

Study of Biodiversity of Sariska Tiger Reserve in Aravallis with Particular Emphasis on Medicinal and Endemic Plants

Anil Kumar Dular

Department of Environmental Science, Maharaja Ganga Singh University, N.H 15, Jaisalmer Road, Bikaner, Rajasthan 334004.India

Abstract: The Sariska tiger reserve in Aravallis has its own importance and specific characteristics endowed with unique biodiversity. In the present study an attempt has been made to ascertain the current status of the flora in all the possible study area. Attention is focused on one of the important reserve forest of state of Rajasthan with pace of their endemism, medicinal important plants species and along with facing number of challenges in this reserve. In present study emphasize on taxonomic richness; genetic difference within each taxon; the communities, ecosystem and landscape occupied by this reserve. The status of medicinal plants with their uses is also incorporate with overall study of floral diversity in the study area. Several studies so far conducted in Aravallis like which supported checklist of plant diversity in this natural reserve. Anon, 2000, Champion and Seth1968, Dennis, Billore, and Mishra, 1997,Jain and Kotwal1960,Jain1970, Khan1995,Katewa1996,Mathur and Saxena1968,Mathur1991,Nair and Nathawat1957, Parmar1985, Pandravada,. Sarath, Rao, Maheswara and Satyanarayana, 2000,Rodgers. and Panwar1988,Rodgers 1990a. Rodgers, 1990b, Rodgers 1991, Rodgers, 1991. Sharma,1958, Sharma, 1978 Sharma1983.

Keywords: Floral diversity, Sariska tiger reserve, Aravallis, endemism

1. Introduction

Rajasthan, the largest state in our country, has marked difference in physiographic feature. The Aravallis, one of the oldest mountain system, divide the state in two unequal parts. Over 30 percent of the state is covered by Aravallis and a vast expanse of arid and semi arid tract lies in the west of Aravallis. According to the Champion and Seth (1968) the forest of Aravalli region fall under the broad category of Tropical Dry forests. Study area the "Sariska Tiger reserve" (74°14' to 76° 34' N and 25° 5' to 27° 3' E) is situated in the Aravalli hill range and lies in the semi-arid part of Rajasthan (Rodgers and Panwar, 1988). It became a wild life sanctuary in 1955 and Tiger reserve in 1982. According to Department of Forest, Government of Rajasthan the total area of the Sariska Tiger Reserve is 866 sq.km, of which 302.2 sq. km. is buffer zone and 497.8 sq.km is core zone. Sariska core zone is comprised of three isolated; pockets: Core-I (273.8 sq.km), II (126.5 sq.km.) and III (97.5 sq.km). The status of the Core I has been notified as a National park in 1982. Sariska is undulating to hilly and has numerous narrow valleys. Kiraska and Kankwari plateau and two large lakes Mansarovar and Somsagar. Silisad lake is situated just along the north eastern boundary of the reserve. The altitude of Sariska varies from 540 to 777 meters. Earlier Sariska was the private hunting grounds of Alwar's royal family, today only 20 percent of this vast expanse of jungle is "Tiger Habitat". The vegetation of Sariska correspond to Northern tropical dry deciduous forests (sub group 5 B; 5/E I and 5/E2) and Northern tropical thorn forest (Sub Group 6 B) (Champion and Seth,1968). The forest being scattered and sparse over a large area on various geological and soil formation and vary greatly in composition. *Anogeissus pendula* (Dhok) is dominant species in the undulating area and on the hills. *Boswellia serrata* (Salar) and

Lannea coromandelica (Garjan) grows on steep rocky areas. *Acacia catechu* (Khair), *Zizyphus mauritiana* (Bordi) and *Butea monosperma* (Dhak) are found in valleys. *Dendrocalamus strictus* is extremely limited in distribution and is found along the well drained reaches of the streams and moist and colder part of the hills.



2. Material and Methods

In the present study emphasis was laid on the study of floral diversity in Sariska Tiger Reserve, during January, 2001 to March, 2004. This study revealed that biodiversity of the study area was affected due to anthropogenic activities. It provides an assessment of the key human factors and their relative roles in driving the destruction of biodiversity, which are likely to operate, not only in core zone but immediately

surrounding buffer zone. Personal observations were taken in the field by visiting the study area and its different landforms. It was a great help that the field staff of Sariska Tiger Reserve, Department of Forest, Government of Rajasthan was associated always in the field. Plant samples (leaf, flower etc.) were brought to Indira Gandhi Centre for Human Ecology, Environmental and Population Studies, herbarium sheets for important species were prepared and help and cooperation was sought from the "Herbarium" of Department of Botany, University of Rajasthan, Jaipur for finding out the current status of vegetation in the study area. The properties of medicinal important plants are assessed by interview of local dweller, ayurvedic doctors, local medicomen and elder man and women of inside and outside the reserve. The exudates of different parts of plants species shall be carried out by the help of pharmaceutical professional and through laboratory investigation. The ethanobotanical aspects of the plants species of the reserve area can elaborate by the medicinal and folk dietary practices of local indigenous people.

Landwise floral (endemic) composition of Sariska Tiger reserve in Aravallis :Sariska Tiger reserve nestled amidst the Aravallis which used to be hunting place (Sikargrah) of princely state Alwar in the past, is now a days a tiger reserve of international reputation. Sariska is very rich in biodiversity with wide spectrum of flora and ample of wild life. According to the latest " Revised forest types of India " by Sir H.G. Champion and Shri S.K. Seth, the forests, met within the division fall under group 5 "Tropical dry deciduous forest" and group 6 "Tropical thorn forests" under the broad category 'Dry tropical forests'. The main endemic and economically valuable species are dhok (*Anogeissus pendula*) salar (*Boswellia serrata*), khair (*Acacia catechu*), bamboos (*Dendrocalamus strictus*), dhak (*Butea monosperma*), kair (*Capparis decidua*), ber (*Zizyphus mauritiana*) with having lot of ground flora comprised of shrubs, herbs, grasses and sedges etc. The forest being scattered over a large area and occurring on various geological and soil formation vary greatly in composition and quality. Approximately 35 percent of the forest area is either occupied by bare rocks or covered specially with degraded and poor type of scrub growth. The growth of the principal trees is generally slow and the height poor. On average the height varies from 4.5 meters to 7.5 meters, in favorable localities like core area the height reaching unto 12 meters. The diameter increment, too is slow and most of the principal species over 30 cm wide in width. The dominating species with occurrence in particular height are divided into upper canopy, middle canopy and ground flora as grasses and sedges mainly. The forests being scattered and sparse over a large area on various geological and soil formations, vary greatly in composition. In the valleys where better soil and moisture conditions exist, the vegetation is comparatively denser. *Anogeissus pendula* is the dominant tree species, covering over 90 percent area of the forests. *Boswellia serrata* and *Lannea coromandelica* grow on rocks and dry slopes. *Acacia catechu* is common in valleys, where

Dendrocalamus strictus is extremely limited and are found along well drained reaches of the streams and moist and cooler parts of the hills. The trees are generally slow growing an attain poor height. *Albizia lebbek*, *Diospyros melanoxylon*, *Syzygium cumini*, *Tamarindus indica* and *Ficus* spp. which are found in moist localities attain large size both in crown grows gregariously, where valleys fan out. and becoming flat and wide. On the basis of their composition. The forests of Sariska Tiger Reserve can be classified as follows (i):*Anogeissus pendula* forest (ii)*Boswellia serrata* forest (iii) *Acacia catechu* forest and(iv)Miscellaneous type of forests which can further be divided into three categories namely (a)*Butea monosperma* forest(b)Forests along nallahs(c)Scrub forest.

3. Result and Discussion

A total number of 403 indigenous and naturalised plant species belonging to 271 genera under 86 families can be observed in Sariska Tiger Reserve. This also includes four species of Petriodophytes belonging to three genera and three families, and a species of Gymnosperm. Table(a) includes the number of families, genera and species, under Dictoyledons and Monocotyledons, Pteridophytes and Gymnosperm. Except for Poaceae (56 species) and Cyperaceae (17 species) the Monocotyledons are poorly represented. The remaining 16 species of Monocotyledons belong to 10 different families.

Table a: Shows current status of vegetation in Sariska Tiger Reserve

	families	Genera	Species
Angiosperm			
Monocotyledons	13	59	90
Dicotyledons	69	208	308
Total	82	267	398
Pteridophytes	3	3	4
Gymnosperm	1	1	1
Total	86	271	403

Aravallis is known for very valuable plant and animal species. The local people and Ayurvedic doctors have been using plant products (leaf, seeds, bark, fruit etc.) in a crude manner. It reveals that these plant species are of medicinal values of which full potential is yet to be explored and utilized. There is ample scope of researches in the field of Phytochemistry, Biochemistry. Pharmacognosy and Biotechnology. Analysis of interview schedule revealed that there are Fifty four plant species occurring in the study area, which can be considered as medicinal plant species. These medicinal plants species with their use of different parts are the subject matter of endemism of the particular area and time to concentrate to conserve their status so far. The information and practices avail by local indigenous people is subject matter of conservation because they are the real custodian of biodiversity. Their indigenous practices great helps in conserving the biological diversity on

madiculous, aesthetic or knowledge based ground which is divine gift to cradle for future endeavour.

Table A: Includes the list of medicinal plant species at Sariska Tiger Reserve

S.No	Name of the species	Families	Vernacular name	Part used	Medicinal properties	Purpose of use
1.	<i>Abrus precatorius L.</i>	Papilionaceae	Chirmi/Ratti	seeds	purgative and aphrodisiac	nervous disorder
2.	<i>Acacia catechu Willd.</i>	Mimosoaceae	Khair	exudate	-	difficult child birth
3.	<i>Acacia farnesiana (L.) Willd.</i>	Mimosoaceae	Vilati babul	bark	astringent	cough, renal dropsy, bronchial infection
4.	<i>Achyranthes aspera L.</i>	Amaranthaceae	Chirchitta	whole plant	-	cough and colds
5.	<i>Adhatoda zeylanica Medic</i>	Acanthaceae	Adulsa	leaves	expectorant	bronchitis
6.	<i>Aegle marmelos (L.) Corr.</i>	Rutaceae	Bel	fruit pulp	cooling, laxative and digestive	chronic diarrhoea and dysentery
7.	<i>Ailanthus excelsa Roxb.</i>	Simaroubaceae	Adu	root/stem bark	-	fever / coughs
8.	<i>Ammania baccifera L.</i>	Lythraceae	-	whole plant	-	guinea worm expulsion
9.	<i>Anogeissus pendula Edgew.</i>	Combretaceae	Dhok	stem bark	-	gastric disorder
10.	<i>Argemone mexicana L.</i>	Papaveraceae	Kateli	root	laxative	chronic skin disease
11.	<i>Asparagus adscendens Roxb.</i>	Liliaceae	Safed musli	roots fasciculated	demulcent	diarrhoea and dysentery
12.	<i>Azadirachta indica A. Juss.</i>	Meliaceae	Neem	leaves twigs	prophylatic	leprosy and skin diseases
13.	<i>Bacopa monnieri (L.)</i>	Scrophulariaceae	Brahmi	whole plant	potent diuretic tranquilizer	insanity, epilepsy cardiac tonic and nerve tonic
14.	<i>Balanites aegyptica (L.) Delile</i>	Simaroubaceae	Hingot	seed	hypotensive source of diosgenin	oral contraceptives
	<i>Name of the species</i>	<i>Families</i>	<i>Vernacular name</i>	<i>Part used</i>	<i>Medicinal properties</i>	<i>Purpose of use</i>
15.	<i>Bauhinia racemosa Lamk.</i>	Caesalpiniaceae	-	stem bark	toxic	weakness
16.	<i>Boswellia serrata Roxb.</i>	Burseraceae	Salar	exudate gum	-	-
17.	<i>Bridella retusa (L.) Spr.</i>	Euphorbiaceae	-	leaves	suppository	-

18.	<i>Butea monosperma</i> (Lamk.) Taub.	Papilionaceae	Dhak	seeds gum	anthelminthic diarrhoea	-
19.	<i>Calotropis gigantea</i> (L.) R. Br.	Asclepiadaceae	Aak	root bark	dysentery diaphoretic	skin diseases
20.	<i>Calotropis procera</i> (Ait.) R. Br.	Asclepiadaceae	Aakada	root bark flowers powdered	expectorant diaphoretic	cough and asthma
21.	<i>Capparis sepiaria</i> (L.)	Capparaceae	-	roots	-	decay of tooth and jaws
22.	<i>Cardiospermum</i> <i>halicacabum</i> (L.)	Sapindaceae	Kanphuti	whole plant	-	stiffness of limbs, earache, rheumatism
23.	<i>Cassia fistula</i> (L.)	Caesalpiniaceae	Amaltas	fruit pulp	purgative laxative	-
24.	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Malkagni	seeds	laxative stimulant aphrodisiac	leprosy and rheumatism
25.	<i>Cayratia trifolia</i> L.	Vitaceae	-	roots	-	diabetes
26.	<i>Citrullus colocynthis</i> (L.) Schard	Cucurbitaceae	Indrayan	roots fruits-pulp	purgative	jaundice, urinary diseases, antibacterial
27.	<i>Cocculus pendulous</i> (J.R. & Frost) Diels.	Menispermaceae	-	roots	-	Intermittent fever
28.	<i>Commiphora wightii</i> (Arn.) Bhandari	Burseraceae	Guggal	oleo-resin exudate	expectorant aphrodisiac carminative	lower blood cholesterol
29.	<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Amerbel	stem	-	tonsillitis
30.	<i>Cyperus rotundus</i> L.	Cyperaceae	Moth	rhizome	-	-
31.	<i>Derris indica</i> (Lamk.) Bennet.	Papilionaceae	-	leaves	-	dandruff and hair tonic
32.	<i>Desmodium gangeticum</i> (L.) Dc.	Papilionaceae	-	roots and seeds	febrifuges anticatarrhatic	-
33.	<i>Eclipta prostrata</i> (L.) Linn.	Asteraceae	Bhrangra	plant juice	-	jaundice and hair tonic
34.	<i>Emblica officinalis</i> Gaertn.	Euphorbiaceae	Amla	fruit raw	diuretic and laxative	-
35.	<i>Euphorbia hirta</i> L.	Papilionaceae	Laldudhi	whole plant	-	bronchial infection, cough, asthma and wormicide in children
36.	<i>Gymnema sylvestris</i> (Retz.) Schult.	Asclepiadaceae	Gurmar	leaves	antidiabetic	blood sugar reducing
37.	<i>Holarrhena</i> <i>antidysentrica</i> (L.) Wall ex. Dc.	Apocynaceae	-	leaves + unripe fruit	-	biliousness dysentery and diarrhoea
38.	<i>Martynia annua</i> L.	Martyniaceae		seeds oil leaves and fruits	-	scabies, eczema and dysentery
39.	<i>Moringa oleifera</i> Lamk.	Moringaceae	Sainjana	seed oil	-	acute rheumatism
40.	<i>Nyctanthes arbor-tristis</i> L.	Nyctanthaceae	Kali tulsi	seeds	diuretic, tonic cooling	-

41.	<i>Ocimum sanctum L.</i>	Lamiaceae	Tulsi	leaves juice / infusion	-	bronchitis digestive complaint and cold
	<i>Name of the species</i>	Families	Vernacular name	Part used	Medicinal properties	Purpose of use
42.	<i>Oldenlandia corymbosa L.</i>	Rubiaceae	-	whole plant	-	in fever and jaundice
43.	<i>Pavonia odorata Willd.</i>	Malvaceae	-	whole plant	-	rheumatism
44.	<i>Plumbago zeylanica L.</i>	Plumbaginaceae	-	roots	an appetizer	diarrhoea, piles and scabies ulcers
45.	<i>Sapindus emarginatus Vahl.</i>	Sapindaceae	Ritha	leaves	-	colic pain due to indigestion diarrhoea, paralysis of limbs.
46.	<i>Solanum nigrum L.</i>	Solanaceae	Makoi	whole plant	-	anema in infant having abdominal upset, cirrhosis of liver
47.	<i>Soymida febrifuga A. Juss.</i>	Meliaceae	Rohan	bark	stimulant	diarrhoea dysentery
48.	<i>Sterculia uren Roxb.</i>	Sterculiaceae	Kadaya	exudate	laxative	-
49.	<i>Tamarindus indica L.</i>	Caesalpiniaceae	Imili	fruit pulp leaves	carminative, antibiotic, refrigerant and laxative	swelling and boils
50.	<i>Terminalia belirica (Gaertn.) Roxb.</i>	Combretaceae	Bahera	fruit pulp unripe fruit	purgative	purgative
51.	<i>Tribulus terrestris L.</i>	Zygophyllaceae	Gokhru	fruit	diuretic and tonic	stone in urinary bladder
52.	<i>Tridax procumben L.</i>	Asteraceae	-	leaves	-	cuts and wound
53.	<i>Withania somnifera (L.) Dunal</i>	Solanaceae	Aswgandh	leaves and roots	tonic/diuretic and antibacterial	joints pain/headache and rheumatism
54.	<i>Syzygium cumini (L.) Skeels.</i>	Myrtaceae	-	bark	-	diarrhoea and dysentery

4. Acknowledgement

Author has deep sense of gratitude to his supervisor Director Indira Gandhi centre for Human Ecology and Population studies, University of Rajasthan, Jaipur for their able guidance during the research tenure and also thankful to Dept of forest, Government of Rajasthan and field director to sariska and other staff members.

References

- [1] Anon, 2000. Report of the task force on conservation and sustainable use of medicinal plants. Planning Commission, Government of India, New Delhi.
- [2] Champion, H.G. and Seth, S.K., 1968. A revised survey of the forest type of India. Government of India Press, Delhi, pp. 404.
- [3] Dennis, T.J., Billore, K.V. and Mishra, K.P., 1997. Pharmacognostic study on gum-oleo-resin of *Boswellia serrata* Roxb. Reprint Bulletin **1(3)** : 353-360.
- [4] Jain, S.K. and Kotwal, N., 1960. On the vegetation of Shahabad in Rajasthan, Indian Forester, **Oct.** 602-608.
- [5] Jain, S.K., 1970. Flora composition of Rajasthan – A review. Bull. Bot. Surv. India 12 : 176-187.
- [6] Khan, T.I., 1995. Tropical deforestation and its consequences with reference to biodiversity in India. The Int. Jour. of Environmental Edu. and information 14(1) : 31-44.
- [7] Katewa, S.S., 1996. Ecology of grazing land of Aravalli hills (south west Rajasthan). J. Environ. Bio. 17(1) : 43-50.
- [8] Mathur, K.B.L. and Saxena, V.S., 1968. The working plan of Bharatpur forest division. Government of Rajasthan, Jaipur, no. F.8 (11) Rev. A/68.
- [9] Mathur, V.B., 1991. Ecological impacts of livestock grazing on wild ungulates in Sariska National Park, India, IVth Congress International de Terres de parcours, Montpellier, France.
- [10] Nair, N.C. and Nathawat, G.S., 1957. Vegetation of Harshnath, Aravalli hills. The Journal of the Bombay Natural History Society 54(2).
- [11] Parmar, P.J., 1985. A contribution to the flora of Sariska Tiger Reserve, Alwar District Rajasthan. Bull. Bot. Surv. India 27(1-4) : 29-40.

- [12] Pandravada, S.R., Babu, B. Sarath, Sivaraj, N. Rao, G. Maheswara and Satyanarayana, Y.V.V., 2000. Species diversity and germplasm collection of medicinal plants from Eastern Ghats. *Indian Forester* **Nov.** 1191-1203.
- [13] Rodgers, W.A. and Panwar, H.S., 1988. Planing a wildlife protected area network in India Vol. I & II Wildlife Institute of Dehradun.
- [14] Rodgers, W.A., 1990a. A preliminary ecological survey of Algal spring, Sariska Tiger Reserve, Rajasthan. *Journal Bombay Natural. History Soc.* 87(2) : 201-210.
- [15] Rodgers, W.A., 1990b. *Capparis sepiaria* Linn. an important dry season fodder plant for wildlife. *Range Mgmt. and Agroforestry* 11(2) : 199-206.
- [16] Rodgers, W.A., 1991. A preliminary ecological survey of Algal spring, Sariska Tiger Reserve Rajasthan. *J. Bombay Nat. Hist. Soc.* 7 : 201-209.
- [17] Rodgers, W.A., 1991. The Management of protected area buffer zones for the maintenance of biodiversity. *Int. J. Sustainable Development*
- [18] Sharma, V.S., 1958. The flora of Ajmer (Rajasthan). *The Journal of the Bombay Natural History Society* 55: 1.
- [19] Sharma, Shiv, 1978. Studies in floral composition of Jaipur District, Rajasthan. *Indian Forester* 104(1) : 41-49.
- [20] Sharma, S., 1983. A contribution to the Botany of Ranthambore Tiger Reserve National park. Department of Environment, Government of India, New Delhi.