

Full Length Research Paper

Biodiversity scenario of lower hills of Baikunthpur (Dist.-Koria) Chhattisgarh (India) with special reference to medicinal plants

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The State of Chhattisgarh has about 44% of its geographical area covered with forests. The Koria District in Chhattisgarh lies between 22°58' to 23°49' North latitudes and 81°33' to 82°45' East longitude. The average rainfall is 121.36 cm. The forest area is 81.23% of total dist. area. The District Koria has a very rich flora exhibiting diversity specially of medicinal plants. There is no comprehensive description of the flora as well as vascular cryptogames of the district; some plant species are on the verge of extinction. Keeping these points in view, the present investigation has been planned. The present paper deals with diversity of the medicinal plants of the district and their ecological status. Vegetational analysis revealed some interesting observations on phytosociological characters. Shannon index of general diversity was calculated for tree shrub and herb layers. It was 4.21637 for trees, 4.6357 for shrubs and 4.8298 for herbs. A total of 108 angiospermic plant species of medicinal importance were found distributed in 46 dicot and 10 monocot families. Two medicinally important Pteridophytes were also reported.

Key words: Diversity, medicinal plants, phytosociology, Koria District.

INTRODUCTION

Koria District in Chhattisgarh is very rich in natural vegetation and biological wealth. The district lies between 22°58' to 23°49' North latitude and 81°33' to 82°45' East longitude. The average rainfall is 121.36 cm. The annual mean temperature is 24°C. The temperature varies between 16.2 to 31°C. Geologically, the area is dominated by upper Gondwana rocks which are rich in coal deposit. The highest mountain ranges of the region occupy the northern part of the district .and has a forest area of 81.23%.

The district has a sizeable tribal population using enormous range of plants for their basic needs, sustenance and livelihood. The district has very rich plant

diversity, including medicinal plants. Many of them are on the verge of extinction due to over exploitation and destruction of their habitat. There has been no comprehensive study on the enumeration, distribution and the assessment of threat to the existing medicinal plants.

The vegetation particularly the forests have not been explored fully except a few reports from the forest department (Tiwari, 1992). There is no report on the rich forest flora of the district. Therefore an attempt was made to study the diversity of forest flora especially of medicinal plants.

MATERIALS AND METHODS

Extensive field survey was undertaken during 2005 to 2007. The floristic diversity of tropical dry deciduous forests was explored. The district comprises 5 development block viz., Baikunthpur, Sonhat,

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Manendragarh, Khadgavan and Bharatpur. Present study was done in the Baikunthpur block of the district. The phytosociological Characters such as frequency, density and abundance was recorded as seen in the method described by Misra (1968). Random quadrat sampling was done in Baikunthpur block taking 20 study site namely Shivpur, Bishunpur, Katghodi, Umghar, Nagar Pahadpara, Tilpandand, Itga, Dhudhania, Phulpur, Shankarpur, Ujyarpur, Rakiya, Jamgahna, Jagdishpur, Kotaktall, Patrapali, Deori, Chilka and Ranai. The sites were widely separated from each other and cover an area of 20 to 40 km. study sites were visited at frequent intervals and a thorough sampling was done to document the species diversity. Species diversity was calculated using the formula:

$$H = - \sum p_i \log p_i \text{ (Shanon-Weaver, 1963)}$$

Where, p_i is the proportion of individuals of its plant species and number of individuals of all the species.

The entire tree stands are grouped according to Girth (GBH) with an interval of 25 cm to understand the growth dynamics of the forest.

RESULTS AND DISCUSSION

Diversity

A total of 168 genera distributed in 224 species under 57 families and two Pteridophytes with 3 species were also reported. Poaceae was found to be the most prominent family among monocots whereas Rubiaceae and Euphorbiaceae were the most prominent among dicots (Table 1).

Phytosociological status

Quantitative vegetational analysis revealed a high degree of heterogeneity. The vegetation is Sal (*Shorea robusta*) dominated of which showed cent percent occurrence in all stands. Maximum percentage frequency was also exhibited by *Randia dumetorum*, *Vernonia anthelminticum*, *Adhatoda vasica*, *Alangium lamarckii*, *Diospyros melanoxylon*, *Vicia sativa*, *Vanda roxburghai*, *Lawsonia inermis* and *Quisqualis indica*. These species were constantly present in the study sites.

Species showing high frequency and low abundance were attributed to a status of regular distribution and species showing low frequency and high abundance were attributed to a status of showing contagious distribution (Table 2).

Shanon index of general diversity

Shanon index was found to be 4.216 for trees, 4.635 for shrubs and 4.829 for herbs. (Table 3). This clearly shows that the study area has great diversity.

The results show higher values than that of Supriya Devi and Yadav (2006) in a tropical forest of Manipur. In Indian forest, H value ranged between 0.83 to 4.1

Table 1. Family wise account of Diversity in the Baikunthpur forest area (only medicinal important plants).

Family	Genera	Species
<i>Asclepiadaceae</i>	5	5
<i>Apocynaceae</i>	3	4
<i>Acanthaceae</i>	6	9
<i>Anacardiaceae</i>	5	5
<i>Amaryllidaceae</i>	1	1
<i>Araceae</i>	1	1
<i>Aracaceae</i>	1	2
<i>Asteraceae</i>	6	7
<i>Apiaceae</i>	1	2
<i>Bixaceae</i>	1	1
<i>Boraginaceae</i>	2	2
<i>Bignoniaceae</i>	3	5
<i>Bombacaceae</i>	1	1
<i>Combretaceae</i>	5	9
<i>Celastraceae</i>	3	3
<i>Cornaceae</i>	1	1
<i>Convolvulaceae</i>	3	3
<i>Caesalpiniaceae</i>	5	7
<i>Cucurbitaceae</i>	2	2
<i>Cactaceae</i>	1	1
<i>Crassulaceae</i>	1	1
<i>Cyperaceae</i>	1	4
<i>Dipterocarpaceae</i>	1	1
<i>Dioscoreaceae</i>	1	2
<i>Euphorbiaceae</i>	7	10
<i>Ebenaceae</i>	1	1
<i>Fumariaceae</i>	1	1
<i>Liliaceae</i>	5	7
<i>Papilionaceae</i>	6	10
<i>Piperaceae</i>	1	1
<i>Poaceae</i>	23	27
<i>Mimosaceae</i>	4	6
<i>Orchidaceae</i>	1	2
<i>Lythraceae</i>	3	3
<i>Lauraceae</i>	2	3
<i>Lamiaceae</i>	5	8
<i>Moraceae</i>	2	4
<i>Malvaceae</i>	4	4
<i>Myrsinaceae</i>	1	2
<i>Menispermaceae</i>	1	1
<i>Meliaceae</i>	4	4
<i>Myrpacaeae</i>	2	4
<i>Nyctaginaceae</i>	2	2
<i>Oxalidaceae</i>	1	1
<i>Plumbiginaceae</i>	1	2
<i>Pedaliaceae</i>	1	1
<i>Polypodiaceae</i>	2	3
<i>Rubiaceae</i>	7	10
<i>Rutaceae</i>	4	5
<i>Sterculiaceae</i>	3	3

Table 1. Continued.

<i>Styreceae</i>	1	1
<i>Scitamineae</i>	1	1
<i>Tiliaceae</i>	1	3
<i>Verbenaceae</i>	5	8
<i>Vitaceae</i>	1	2
<i>Zingiberaceae</i>	3	3
<i>Zygophyllaceae</i>	2	2
Total	168	224

Table 2. Phytosociological Characters of different plant species of Baikunthpur block (Dist. Korla) C.G.

Name of Plant spp.	Phytosociological Characters			Distribution
	(%) Frequency	Density	Abundance	
<i>Andrographis paniculata</i> , Nees	60%	27.5	45.83	R*
<i>Pluchea lanceolata</i> , Oliver & Hiem	60%	15	25	R
<i>Randia dumetorum</i> , Lank	100%	12.5	12.5	R
<i>Embelia ribes</i> , Burm.F.	5%	0.5	10	C*
<i>Sphaeranthus indicus</i> , L.	90%	80	88.88	R
<i>Adiantum lanulatum</i> , Burm.	20%	5	20	
<i>Clerodendrum serratum</i> , L.	60%	5	8.33	R
<i>Helicteres isora</i> , L.	60%	12.5	20.83	R
<i>Nyctanthes arbor-tristis</i> , L.	50%	12.5	25	R
<i>Gardenia lucida</i> , Roxb.	30%	2.5	8.33	R
<i>Desmodium gangeticum</i> , DC.	60%	20	33.33	R
<i>Vicoa auricalata</i> Cass.	95%	62.5	65.78	R
<i>Hymenodictyon excelsum</i> , Wall.	50%	5	10	R
<i>Bauhinia Variegata</i> L.	85%	10	11.76	R
<i>Grewia hirsuta</i> , Vanb.	25%	2.5	10	R
<i>Asparagus recemosus</i> , Willd.	60%	15	25	R

Table 2. Continued.

<i>Vernonia anthelminticum</i> Willd.	100%	60	60	R
<i>Erythrina indica</i> Lamk.	30%	5	16.66	R
<i>Abelmoschus moschatus</i> , L.	10%	2.5	25	C
<i>Ocimum basilicum</i> L.	95%	65	68.42	R
<i>Dryopteris crenata</i> , Christ.	75%	15	20	R
<i>Acacia concinna</i> , DC.	40%	2.5	6.25	R
<i>Symplocos racemosa</i> Roxb.	60%	7.5	12.5	R
<i>Sterculia urens</i> , Roxb.	65%	10	15.38	R
<i>Bixa orellana</i> , L.	20%	1.5	7.5	R
<i>Leucas cephalotes</i> Spreng.	70%	20	28.57	R
<i>Crotalaria juncea</i> L.	70%	57.14	40	R
<i>Dioscorea daemona</i> , Roxb.	45%	7.5	16.66	R
<i>Lannea grandis</i> Roxb.	75%	5	6.66	R
<i>Croton tiglium</i> L.	10%	1.25	12.5	C
<i>Adhatoda vasica</i> , Nees	100%	15	15	R
<i>Grewia rotundifolia</i> , Juss.	10%	0.75	7.5	R
<i>Thysanolaena agrostis</i> Nees	80%	50	62.5	R
<i>Abutilon indicum</i> , G. Don.	60%	25	41.66	R
<i>Oxalis corniculata</i> L.	70%	60	85.71	C
<i>Cassia glauca</i> , Lam.	60%	5	8.33	R
<i>Celastrus paniculata</i> , Willd.	10%	1	10	R
<i>Clitoria ternatea</i> , L.	60%	17.5	29.16	R

Table 2. Continued.

<i>Ongeinia dalbergioides</i> Benth	75%	5	6.66	R
<i>Bauhinia vahlii</i> , W. & A.	85%	7.5	8.8	R
<i>Cassia sophora</i> , L.	90%	150	166.6	C
<i>Acacia catechu</i> Willd.	50%	10	20	R
<i>Terminalia tomentosa</i> , W. & A.	70%	7.5	10.71	R
<i>Terminalia arjuna</i> , W. & A.	65%	5	7.69	R
<i>Centella asiatica</i> , L.	30%	12.5	62.5	C
<i>Alangium lamarckii</i> , Thw.	100%	35	35	R
<i>Eclipta alba</i> , Hassk.	85%	32.5	38.23	R
<i>Vernonia cinerea</i> , Less.	100%	65	65	R
<i>Plumbago zeylanica</i> , L.	35%	30	42.85	C
<i>Diospyros melanoxylon</i> , Roxb.	100%	40	40	R
<i>Gymnema sylvestre</i> , R. Br.	20%	15	30	C
<i>Hemidesmus indicus</i> , Br.	60%	22.5	37.5	R
<i>Pergularia extensa</i> N.E. Br.	75%	17.5	23.33	R
<i>Cordia myxa</i> , L.	60%	7.5	12.5	R
<i>Bryophyllum Calycinum</i> Salis.	40%	17.5	43.75	C
<i>Boerhaavia diffusa</i> L.	70%	10	14.28	R
<i>Ficus infectoria</i> , L.	70%	10	14.28	R
<i>Chlorophytum tuberosum</i> , Baker	25%	2.5	12.5	R
<i>Smilax zeylanica</i> , L.	40%	10	25	R

Table 2. Continued.

<i>Hygrophila augustifolia</i> R.Br.	75%	120	150	C
<i>Luffa aegyptiaca</i> Mill	40%	7.5	18.75	R
<i>Cissus quadrangularis</i> L.	55%	50	62.50%	R
<i>Woodfordia fruticosa</i> Kurz.	90%	40	50	R
<i>Vicia Sativa</i> L.	100%	65	65	R
<i>Spilanthes acmella</i> L.	30%	5	25	R
<i>Pterospermum acerifolium</i> , Willd.	65%	5	7.69	R
<i>Blumea lacera</i> , DC.	95%	25	26.3	R
<i>Mucuna prurita</i> , Hook.	45%	15	30	R
<i>Sida spinosa</i> , L.	50%	25	62.5	C
<i>Tribulus terrestris</i> L.	65%	40	66.66	C
<i>Dioscorea bulbifera</i> L.	65%	30	50	R
<i>Psoralea corylifolia</i> , DC.	75%	60	85.71	C
<i>Ipomea paniculata</i> , L.	45%	10	20	R
<i>Wedelia calandulacea</i> Less.	80%	70	87.5	C
<i>Semecarpus anacardiun</i> L.	40%	2.5	6.25	R
<i>Phyllanthus niruri</i> L.	95%	80	84.21	R
<i>Cyperus rotundus</i> L.	70%	10	35.71	R
<i>Tecoma undulata</i> , G. Don.	5%	0.25	5	R
<i>Jatropha gossypifolia</i> L.	80%	150	187.5	C
<i>Vanda roxburghai</i> L.	100%	200	200	C

Table 2. Continued.

<i>Quisqualis indica</i> , L.	45%	7.5	16.66	R
<i>Bryonia laciniosa</i> Mong.	60%	20	33.33	R
<i>Convolvulus pluricaulis</i> , Chois.	75%	22.5	30	R
<i>Salmalia malabaricum</i> , DC.	45%	30	60	C
<i>Holorrhena antidysenterica</i> , Wall.	90%	22.50%	22.5	R
<i>Abrus precatorius</i> L.	60%	40	66.66	C
<i>Acorus Calamus</i> L.	25%	30	100	C
<i>Carissa spinarum</i> L	80%	100	125	C
<i>Barleria cristata</i> ,L.	50%	5	10	R
<i>Martynia diandra</i> , Glox.	30%	10	33.33	C
<i>Shorea robusta</i> Gaertn.	100%	65	65	R
<i>Curculigo orchioides</i> Gaertn.	5%	0.25	5	R
<i>Vitex negundo</i> L.	95%	35	36.83	R
<i>Dalbergia latifolia</i> Roxb.	70%	70	100	C
<i>Cuscuta reflexa</i> Roxb.	90%	80	88.88	R
<i>Hedychium coronarium</i> , Koenig.	20%	3	15	R
<i>Rouwolfia serpentina</i> . Benth.	40%	10	25	R
<i>Alostonia scholaris</i> , Brown.	60%	50	83.33	C
<i>Curcuma angustifolia</i> , Roxb.	40%	15	37.5	R
<i>Fumaria parviflora</i> , Lamk.	50%	40	80	C
<i>Mimosa pudica</i> , L.	40%	50	125	C
<i>Quisqualis indica</i> , L.	100%	120	120	C
<i>Kaempferia rotunda</i> , L.	50%	20	40	R
<i>Cinnamomum tamala</i> , Fr. Nees.	50%	30	60	C
<i>Jatropha curcas</i> , L.	90%	100	111.11	C
<i>Lawsonia inermis</i> L.	100%	150	150	C
<i>Piper longum</i> L.	50%	35	70	C
<i>Aloe barbadensis</i> , Mill.	100%	10	10	R
R = Regular Distribution				
C = Contagious Distribution				

Table 3. Species diversity in different layers of plant communities in Baikunthpur (Dist. - Koria) C.G.

Strata in the forest	H
Trees	4.216
Shrubs	4.635
Herbs	4.829

(Parthasarathy et al., 1992; Singh et al., 1984; Visalakshi, 1995); Pascal (1988) reported that this ranged between 2.1 to 4.3 in different forest ecosystems of Western Ghats. Thakur and Khare (2008) reported Shanon Wiever diversity index (H) ranging from 2.22 to 3.66 in forest vegetation of Sagar (M.P). However, the results clearly indicate a high degree of diversity and the community is a tropical dry deciduous type of Sal forest.

Presently the medicinal plant diversity was also recorded as very high. There are plant species showing very low population density which draw attention of researchers for conservation. The sampled area requires conservation because of its potential for natural regeneration and utility value as well as varied plant diversity.

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