covers the large area of forest. Due to nutrients rich and fertile soil, enough average seasonal rain fall i.e. 1443 mm, favorable weather, temperature and climate, and availability of fresh water throughout the year, are the factors those help to grow naturally and develop the wide varieties of the tree. Obviously, it also provide suitable niche to grow other plants species such as shrubs, herbs and climber. The majority of the local inhabitants are mainly tribes and some are migrated marginalized groups, are use the forest trees and other forest produce to fulfill their daily requirements such as fuel wood, medicinal purpose, timber wood to built their kachcha house and equipments those are used in agriculture practices and grazing their domestic animals. Over all, this area is considered as undisturbed natural dry deciduous forest.

In the present study, at about 79 deciduous forest trees species belonging to 32 different families, were identified with their botanical name and their possible uses by the local tribes were recorded in table 1. According to Odum (1971) the contiguous distribution of species are found only in very uniform environment and regular distribution occurs, where the severe competition happened between the individual species. From the data obtained through quadrate surveyed of Rajpur forest trees, were recorded in table 1. It is observed that the family Fabaceae represent maximum number i.e., seventeen species, followed by Moraceae with 7 species, Combretaceae with 06 species, Myrtaceae with 5 species Rutaceae with 4 species, Anacardiaceae Rubiaceae and Euphorbiaceae with 3 species, respectively. Besides, the families Annonaceae, Apocynaceae, Burseraceae, Embenaceae, Lamiaceae and Meliaceae were found with two species of each in the surveyed area.

The species diversity always depend upon the adaptability and stability of the plant community, hence the Rajpur forest trees are also showed mixed community. The date obtained during the survey indicates, nineteen other families are also showed their existence by appearing as single species of each. A total of 79 different plant species belongs to 32 different families are exhibited in the species composition, which complete to each other, prevent extinction and increase their diversity (Shankar, 2001).

Structural distribution analysis for each species conducted, by using the parameters such as Frequency, Density and Abundance of each case (Curtis and Mclntosh, 1950; Curtis and Cotton, 1956; Gour, 1999; Kadavul and Parthsarthy, 1999; Khurana and kalpana, 2008; Khurana and Saxena, 2009; Mishra et. al., 2008; Negi and Nautiyal, 2005; Pandey et. al., 2002; Rastogi and Rastogi, 2007; Sagar and Singh, 1999; Sahu et. al., 2008). On the basis of data analysis *Butea monosperma* showed their maximum frequency, density and abundance i.e., 0.507, 1.074 and 2.117 respectively, during the sampling, and then followed by *Cassia fistula* and *Shorea robusta* with 0.313 and 0.388, respectively. On the other hand, *Embilica officinalis, Ficus bengalensis, F. carica, F. glomerata, Pongamia pinnata and Pterocarpus marsupium* showed minimum distribution in the forest. Surprisingly, the species like *Santalum album, Mangifera indica* and *Annona reticulate, Terminalia arjuna and Tectona grandis* were appeared with high abundance. It is due to human interference in the forest (Sharma, 1996).

Table 1: Occurrence of various tree species in the study site

S. No.	Name of species	Family	Local name	Uses
01.	*Acasia arabica*	Fabaceae	Kikar/ abul	Timber wood, medicinal value
02.	*Acasia caesia*	Fabaceae	Goriar	Timber wood, medicinal value
03.	*Acacia catechu*	Fabaceae	Khair	Katha production
04.	*Adina cordifolia*	Rubiaceae	Haldu	Antiseptic, Timber wood
05.	*Aegle marmelos*	Rutaceae	Bel	Medicinal value, Fruit
06.	*Ailangium salvifolium*	Cornaceae	Akol	Making kachha house
07.	*Albizzia lebbek*	Fabaceae	Siris	Medicinal value, Timber wood
08.	*Alstonia scolaris*	Apocynaceae	Chhatrak	Medicinal value
09.	*Anogeissus latifolia*	Combrataceae	Dhawada	Timber and fuel wood
10.	*Annona squamosa*	Annonaceae	Sheetaphal	Edible fruit, medicinal value
11.	*Annona reticulate*	Annonaceae	Ramphal	Edible fruit, medicinal value
12.	*Anthocephalus cadamba*	Rubiaceae	Kadamb	Medicinal value, timber wood
13.	*Azadirachta indica*	Meliaceae	Neem	Medicinal value, timber wood
14.	*Bambusa arundinaceae*	Gramineaceae	Bamboo	Medicinal value
15.	*Bauhinia variegata*	Fabaceae	Kachnar	Medicinal value, timber wood
16.	*Bombax ceiba*	Bombaceae	Samel	Fuel wood
17.	*Boswellia serrata*	Burseraceae	Salai	Fuel wood
18.	*Buchania lanzan*	Anacardiaceae	Chironjee	Medicinal value, edible fruit
19.	*Butea monosperma*	Fabaceae	chhoela	Medicinal value
20.	*Careya arborea*	Myrtaceae	Kumahi	Fuel wood
21.	*Caesalpinia bonducella*	Fabaceae	Flem	Fuel wood
22.	*Carthamus tinctorius*	Compositae	Kusum	Fuel wood, edible fruit
23.	*Cassia fistula*	Fabaceae	Amaltas	Fuel wood
24.	*Citrus medica*	Rutaceae	Nimbu	Medicinal value, edible fruit
25.	*Cordia mixa*	Rutaceae	Lasoda	Fuel wood
26.	*Celastrus peniculata*	Celastraceae	Unjain	Fuel wood
27.	*Dalbergia sisso*	Fabaceae	Sisham	Timber, medicinal value
28.	*Dalbergia paniculata*	Fabaceae	Dhobin	Timber, medicinal value
29.	*Delonix regia*	Fabaceae	Gulmohar	Medicinal value, edible fruit
30.	*Diospyrus melanoxylon*	Ebenaceae	Tendu	Edible fruit, timber wood
31.	*Diospyrus ebenum*	Ebenaceae	Makar tendu	Edible fruit, timber wood
32.	*Embilica officinalis*	Euphorbiaceae	Amla	Edible fruit, timber wood
33.	*Erythrinia indica*	Fabaceae	Munga	Medicinal value, edible fruit
34.	*Eucalyptus grandis*	Myrtaceae	Neilgiri	Timber wood medicinal value
35.	*Eugenia jombolana*	Myrtaceae	Jamun	Edible Fruit, medicinal value
36.	*Eugenia heyneana*	Myrtaceae	Jamti	Fuel wood
37.	*Ficus bengalensis*	Moraceae	Bargad	Religious tree
38.	*Ficus religiosa*	Moraceae	Pipal	Religious tree
39.	*Ficus carica*	Moraceae	Anjeer	Medicinal value
40	*Ficus elastic*	Moraceae	Rubber	Economic value
41.	*Ficus infectoria*	Moraceae	Pakri	Fuel wood
42.	*Ficus glomerata*	Moraceae	Gular	Medicinal value
43.	*Gardenia latifolia*	Rubiaceae	Piprol	Medicinal value
44.	*Garur pinnata*	Burseraceae	Khenkara	Fuel wood
45.	*Gmelina arborea*	Lamiaceae	Khamer	Timber and fuel wood
46.	*Holarrhena hantidysenerica*	Apocynaceae	Koriya	Fuel wood
47.	*Hardwikia binata*	Fabaceae	Anjan	Medicinal value
48.	*Jatropha curcus*	Euphorbiaceae	Rattanjote	Making biofuel
49.	*Lagestoromea lanciota*	Malvaceae	Nana	Fuel wood
50.	*Laucaenea leucocephala*	Fabaceae	Subabul	Medicinal value and fuel wood
51.	*Litchi chinensis*	Sapindaceae	Litchi	Medicinal value, edible fruit
52.	*Litsea chinensis*	Lauraceae	Maida	Fuel wood
53.	*Maduca indica*	Sapotaceae	Mahua	Economic value
54.	*Mangifera indica*	Anacardiaceae	Aam	Economic value, fuel wood
55.	*Morus alba*	Moraceae	Mulberry	Medicinal value
56.	*Moringa oleifera*	Mongiaceae	Senjhra	Medicinal value
57.	*Melia azadirachta*	Meliaceae	Bachain	Medicinal value
58.	*Murraya koenigii*	Rutaceae	Mithineem	Timber wood
59.	*Ougenia dalbergia*	Leguminosae	Tilsa	Fuel wood
60.	*Plantanus orientalis*	Plantaceae	Chinar	Fuel wood
61.	*Pongamia pinnata*	Fabaceae	Karanj	Medicinal value
62.	*Prunus amygdalus*	Rosaceae	Almond	Medicinal value
63.	*Psidium guyava*	Myrtaceae	Guava	Fruit & fuel wood
64.	*Pterocarpus marsupium*	Euphorbiaceae	Bija	Timber wood
65.	*Randia dumetorum*	Rubiaceae	Menda	Fuel wood
66.	*Santalum album*	Santalaceae	Chandan	Medicinal value
67.	*Saraca indica*	Fabaceae	Ashoka	Medicinal value
68.	*Semecarpus anacardium*	Anacardiaceae	Bhelwa	Medicinal value
69.	*Shorea robusta*	Dipterocarpaceae	Sarai	Timber wood
70.	*Soymida febrifuge*	Meliaceae	Rohina	Medicinal value, timber wood
71.	*Symplocos racemosa*	Symplocaceae	Lodh	Fodder, Timber wood
72.	*Tamarindus indica*	Fabaceae	Imali	Fuel wood
73.	*Terminalia arjuna*	Combretaceae	Kahua	Timber wood
74.	*Terminalia bellerica*	Combretaceae	Baihra	Medicinal value
75.	*Terminalia chebula*	Combretaceae	Harra	Medicine value
76.	*Terminalia tomentosa*	Combretaceae	Saj	Timber wood
77.	*Terminalia eliptica*	Combretaceae	asan	Timber wood
78.	*Tectona grandis*	Verbenaceae	Sagwan	Timber wood, Medicinal value
79.	*Zizyphus mauritiana*	Rhamnaceae	Ber	Medicinal value & fruit

Table 2: Frequency, density and abundance of the forest tree species during the sampling

S No	Name of species	Number of samples in which species present	Total numbe of individual species present	Frequency	Density	Abun-dance
01.	*Acasia arabica*	07	07	0.104	0.104	1.000
02.	*Acacia catechu*	11	12	0.164	0.197	1.090
03.	*Albizzia lebbek*	09	12	0.134	0.197	1.333
04.	*Anogeissus latifolia*	12	16	0.179	0.238	1.333
05.	*Azadirachta indica*	15	18	0.223	0.268	1.200
06.	*Annona reticulate*	08	17	0.119	0.253	2.125
07.	*Anthocephalus cadamba*	07	10	0.104	0.149	1.428
08.	*Bambusa arundinaceae*	08	14	0.119	0.208	1.750
09.	*Bauhinia variegata*	16	21	0.238	0.313	1.312
10.	*Bombax ceiba*	07	11	0.104	0.164	1.571
11.	*Buchania lanzan*	13	17	0.194	0.253	1.307
12.	*Butea monosperma*	34	72	0.507	1.074	2.117
13.	*Cassia fistula*	21	32	0.313	0.477	1.523
14.	*Dalbergia sisso*	18	29	0.268	0.432	1.611
15.	*Delonix regia*	13	15	0.194	0.223	1.153
16.	*Diospyrus melanoxylon*	08	13	0.119	0.194	1.625
17.	*Emblica officinalis*	05	08	0.074	0.119	1.600
18.	*Eucalyptus grandi*	17	21	0.253	0.313	1.235
19.	*Eugenia jombolana*	18	23	0.268	0.343	1.277
20.	*Ficus bengalensis*	06	08	0.089	0.119	1.333
21.	*Ficus religiosa*	07	07	0.104	0.104	1.000
22.	*Ficus carica*	06	06	0.089	0.089	1.000
23.	*Ficus glomerata*	06	07	0.089	0.104	1.166
24.	*Jatropha curcus*	20	37	0.298	0.552	1.850
25.	*Laucaenea leucocephala*	16	22	0.238	0.328	1.375
26.	*Maduca indica*	18	33	0.268	0.492	1.833
27.	*Mangifera indica*	17	35	0.253	0.522	2.058
28.	*Melia azadirechta*	11	17	0.164	0.253	1.545
29.	*Ougeinia oujeinensis*	16	18	0.238	0.731	1.125
30.	*Pongamia pinnata*	06	08	0.089	0.119	1.333
31.	*Pterocarpus marsupium*	06	07	0.089	0.104	1.166
32.	*Santalum album*	07	27	0.104	0.402	3.857
33.	*Semecarpus anacardium*	08	11	0.119	0.164	1.357
34.	*Shorea robusta*	26	46	0.388	0.686	1.769
35.	*Soymida febrifuge*	10	13	0.149	0.194	1.300
36.	*Tamarindus indica*	13	23	0.194	0.343	1.769
37.	*Terminalia arjuna*	21	44	0.313	0.656	2.095
38.	*Terminalia bellerica*	16	18	0.238	0.268	1.125
39.	*Terminalia chebula*	08	11	0.119	0.164	1.375
40	*Terminalia tomentosa*	18	34	0.268	0.507	1.888
41.	*Tectona grandis*	23	49	0.238	0.268	2.130
	Total	532	849			

5. Conclusion

Forests are the safeguard for our future generations but, due to the anthropogenic pressure, the most serious threat has been changed in the land use. Extensive forest areas have been cleared for human settlements, road and railway track network, and industrial units. On the other hand, sizeable-forest land has been diverted to agricultural land or land for building colonies and factories. The present condition of forest is very poor and many species of this region have been disappeared and many other species are endangered and rare. The local pressure including timber wood and fuel wood are cut by villagers and collection of non timber products such as fruits, gum, seeds and leaf, grazing their animals, forest fire and animal hunting make situation more worst since such extraction is not legally permitted, because quantitative estimation of the extraction is not possible. Hence, the distribution and Phytosociological studies clearly indicate that Rajpur forest is an extremely important ecosystem by the virtue of richness of forest wealth and diversity of tree species with mixed dominance and favourable regeneration. However, controlled quantities of fuel wood can be removed from the forest. The species those are threaten rare need more attention and care.

References

[1] **Champion,** H.G. and Seth, S.K.(1968).A Revised Survey of Forest types of India, Forest Research of India Dehradun.

[2] **Chatterjee,** A.K. (2014) Ecological studies of vegetation of odgi Forest of Surguja District, Chhattisgarh. IJACTE 3[3]: 17-19.

[3] **Cintron**,G. and Y.S. Novelli (1984) Methods for studying mangrove structure. In Samuel, C. snedakar, and J.G. Snedaker [eds/the mangrove ecosystem] Research methods: Unesco, 251.

[4] **Curtis**, J.T,McIntosh, RPC (1950) 'The interrelation of certain analytical and synthetic Phytosociological characters'. Ecology, vol.31: 434-435.

[5] **Curtis**,J.T. and cotton,G.(1956) Plant ecology work book. Laboratory and field manual,Burgers pub.co.,minnesota.

[6] **Gour,**R.D. (1999) Flora of the district Garhwal,north west Himalaya.Trans. media, Srinagar, Garhwal.

[7] Jhariya,M.K. and Oraon, P.R.(2012)Lianas and shrubs regeneration distribution pattern and divercity in tropical forest ecosystem of Chhattisgarh. The Bioscan, 7[3]: 377-382.

[8] **Kadavul,** K. and Parthasarathy, N. (1999) Structure and composition of woody species in tropical semi evergreen forest of Kalrayan Hills, Eastern Ghats , India. Tropical Ecology. 40: 247-260.

[9] **Khurana,** P. and Kalpana (2008) Phytodiversity study in natural forest of Hastinapur. Indian forester. 134(4): 554-562.

[10] **Khurana.** P.and Saxena, R.S. (2009) Vegetation analysis along the disturbance gradient in tropical dry deciduous forest of Hastinapur Indian forester. 135 (5): 678-690.

[11] **Mishra**, R. (1968) Ecology, work book. Oxford and IBH Publishing company, Calcutta.

[12] **Mishra,** R.K., Upadhyay, V.P. and Mohanty, R.C. (2008) Vegetation ecology of the simplipal biosphere reserve, Orissa, India. Applied Ecology and Environment Research 6(2):89-99.
[13] **Negi,** C.S. and Nautiyal, S. (2005) Phytosociological studies of a traditional reserve forest-Thalke Dhar, Pithoragarh, Central Himalayas, Indian forester. 13(4): 535-543.
[14] **Odum**, E.P. (1971) Fundamentals of ecology, W.B. Saunders. Philadelphia.
[15] **Pandey,** P.K., Negi, J.D.S. and Sharma, S.L. (2002) Plant species diversity composition gradient analysis and regeneration behavior of some tree species in a moist temperate western Himalayan forest ecosystem. Indian forester, 128(8):869-885.
[16] **Phillips,**E.A. (1959)Methods of vegetation study. A Holt dry den book, Henry Holt and co. ,Inc. New York. pp 105.
[17] **Rastogi,** N. and Rastogi, A. (2007) Phytosociological analysis of the re-stored Sal (Shorea robusta) plantation and natural Sal forest of Tripura. Indian Journal of forestry. 30(4):377-385.
[18] **Sagar**, R. and Singh, J.S. (1999).Species diversity and it's management. The Botanica. 49:9-16.
[19] **Sahu,** P.K., Sagar, R. and Singh, J.S. (2008) Tropical forest structure and diversity in relation to altitude and disturbance in a biosphere reserve in Central India. Applied vegetation science. 11:461-470.
[20] **Sharma,** P.D. (1996).”Ecology and environment”. Seventh revised edition. Rastogi Publication, Meerut
[21] S**hankar**, U. (2001) A case of high tree diversity in a Sal (Shorea robusta) dominated lowland forest of Eastern Himalaya, Floristic composition, regeneration and conservation. Current science. 81:776-786.
[22] **Singh,** D.K. and Panda, G.K. (1999) Bhitarkanika and its enviros-a geographical appraisal, in: Bhitarkanika-the wonderland of Orissa. Nature and wild life conservation society of Orissa. Bhubaneswar, India. Pp 10-18.
[23] **Sinha**, M.K. and Sinha, D. (2013) Biodiversity scenario of lower hills of Baikunthpur (Dt. Korea), Chhattisgarh, India: with special reference to medicinal plants. In JMPR, 7(27):2082-2088.
[24] **Snedaker**, S.C. and Snedaker, J.G. (1984) The mangrove ecosystem: Research methods. UNESCO, Paris.
[25] **Subrahmanyam**,N.S. and Sambamurty, AVSS (2000) Ecology, First edition. Narosa publishing house, New Delhi.
[26] **Uniyal**, P., Pokhriyal, P., Dasgupta, S., Bhatt, D. and Tadaria, N.P. (2010) Plant diversity in two forest types along the disturbance gradient in Dewalgarh watershed Garhwal Himalaya. Current science. 98(7): 938-943.