

Fainting scenario of Rajasthan pteridophytes- needs an attention

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Approximately half of the known species of pteridophytes from the state are either on way to extinction or many of them have already vanished. For this scenario the biotic factors are responsible directly or indirectly. Merciless cutting of forests and making the Aravalli Hills denude, resulted into direct exposure of ground herbaceous flora to sun. Aforestation also resulted into deterioration of annual average rainfall in the state. Similarly constructions of dams, roads, buildings, hotels and temples have destroyed the houses of ferns and fern allies. Proper care is required for the protection of vanishing vegetation of the herbaceous flora including pteridophytes because these plants help in conservation of soil and increase the organic manures which are related directly in the development of forests.

Key-words—Vanishing vegetation, Influence, Rainfall, Forestation.

INTRODUCTION

ADAM (1900) mentioned the existence of number of fern taxa like *Blechnum orientale*, *Cyathea spinulosa*, *Davallia pulchra*, *Phymatodes lepidatum*, *Polypodium quercifolium*, etc. at Mt Abu, which have now disappeared from the area. Similarly, there are number of species of ferns and fern allies which have either vanished from the state e.g. *Botrychium lanuginosum*, *Pteris cretica*, *P. quadriaurita*, *Pityrogramma calomelanos*, *Cheilanthes aravallensis*, *Adiantum hispidulum*, *Athyrium fimbriatum*, *A. hohenackerianum*, *A. parasnathense*, *A. puncticaule*, *Asplenium trapeziformis*, *A. varians*, etc., or are on the verge of becoming extinct e.g. *Selaginella rapenda*, *Isoetes coromandelina*, *I. reticulata*, *Equisetum ramosissimum* subsp. *ramosissimum*, *Ophioglossum nudicaule*, *O. gramineum*, *Asplenium dalhousiae* (*A. lunulatum*), *Araiostegia pseudocystopteris*, etc. (Adam 1900, Sutaria 1941, Mahabale & Kharadi 1946; Kanodia & Deshpande 1962; Bir & Verma 1963; Vyas 1964, 1965; Bir 1987; Sharma *et al.* 1992; Gena 1998). In the present paper causes of vanishing of the pteridophytic vegeta-

tion are discussed and suggestions are given for their protection.

MATERIAL AND METHOD

In Rajasthan, the Aravalli Hills and the Chambal ravines are the main areas which face sufficient pouring during the rainy season and many pteridophytes flourish luxuriantly from July to September. Collections of ferns and fern allies were made several times in a year and continuously for many years. This has given a complete picture of habit, habitat and life cycle of these plants. Various aspects like taxonomy, morphology, anatomy, phytochemistry and experimental studies have been made especially at two centres of learning viz. Govt. College, Ajmer and J.N. Vyas University, Jodhpur (Gena *et al.* 1979, Gupta 1962; Sharma & Bohra 1977; Sharma & Harsh 1995; Sharma & Sharma 1992; Sharma & Singh 1984b; Sharma *et al.* 1985, 1995; Bohra *et al.* 1980; Harsh & Sharma 1995; Rathore & Sharma 1992; Vyas & Sharma 1988a).

OBSERVATION AND DISCUSSION

Table shows the distribution of pteridophytes reported by various workers from Rajasthan.

Table

S.No.	Species	Distribution	Remarks
1.	<i>Selaginella rapenda</i>	Gwaparnath (Kota)	Vanishing
2.	<i>S. rajasthanensis</i>	Bharatpur	
3.	<i>Isoetes coromandelina</i>	Daosa	Vanishing
4.	<i>I. tuberculata</i>	Atru, Jhalawar, Bhilwara	
5.	<i>I. reticulata</i>	Atru	Vanishing
6.	<i>I. rajasthanensis</i>	Mt. Abu, Chittor	
7.	<i>Equisetum ramosissimum</i> subsp. <i>ramosissimum</i>	Mt. Abu, Ajmer, Jaipur Takhaji, Alwar	Vanishing
8.	<i>E. ramosissimum</i> subsp. <i>debile</i>	Sriganganagar	
9.	<i>Ophioglossum reticulatum</i>	Mt Abu, Jhalawar	
10.	<i>O. petiolatum</i>	Mt Abu, Ajmer	
11.	<i>O. nudicaule</i>	Mt Abu	Vanishing
12.	<i>O. gramineum</i>	Mt Abu	Vanishing
13.	<i>O. costatum</i>	Mt Abu, Atru, Jhalawar	
14.	<i>O. polyphyllum</i>	Mt. Abu	
15.	<i>O. vulgatum</i>	Sriganganagar	
16.	<i>Botrychium lanuginosum</i>	Mt Abu	Vanished
17.	<i>Cheilanthes farinosa</i>	Mt Abu, Ajmer, Alwar, Goramghat	
18.	<i>C. albomarginata</i>	Mt Abu, etc.	
19.	<i>C. belangeri</i>	Mt Abu	Vanished
20.	<i>C. aravallensis</i>	Mt Abu	Vanished
21.	<i>Actiniopteris radiata</i>	Aravalli Hills & Chambal ravines	
22.	<i>Pteris cretica</i>	Mt Abu	Vanished
23.	<i>P. quadriaurita</i>	Mt Abu	Vanished
24.	<i>P. vittata</i>	Mt Abu	
25.	<i>Ceratopteris thalipetroides</i>	Banswara	
26.	<i>Adiantum incisum</i>	Common in Aravalli Hills	
27.	<i>A. lunulatum</i>	Mt Abu	Vanished
28.	<i>A. caudatum</i>	Dabla (Sikar)	Rare
29.	<i>A. hispidulum</i>	Mt Abu	Vanished
30.	<i>A. capillus-veneris</i>	Menal, Goramghat, Gwaparnath	
31.	<i>Pityrogramma calomelanos</i>	Parasram Hills	Vanished
32.	<i>Athyrium pectinatum</i>	Mt Abu	
33.	<i>A. fimbriatum</i>	Mt Abu	Vanished
34.	<i>A. hohenackerianum</i>	Mt Abu	Vanished
35.	<i>A. parasnathense</i>	Mt Abu	Vanished
36.	<i>A. puncticaule</i>	Mt Abu	Vanished
37.	<i>A. schimperii</i>	Mt Abu	
38.	<i>Tectaria coadunata</i>		
		(=T. macrodonta)	Mt Abu
39.	<i>Hypodematiium crenatum</i>	Mt Abu, Menal, Gwaparnath	
40.	<i>Dryopteris cochleata</i>	Mt Abu, Menal	
41.	<i>D. parasitica</i>	Parasram Hills	Vanishing
42.	<i>Nephrolepis cordifolia</i>	Mt Abu	Vanished
43.	<i>Cyathea spinulosa</i>	Mt Abu	Vanished
44.	<i>Asplenium dalhousiae</i> (=A. <i>lunulatum</i>)	Mt Abu	Vanished
45.	<i>A. trapeziformis</i>	Mt Abu	Vanished
46.	<i>A. varians</i>	Mt Abu	Vanished
47.	<i>A. pumilum</i> var. <i>hymenophylloides</i>	Mt Abu	Vanishing
48.	<i>Ampelopteris prolifera</i>	Sitamata forest Joganiamata	
49.	<i>Christella dentata</i> (=Cyclosorus <i>dentata</i>)	Mt Abu, Goramghat, sp. Gwaparnath	
50.	<i>Blechnum orientale</i>	Mt Abu	Vanished
51.	<i>Araiostegia pseudocystopteris</i>	Mt Abu	Vanishing
52.	<i>Davallia pulchra</i>	Mt Abu	Vanished
53.	<i>Phymatodes lepidatum</i>	Mt Abu	Vanished
54.	<i>Polypodium quercifolium</i>	Mt Abu	Vanished
55.	<i>Marsilea aegyptiaca</i>	Jodhpur, Ajmer, Beawar	
56.	<i>M. condensata</i>	Barmer	Vanished
57.	<i>M. minuta</i>	Common	Vanished
58.	<i>M. rajasthanensis</i>	Kolayat, Ajmer, Udaipur	
59.	<i>M. coromandelina</i>	Atru	
60.	<i>M. quadrifolia</i>	Identification doubtful	
61.	<i>Salvinia auriculata</i>	Alwar	
62.	<i>Azolla pinnata</i>	Common	

Out of 62 species belonging to 28 genera, 39 species of 21 taxa have only been collected by Gena (1998). Some of the species have disappeared from the collection sites during the past 15 years or so, viz. *Pteris vittata*, *Asplenium dalhousiae*, *Nephrolepis cordifolia* and *Equisetum*. All these ferns used to grow in the dense vegetation all along the margin of Niki lake. (Bir & Verma 1963). The cause of disappearance is the construction of metallic road surrounding the lake, building of Hanumanji temple and scrapping of vegetation for the purpose of decoration. Deforestation, spreading of *Lantana* and cultivation of *Eucalyptus* in the forest area, are also responsible for

the deterioration of the pteridophytic vegetation at Mt Abu. There is a tremendous decrease in annual average rainfall i.e. 400 mm to 150-200 mm and specially during the past 20-25 years. So much so, that the drinking water is not easily available at Mt Abu. Sometimes, the water supply is either on the alternate days or the third day.

The destruction of vegetation at Mt Abu is going on as a result of construction of new hotels, temples and colonies in the areas where many interesting pteridophytes used to flourish viz. *Equisetum* near Achalgarh, *Ophioglossum costatum* and *O. nudicaule* near filter house, *Asplenium dalhousiae* around Niki Lake, and *Araiostegia pseudocystopteris* on way to Guru Sikhar.

Similar is the story at other places in Rajasthan. There used to be a dense forest at Silisade and Saraska near Alwar and many ferns used to flourish well in the area but deforestation has made the hills denude and the herbaceous vegetation including ferns has disappeared. At Ajmer, there is enormous construction of colonies in the out skirt areas e.g. Nagpahar, Anter, Beer, Nasirabad valley, etc. and this has resulted into vanishing of the pteridophytic vegetation e.g. *Equisetum*, *Athyrium*, *Ophioglossum* and *Cheilanthes*, etc.

During seventies and early eighties, the author collected enough material for research work on *Isoetes coromandelina* from Daosa. This plant used to grow all along the railway track and at the Haripura dam-11 km from Daosa. A market has been constructed along the railway track and the dam is converted into fields at Haripura and as such hardly any plant of *I. coromandelina* are now available at Daosa.

Deterioration of pteridophytic vegetation has also been observed at Rameshwar, Bhimlat, Joganiamata and Menal in Bundi area. In the Chambal ravines at Gwaparnath - 22 km from Kota on way to Rawat Bhatta road, there used to be a dense vegetation near and along the waterfall e.g. *Adiantum capillus-veneris*, *Pteris vittata*, *Ampelopteris* sp., *Selaginella rapenda* and *Equisetum ramosissimum*. Now, a temple has been constructed at the bottom of the fall and a metallic road is built from top to the bottom of the waterfall. This has resulted into disap-

pearance of *Selaginella rapenda* and *Pteris vittata* from the area.

Mining has also destructed the pteridophytic vegetation in some areas surrounding Kota and Udaipur e.g. Dara forest in Kota and marble mines in Nathdwara and Udaipur.

However, there are some areas in the Aravalli Hills that still possess good pteridophytic vegetation e.g. Goramghat, Todgarh, Kumbalgarh, etc. in Ajmer and Pali districts, and Jaswantgarh in Sirohi district. Human interference is minimum in these areas and the tribal population continues to maintain the wealth of forests. Similarly, there are a few sites in Chambal ravines that remain more or less undisturbed by man and pteridophytes flourish very well in these areas e.g. Menal, Jaganiamata, etc.

From the above account it is clear that the deterioration in herbaceous vegetation is directly related to adeforestation and the biotic factors specially the man has played the major destructive role in disturbing the ecosystem. This has influenced indirectly the decrease in annual average rainfall. Majority of pteridophytes are herbaceous green plants need shade and moist conditions. Generally the ferns have developed dense adventitious root system (Sharma & Harsh 1992; Sharma *et al.* 1997) which help in conservation of soil and enrich the surroundings with organic manures through mycorrhizal associations (Sharma 1998). It has been observed that the nursery of forest trees flourish much better if it has intermingled plants of ferns than a pure culture of flowering plants or gymnosperms.

Many ferns are of great medicinal value (Dixit 1975; Sharma & Vyas 1985; Vyas & Sharma 1988b; Dhiman 1998) and are used directly or indirectly especially by the tribal population of remote places in the Aravalli Hills.

Teachers of Botany can also help in protection of fern flora by stopping the submission of herbarium sheets (which are mostly incomplete, not properly prepared and unidentified) during the practical examinations. Teachers who accompany the students in botanical excursions should show the plants growing in nature and may teach about them but should not ask the students for plucking the leaves of these plants.

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