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Floristic Diversity of Angiosperms of Devgiri Hill, Sirohi (Rajasthan)

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ABSTRACT: The study was conducted to explore and identified plants species of Devgiri hill of Aravalli range near Sirohi. A list of plant species have been prepared on the basis of regular seasonal trekking and extensive floristic surveys which were carried out during last four years. A total of 94 species and 86 genera belonging to 42 angiosperms families were reported during the past studies. The locality has a huge potential of floristic diversity as well as having mythological importance which has been considered a holy place by local tribes inhabitant adjoining areas of Sirohi district. The chief vegetation comprises thorny shrubs, deciduous trees along some endangered plants.

KEYWORDS: Devgiri hill; floristic diversity; deciduous trees; medicinal plants.

I. INTRODUCTION

Floristic diversity can be defined as 'the variety and variability of plants found in a given geographical region. It also refers to number of taxa present in a given area (A K Mishra, et al., 2015). India has very rich plant diversity with four biodiversity hot spots, many plant species of hot spots are endemic. The rich resources are disappearing at an alarming rate as a result of over-exploitation and climate change. The management of traditional medicinal plant resources has become a matter of urgency (Sharma S. and Thokchom R., 2014). Floristic studies can help us to know about species richness, endemism, biological interactions and current status of a particular plant species. Due to increase of human population, there has been continuous depleting of natural resources especially forests. Several species of plants are either already extinct or are on the verge of extinction in near future. In India, where the human population has been increasing very fast, the problem is more serious. In the year 1969 at the eleventh technical meeting of the IUCN the problem was discussed. Later on, the Botanical Survey of India brought out a small booklet, "Threatened Plants of India- A State of the Art Report" in the year 1980. Further data on the subject was collected by the flora. Initially about 1000 plant species were considered as endangered. Finally, the Red Data Book of Indian plants also saw the light of the day (Nayar & Sastry, 1987). Aravalli ranges are one of the very important features of western part of India which runs from Gujarat to Delhi. It traverses through four states viz., Gujarat, Rajasthan, Haryana and Delhi. Maximum part of Aravalli range is confined to Rajasthan (Sharma S.K., 2019).

The state of Rajasthan with an area of about 342,239 sq. km lies in the north-west part of India which forms arid and semi-arid regions of the Thar desert. The Aravalli which is considered as the oldest folded system of mountains in the world divides Rajasthan state diagonally into two regions, a sandy desert on the north-west direction and a fertile region on the south-east direction. These two regions are different in their climate, physiography and annual rainfall pattern as well as floristic composition (Aery & Tiagi, 1982,).

A recent survey of South Rajasthan and parts of Gujarat state has revealed the occurrence of *C. crenata* (C.B. Gena et al, 2010). Several Ethno-medicinal plants are used by traditional healers such as *Achyranthes aspera*, *Mucuna pruriens*, *commiphora wightii*, *Pentanema indicum* etc. (S K Jain, 2016). A list of plant species which have been considered as rare, vulnerable and endangered was given on the basis of frequent floristic surveys (N.C. Aery and Y.D. Tiagi, 2001) . Meena K.L. and Yadav B.L., (2010) carried out an extensive survey of Garasiya tribe dominated area of Sirohi district, to document the information about uses and conservation of ethnomedicinal plants including *Chlorophytum borivilianum*. Ethnomedicinal studies at Sanchor and Mount Abu regions (Sirohi) were carried out to conserve the traditional knowledge hidden in these regions (Negi R.S.et al., 2012). Tuberous plants which characteristically have a storage organ on or below the soil surface; which may be a bulb, corm, tuber, tuberous root, rhizome, stolon etc. Storage organs allowing the plants to survive in environmental stress conditions such as cold, heat or drought (Shweta Swarnkar and S.S Katewa., 2008). In the Indian sub- continent *Lantana* has invaded vast tracts of dry-moist forests and



other wastelands and has potentially altered the biodiversity of hill forests through infestation, causing allelopathy and rapid growth (Girish C. S. Negi et al., 2019). A taxonomic study of the genus *Cassia* Linn. in Rajasthan was carried out by Vijendra Singh, (1976). Pankaj H. Chaudhary and Somshekhar S. Khadabadi studied on Pharmacognosy, Ethnobotany and Phyto-pharmacology of *Bombax ceiba*.

II. STUDY AREA

Devgiri hill is located in the Aravalli range about 10 km near Makaroda village (Latitude 24.84 and Longitude 72.84, BharatMap) south-east of Sirohi. A thorny belt of *Prosopis juliflora* and *Ziziphus nummularia* can be seen along with some scattered forms of *Acacia senegal* that runs parallel to the foot hills. At the upper parts, some deciduous trees include *Cassia fistula*, *Butea monosperma*, *Bombax ceiba*, *Sterculia urens* etc. can be visible clearly. There is a long Zigzag trek along the water stream which runs near Lord Shiva temple located on the top hill and worshipped by the local people. Few patches of shrub *Cordia crenata* (Fig.4) can also be seen near the holly place.

III. MATERIALS AND METHODS

The present study was conducted in Devgiri hill area near Sirohi aiming to assess the composition and structure of vegetation. The surveys were made in this hilly area from 2016 to 2020 to know the status and ethno-medicinal importance of some rare and endangered plants and floristic composition or species richness.

The following materials and methods were used during study:

I. Floristic Survey: During the investigation frequent field trips were undertaken in monsoon, winter and summer seasons. The vegetation type of major parts of adjoining areas of Mount Abu region comprises of tropical deciduous forests on the hills and other exposed slopes along isolated pockets of semi-evergreen forests (Kanodia K.C. and Deshpande U.R., 1961). Authors have been working on floristic composition and eco-taxonomical studies of the region for the past four years. During regular forays it has been observed that some species like *Chlorophytum borivilianum*, *Commiphora wightii* were very common but now have become most uncommon and few of them are on the verge of disappearance. There is an urgent need to enlist such plant species for their conservation point of view. During past years, extensive surveys were carried out along with local people and colleagues especially during the rainy season. While survey, field diary was maintained to collect precise data about growth and flowering of a particular species recorded. Causes of their threats, encroachment and grazing activities of cattle were also observed and recorded.

II. Herbarium Method: During field trips, the plant specimens were collected during different reproductive stages. Only photographs were taken in case of rare and endangered plant species such as *Commiphora wightii*, *Cordia crenata* (Fig.4), *Moringa concanensis* etc. Collected plant specimens were regularly dried and pressed with the help of a plant press and subsequently all the plant species have been identified with the help of Flora of Rajasthan (Shetty and Singh, 1993), Flora of Indian Desert (Bhandari, 1990). Beside these, online literature (e-flora, India biodiversity portal, Wikipedia etc.) was also cited for plant identification. Finally, plant specimens were labelled and mounted on a herbarium sheet of definite size (29.5' X 42'). The taxa are arranged alphabetically along their respective families which are further arranged according to the Bentham and Hooker's system of plant classification. Available local names of plants and their habit are also mentioned (table 1). Use of Vasculum was done for the collection of some bulbous and fleshy specimens. It is a metallic box painted white and has a lid along shoulder sling, used during field trips (Gurcharan Singh 2004). An average 1 to 2 surveys were also carried out during the months of March-April of summer season when there is a full flowering season in deciduous forest trees such as *Butea monosperma*, *Bombax ceiba*, *Crataeva nurvala*, *Sterculia urens*, *Lannea coromandelica*, *Boswellia serrata*, *Helicterus isora* (Fig.2) etc. Hutchinson, (1959) enumerates 24 principals related to general habit and phylogeny of Angiosperms. He considered tree habit more primitive than shrub and herb followed by climber or epiphyte.

III. Interaction with local people: During the field surveys, regular interviews of local tribe were taken to know about economic, ethnobotanical as well as aesthetic values of different plant species of the hilly region. During the interaction, valuable information of plants about traditional uses especially ethno-medicinal uses of *Chlorophytum borivilianum*, *Commiphora wightii*, *Moringa concanensis*, *Mucuna pruriens* (Fig.1), *Crataeva nurvala*, *Bombax ceiba*, *Cassia fistula* etc. was collected and interpreted with help of available literature. *Moringa concanensis* is a rare medicinal tree found in Aravalli region. The various parts of plant such as seed, stem gum, leaves, fruits etc. are used in traditional medicine as anticancer, antibacterial, analgesic, anti-inflammatory.

On the basis of above mentioned methods of studies and extensive survey, we have prepared a list of plants along with their vernacular or local names reported from the region.

Table 1: List of wild plant species of study area

SN.	Plant Name	Family	Local Name	Habit
1.	<i>Cissampelos pariera</i> L.	Menispermaceae	Patal ki bel	Climber
2.	<i>Cocculus hirsutus</i> (L.) W. Theob.	Menispermaceae	Jal Jamani, Chireta	Climber
3.	<i>Crataeva nurvala</i> Buch.-Hum.	Capparaceae	Varun	Tree
4.	<i>Cleome viscosa</i> L.	Cleomaceae	Hulhul	Herb
5.	<i>Portulaca oleracea</i> Linn.	Portulacaceae	Kulfa	Herb
6.	<i>Boswellia serrata</i> Roxb.	Burseraceae	Salar	Tree
7.	<i>Commiphora wightii</i> (Arnott) Bhandari	Burseraceae	Guggal	Shrub
8.	<i>Corchorus aestuans</i> L.	Tiliaceae	Chonch	Herb
9.	<i>Grewia flaviscens</i> Juss	Tiliaceae		Shrub
10.	<i>Grewia tenax</i> (Forsk.) Fiori	Tiliaceae	Gangar	Tree
11.	<i>Triumfetta rhomboidea</i> Jacq.	Tiliaceae	Kasani	Herb
12.	<i>Bombax ceiba</i> L.	Malvaceae	Semal	Tree
13.	<i>Hibiscus vitifolius</i> L.	Malvaceae		Herb
14.	<i>Sida acuta</i> Burm.f.	Malvaceae	Bala	Herb
15.	<i>Waltheria indica</i> L.	Malvaceae		Herb
16.	<i>Helicteris isora</i> Linn.	Sterculiaceae	Marod Phali,	Shrub
17.	<i>Sterculia urens</i> Roxb.	Sterculiaceae	Gam Karaya, Ulatkambal	Tree
18.	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Kanti, Gokharu	Herb
19.	<i>Oxalis corniculata</i> L.	Oxalidaceae	Khati-butti	Herb
20.	<i>Aegle marmelos</i> (L.) Corr.	Rutaceae	Bael Tree	Tree
21.	<i>Ziziphus nummularia</i> Wt. & Arn.	Rhamnaceae	Jhadber	Shrub
22.	<i>Ampelocissus latifolia</i> (Roxb.) Planch	Vitaceae		Climber
23.	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Baloon bel	Herb
24.	• <i>Lannaea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Jhingan	Tree
25.	<i>Moringa concanensis</i> Nimmo ex Dalz.	Moringaceae	Sarguda	Tree
26.	<i>Abrus precatorius</i> Linn.	Fabaceae	Rati, Chirmi	Climber
27.	<i>Acacia leucophloea</i> Roxb.	Fabaceae	Ronj	Tree
28.	<i>Acacia Senegal</i> (L.) Willd.	Fabaceae	Kumta	Tree
29.	<i>Albizia lebbeck</i> (L.) Benth.	Fabaceae	Siras	Tree
30.	<i>Bauhinia racemosa</i> Lam.	Fabaceae	Kachnar, Jhinj	Tree
31.	<i>Butea monosperma</i> (Lam.) Taub.	Fabaceae	Dhak, Palash	Tree
32.	<i>Cassia absus</i> L.	Fabaceae		Herb
33.	<i>Cassia fistula</i> L.	Fabaceae	Amaltash	Tree
34.	<i>Cassia tora</i> Linn.	Fabaceae	Pawad, Chakramard	Herb
35.	<i>Crotalaria medicaginea</i> Lam.	Fabaceae	Ghughrio	Herb
36.	<i>Desmodium procumbens</i> (Mill.) Hitch.	Fabaceae		Herb
37.	<i>Dichrostachys cinerea</i> (L.) Wight & Arn.	Fabaceae	Kanwal	Shrub

38.	<i>Indigofera astragalina</i> DC.	Fabaceae		Herb
39.	<i>Indigofera cordifolia</i> B. Heyne ex Roth	Fabaceae	Bekharlo	Herb
40.	<i>Mucuna pruriens</i> (L.)DC.	Fabaceae	Konch Phali	Climber
41.	<i>Prosopis juliflora</i> Sw. DC.	Fabaceae	Vilayati Babool	Tree
42.	<i>Tamarindus indica</i> Linn.	Fabaceae	Imli	Tree
43.	<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	Sarphonka, Kharnio	Herb
44.	<i>Tephrosia strigosa</i> (Dalzell) Santapau & Mahesh.	Fabaceae		Herb
45.	<i>Anogeissus acuminata</i> (Roxb. Ex dC.) Guill. & Perr.	Combretaceae	Dhonk	Tree
46.	<i>Bryonopsis laciniosa</i> (L.) Naud.	Cucurbitaceae	Shivlingi	Climber
47.	<i>Coccinia indica</i> (L.) Voigt.	Cucurbitaceae	kanduri	Climber
48.	<i>Mukia maderaspatana</i> (L.) M. Roem.	Cucurbitaceae	Ankh phod ki bel	Climber
49.	<i>Trichosanthes cucumerina</i> L.	Cucurbitaceae	Chichinda	Climber
50.	<i>Trianthema portulacastrum</i> L.	Aizoaceae	Santhi	Herb
51.	<i>Mitragyna parviflora</i> Roxb. Korth	Rubiaceae	Kadam	Tree
52.	<i>Spermadictyon suaveolens</i> Roxb.	Rubiaceae	Gandhela, Padela	Shrub
53.	<i>Ageratum conyzoides</i> L.	Asteraceae	Mahkua	Herb
54.	<i>Bidens biternata</i> (Lour.) Merr. & Sherff.	Asteraceae	Sui ka Ped	Herb
55.	<i>Blainvillea acmella</i> (L.) Philipson	Asteraceae		Herb
56.	<i>Pentanema indicum</i> (L.) Ling	Asteraceae		Herb
57.	<i>Parthenium hysterophorus</i> L.	Asteraceae	Gajar Grass	Herb
58.	<i>Sonchus arvensis</i> L.	Asteraceae	Dudi	Herb
59.	<i>Dierophytum indicum</i> (Gibson ex Wight) Kuntze	Plumbaginaceae	Lal Chitrak, Chitavar	Shrub
60.	<i>Plumbago zeylanica</i> Linn.	Plumbaginaceae	Safed Chitrak	Shrub
61.	<i>Wrightia tinctoria</i> Roxb. R.Br.	Apocynaceae	Khirani	Tree
62.	<i>Cordia crenata</i> Delile	• Boraginaceae	Jangali Gundi	Shrub
63.	<i>Trichodesma indicum</i> (Linn.) R.Br.	Boraginaceae	Ondhahuli	Herb
64.	<i>Evolvulus asinoides</i> Linn.	Convolvulaceae	Shankh Pushpi	Herb
65.	<i>Ipomoea nil</i> (L.) Roth	Convolvulaceae	Krishna Bij	Climber
66.	<i>Physalis minima</i> L.	Solanaceae	Rasbhari Chhoti	Herb
67.	<i>Solanum surattense</i> Burm. f.	Solanaceae	Pili Kantili, Ringadi	Herb
68.	<i>Limnophila heterophylla</i> Benth.	Scrophulariaceae		Aquatic weed
69.	<i>Martynia annua</i> L.	Martyniaceae	Hathajori	Shrub
70.	<i>Adhatoda vasica</i> Nees	Acanthaceae	Adusa	Shrub
71.	<i>Andrographis echinoides</i> (L.) Nees.	Acanthaceae	Kulphnath	Herb
72.	<i>Barleria cristata</i> L.	Acanthaceae	Vajradanti Safed	Herb
73.	<i>Blepharis maderaspatensis</i> (L.) Heyne ex Roth	Acanthaceae		herb
74.	<i>Lantana camara var. aculeata</i> L.	Verbenaceae	Laltenia	Shrub
75.	<i>Leucas aspera</i> (Wild.) Link	Lamiaceae	Goma	Herb
76.	<i>Leucas cephalotes</i> (Roth.) Spreng.	Lamiaceae	Dronapushpi	Herb
77.	<i>Ocimum gratissimum</i> L.	Lamiaceae	Wild Tulsi	Herb
78.	<i>Boerhaavia diffusa</i> L.	Nyctaginaceae	Santi, Punarnava	Herb
79.	<i>Achyranthes aspera</i> Linn.	Amaranthaceae	Latjeera, Apamarg	Herb
80.	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Kantewali Chaulai	Herb

81.	<i>Euphorbia caducifolia</i> Haines	Euphorbiaceae	Danda Thor	Herb
82.	<i>Euphorbia clarkeana</i> Hook.f.	Euphorbiaceae	Dudi	Herb
83.	<i>Phyllanthus fraternus</i> G. L. Webster	Phyllanthaceae	Bhumi Amla	Herb
84.	<i>Ficus benghalensis</i> L.	Moraceae	Bargad, Bar	Tree
85.	<i>Flacourtia indica</i> (Burm. F.) Merr.	Salicaceae	Khanti	Tree
86.	<i>Asparagus racemosus</i> Willd.	Liliaceae	Satavar, Satawari	Climber
87.	<i>Chlorophytum borivilianum</i> L.	Liliaceae	Safed Musli	Herb
88.	<i>Commelina benghalensis</i> L.	Commelinaceae	Kankoa	Herb
89.	<i>Cyanotis axillaris</i> (L.) D.Don ex Sweet	• Commelinaceae		Herb
90.	<i>Cyperus rotundus</i> L.	Cyperaceae	Nagar Motha	Sedge
91.	<i>Apluda mutica</i> L.	Poaceae	Royal	Grass
92.	<i>Eragrostis ciliaris</i> (L.) R.Br.	Poaceae		Grass
93.	<i>Melanocenchris jacquemontii</i> Jaub. & Spach	Poaceae		Grass
94.	<i>Setaria verticillata</i> (L.) P. Beauv.	Poaceae	Lapchuna	Grass



Fig.1 *Mucuna pruriens*



Fig.2 *Helicterus isora*



Fig.3 *Bryonopsis laciniosa*



Fig.4 *Cordia crenata*



Fig. 5 *Aegle marmelos*



Fig.6 *Dierophytum indicum*



Fig.7 *Indigofera astragalina*



Fig.8 *Spermadictyon suaveolens*
Plates of Some plant species (1-9)



Fig.9 *Plumbago zeylanica*



IV. RESULT AND DISCUSSION

The floristic composition of the region shows the species richness include many miracle medicinal plants which have traditionally been protected and utilized by local tribes. (The enlisted plant species which have been schematically represented by table 1 and plates 1-9).

During present investigation, a total of 94 species and 86 genera belonging to 42 angiosperm families were reported. Out of these, fabaceae was the dominant family having 19 species of 14 genera followed by asteraceae and acanthaceae Table 1. Out of these, 85 species and 77 genera of 38 families are belonging to dicots and remaining others are monocots. There also reported some regular grazing activities along the foot hill area which can cause serious threat to endangered species like *Commiphora wightii*, *Chlorophytum borivilianum*. Some plant species like *Mucuna pruriens* (Fig.1), *Bryonopsis laciniosa* (Fig.3), *Aegle marmelos* (Fig.5), *Dierophytum indicum* (Fig.5), *Plumbago zeylanica* (Fig.9) etc have been used as traditional ethnomedicine.

Commiphora wightii is a plant of immense medicinal value found in Aravalli range. It is listed in IUCN's Red Data List of threatened plants. It is a slow growth arid region plant, a source of resin guggal gum (Neeraj Jain and Rajani S. Nadgouda, 2013). Plant tissue culture studies was done by Purohit et al., (1994) on Safed Musli (*Chlorophytum borivilianum*), a rare medicinal herb. The Studies on floristic Diversity of Jessore Sloth Bear Wildlife Sanctuary located in Banaskantha district of Gujarat was carried out by Meena S.L., (2012). Jessore hills are part of the Aravalli range adjoining to Mount Abu region and it has dry-deciduous type forest and wealth of medicinal plants. Few patches of weeds were also observed during investigation which can produce allelopathic impacts surrounding the medicinal plants that grow in the hilly area, include aquatic weed *Limnophila heterophila* and *Ageratum conyzoides*⁵³⁻⁶⁷. Allelopathic impact caused due to over growth of exotic weed *Lantana camara* could be assessed in the vicinity of medicinal plants⁷⁴. Kapoor B.B.S. and Kumar Deepak, (2014) studied on occurrence of ascorbic acid in some medicinal tree species of Sirohi district.

Present study is done to provide basic information and occurrence of different plant species and also usefulness of some medicinal plants of the study area. Local inhabitants also use various plant parts as food, fodder, medicine etc.. Some plant species such as *Lantana camara* which also causes poisonous effects on vegetation is observed in few localities of study area. Checklist of botanical name, family, habit and local name(s) is provided (Table 1).

V. CONCLUSION

Above listed most of the plant species have high medicinal value^{7, 20, 25,40,46,59,60,86,87}. These plant species have been utilized by the local people especially Garasia community in their life styles as ethno-medicine for treating different ailments such as asthma, diarrhoea, fever, ulcers, impotency, arthritis etc. Katewa S.S. et al., (2003) carried out studies on traditional uses of wild plants by tribes of Aravalli hills of Rajasthan. Salvi Jyotsna and Katewa S.S., (2016) emphasized on underutilized wild edible plants of southern Rajasthan. Past studies shows that if timely action for these wild plant species is not taken, it may result into disappearance of few species like *Commiphora wightii*, *Moringa concanensis*, *Chlorophytum borivilianum* in the near future^{7,25,87}. There is an urgent need to give attention to conserve these species through regular surveys and also need to check impact of few invasive species^{41,74}. With the help of forest department, emphasis should be given on prevention of grazing activities by cattle surrounding the hilly areas. Thus, plant diversity of the hilly area can be protected in the near future.

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