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ETHNOECOLOGICAL PROFILE OF PLANTS OF HARBOI RANGELAND, KALAT, PAKISTAN

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ABSTRACT

Ethnoecological studies carried over three years in Harboi rangeland, Kalat revealed that of the total 202 recorded species 145 species (72%) had various local uses. The major utilization of plants was as a fodder that included 129 (65%) species, which was followed by medicinal plants contributing 50 (25%) species. There were 12 species used as vegetable or fruits, 7 species as fuel wood and 3 species as herbal tea. The rangeland is highly degraded and needs restoration of palatable vegetation cover to improve the biodiversity.

Key words: Ethnobotany, Harboi rangeland, Kalat, forage and medicinal plants.

INTRODUCTION

Harboi rangeland Kalat, spreading over 22351 hectares, lies between 29° N and 66°, 45 to 67 ° E. It was declared as Protected Forest since January 1967. The rangeland is characterised by rugged mountains of limestone and conglomerates with many small valleys and dry ravines. The altitude varies between 2900 to 3300 m. Over-grazing and human pressure such as lopping and uprooting of plants for fuel, forage and medicinal purposes are the major ecological problems.

The nearest meteorological station is located at Kalat which is 30 Km away from the research site. The climate is arid temperate with short summers that last from May to September. The mean temperature of the hottest months, June and July, rises to over 30°C with maximum hardly reaching up to 35 °C at Kalat. The winters extending from October to April are long and cold. January, the coldest month, has a mean monthly temperature of - 4 °C that may drop to as low as -16 °C. The cold spell is quite severe with chilling winds. Wind speed varies from 1.88 to 3 mS'^{1}. The mean annual air pressure is 1516 MPa that varies from low during May (1443 MPa) to high (1564 Mpa) in September. The mean annual relative humidity is 44 % with lowest (33%) during July and highest (60 %) in January. The mean cloud value is 1.87 OKTS. The highest cloud (28 OKTS) occurs in March and least in September (0.62 OKTS). The mean.dew point temperature varies from - 5 °C (January) to 9 °C (July). The mean annual rainfall is 28.5 mm that varies from 2.4 mm (September) to 125 mm (December). Evapotranspiration is higher than rainfall that causes aridity. The precipitation is mostly received during winter from western depression. The area receives regular snowfall during winter.

Plants provide most of the basic needs not only to man, but also to all animals. Mehrotra (1989) reported that the use of natural herbal drugs to alleviate suffering is perhaps as old as the origin of man itself. This plant and human interaction has led to centuries old trusted knowledge that has been now defined as ethnobotany. Excessive exploitation of plant resources has caused deterioration of habitat that in turn has led to the loss of biodiversity. Conservation biologists warn that 25% of all species might become extinct during the next few years. With the advancement of technology and modern facilities the traditional knowledge has not only declined but its transfer from knowledgeable elders to youngsters has almost ceased. Hence, it was realized globally to record the local knowledge about plants, their potential uses and problems associated with conservation and application of indigenous knowledge for the sustainable development of renewable resources. Such traditional knowledge is the basis for the modern herbal and pharmaceutical industry. Many scientists reported that the remote human societies depend on traditional uses of plants for health care and other needs (Pie, 1991,1992). Hocking (1958) estimated that in early 1950's up to 84% of Pakistani population were dependent on traditional medicines for most of their health care needs. However, Hussain (1987) reported that nearly 50 percent of the drugs presently used in Pakistan are prepared synthetically. This shows a shift from traditional to modem health care system.

Work on the ethnoecology of various parts of Swat and Malakand (Haq and Rehman, 1981; Haq and Ghani, 1994; Hussain *et al*, 1995; Ahmad and Sirajuddin, 1996; Zabiullah, 2000; Sher *et. al.*, 2003; Murad, 2004), Kaghan Valley (Shinwari and Khan, 1995), Muzaffarabad (Bukhari, 1996) and Wazirstan (Badshah *et al.*, 1996) has been reported. Various workers did sporadic collections of plants from different parts of Balochistan including Harboi range (Burkilll, 1956; Stewart, 1959; Khan, 1960). Khattak (1951), Kazmi (1953) and Zaman *et al.* (1968,1971) worked on various species of *Ephedra* and *Juniperus* found in these hills. Rafi (1965) and Durrani *et al.* (S&916)

stated that deforestation, overgrazing and over-collection of plants by local people has deteriorated the vegetation resources of this area. Tareen *et al.* (2002) worked on the ethnobotany of Ziarat. While Rehman *et al.* (2002) reported about the ecology of Zaiawan. No reference is, however, available on the ethnoecology of Harboi rangeland. The present paper, therefore, reports the ethnoecological profile of plants used by the local communities, which depend on this rangeland. The findings will be of interest to range management scientists, Geologists, ethnobotanists, taxonomists and wildlife workers for their future studies.

MATERIALS AND METHODS

Harboi rangeland was surveyed for three consecutive years i.e. 1996 to 1998 for the collection of plants. The ethnoecological information, which was gathered from the local people and herders. Plants were classified on the basis of their local economic uses as listed in Table 1. Plants were identified with the help of standard literature (Burkill, 1956; Nasir and Alt, 1971-1995; Alt and Qaiser, 1995-2004) and later on confirmed at National Herbarium NARC, Islamabad, Pakistan Museum of Natural History, Islamabad and Herbarium of Botany Department, University of Karachi.

RESULTS AND DISCUSSION

It was observed that of the total 202 recorded species, 145 (72%) species had various local uses (Table 1). It included 129 (65%) fodder species, 50 (25%) medicinal species, 12 (6%) wild vegetable/ edible fruit species and 7(4%) fuel wood species. The remaining categories included 1 or less than 1% species that were used as roof thatching (3 sp.), source of nectar for honey bee (2 sp.), herbal tea (3 sp.), tanning/dying (2 sp.), resin yielding (2sp.), washing utensils/clothes (1 sp.), fencing (1 sp.), making pencils (1 sp.) and used for repelling evils ((1 sp.; Locally called Nazarbund). Some 11(6%) species including *Daphne mucronata, Euphorbia* sp., *Hyoscymus pusillum* and *Melica persica* were poisonous to livestock and human beings. It was obvious that the major resources of this rangeland were fodder (65%) and medicinal (25%) plants. The vegetation cover, especially palatable, has to be maintained by all means. It not only provides fodder to livestock, but also is a refuge and home to many valuable birds, animals and reptiles that are unique to this ecosystem. Furthermore, vegetation cover is also needed to prevent soil erosion, which is one of the most common ecological problems. The grazing system has to be managed scientifically to allow palatable vegetation for its regeneration. The carrying capacity of the range has to be worked out for proper grazing management because at present it is freely grazed with traditional grazing system. Another equally important management aspect would be the replacement of the present livestock breed with better milk, meat and wool yielding improved breeds of goat and sheep. Besides health of the rangeland, the health of the livestock must also be cared for.

The medicinal plants are mostly used in a crude form even today. However, with the increasing demands of pharmaceutical industries, the exploitation of such resources has also increased that has drastically reduced medicinal plants in the area. Such medicinal plants could now be found in inaccessible spots with difficult hill terrain or within the thickets of spiny bushes. Burkilll (1956) reported few medicinal species including 6 species that were also recorded in the present study. The collection of Juniper berries, *Ephedra intermedia* and other medicinal plants from various parts of Balochistan including Harboi range has been reported (Zaman *et al.,* 1968, 1971) and that practice still continues by the local inhabitants for their personal use and for earning livelihood. However, in the light of present research and discussion with the elderly people, it appeared that these resources have declined owing to over exploitation. Medicinal plants such as Iris, *Teucrium, Salvia cabulica, Ferula foetida, Berberis,* and *Lallimentia* reported by the previous workers have been recorded with reduced occurrence in the present study.

Most of the plants recorded in the present study have also been reported by other workers (Burkill, 1956; Khan, 1960; Zaman *et al,* 1971; Rafi, 1965; Goodman and Ghafoor, 1992; Hussain and Mustafa, 1995; Badshah *et al.,* 1996; Durani *et al,* 1996; Shinwari and Shah, 1996; FAO, 1997; Tareen *et al.* 2002) with almost similar uses in other parts of Balochistan and country. Although, the traditional trade of medicinal plants is sizable in Balochistan, yet it is unscientific with out any sustainable management. The proper collection, processing and marketing could possibly bring wealth to this poor community, which mostly depend upon these rangeland resources. Elisabetsky (1990) reported that annual world market value for medicines derived from medicinal plants discovered by indigenous people is about US$ 43 billions.

It is interesting to see that three species: *Marrubium vulgare, Mentha longifolia* and *Nepeta juncea* are used locally for preparing herbal tea. The *in-* and *ex-situ* cultivation and conservation of these plants will not only improve the economy of the locals but will also reduce financial stress on national level due to import of green/black tea. Similarly plants yield resin *(Ferula foetida.* Juniper) and tanning material *(Ephedra, Daphne)* could be

encouraged as source of income generation plants.

Table 1: - **ETHNOECOLOGICAL PROFILE OF PLANTS OF HARBOI RANGELAND, KALAT.**

S.#	Plant species	Fodder	Med	Veg/F	Fuel	R/That	H/Tea	H/bea	Tan/dy	Resin	Timber	U/wash	Evil/r	Pen	Fence
1.	*Acantholimon manrosanum* Aitch &Hemsl	+													
2.	*Acantholimon polystachyum* Boiss	+													
3.	*Achillea santolina* L.	+	+												
4.	*Adonis aestivalis* L.	+	+												
5.	*Aerua javanica* (Burm. F) Juss	+			+										
6.	*Allium dolichosylum* Vved	+		+											
7.	*Alyssum desertorum* Stafp	+													
8.	*Alyssum linifolium* Staph ex Willd	+													
9.	*Alyssum marginatum* Steud ex Willd	+													
10.	*Alyssum szovitzianum* F & M	+													
11.	*Aristida sp*	+													
12.	*Aristida adscensionsis* L.	+													
13.	*Artemisia maritima* L.	+	+		+	+									
14.	*Artemisia tournefortiana* Reich.		+												
15.	*Asparagus capitatus* Baker	+													
16.	*Astragalus gompholobium* Bth ex Bunge	+													
17.	*Atragalus* 97 – 151	+													
18.	*Astragalus* 97 – 53	+													
19.	*Astragalus* 97 – 8	+													
20.	*Astragalus anisacanthus* Boiss	+													
21.	*Astragalus psilocentros* Fisch	+													
22.	*Berberis balochistanica* Ahrendt.		+	+											
23.	*Berberis collitobrys* Aitchex Koenne		+												
24.	*Boissera squarrosa* (Soland) Nevski	+													
25.	*Bothriochloa ischaemum* (L) Keng	+													
26.	*Bromus sericeus* Drobov	+													
27.	*Bromus tectorum* L.	+													
28.	*Bupleurum lineariifolium* DC.	+													
29.	*Bupleurum exaltatum* Bieb	+													
30.	*Caragana stocksii*	+		+											
31.	*Carex spp* (i)	+													
32.	*Carex sp* (ii)	+													
33.	*Ceratocephalla falcatus* (L) Pers.	+													
34.	*Ceratocephalla testiculata* (Crantz) Roth	+													
35.	*Chenopodium album* L.	+	+												
36.	*Chenopodium botrys* L.	+	+												
37.	*Chenopodium foliosum* (Moench) Ashers	+													
38.	*Chenopodium hybridum* L.	+													
39.	*Clematis grayeolens* Lindll	+													

40.	*Clematis orientalis* L.	+	+	+	+										
41.	*Colutea armata* Hemsl & Lace.	+													
42.	*Convolvulus arvensis* L.	+	+												
43.	*Convolvulus leiocalycinus* Boiss	+													
44.	*Conyza bonariensis* (L) Cronguist	+													
45.	*Cousinia onopordioides* Ledeb	+						+							
46.	*Coisinia sp.*	+						+							
47.	*Cuminum cyminum* L.		+												
48.	*Cymbopogon jwarancusa* (Jones) Schult	+	+												
49.	*Daphne mucronata* Royle		+						+						
50.	*Descuraninea sophia* (L) Webb & Berth	+													
51.	*Ebenus stellata* Boiss	+													
52.	*Echinops echinatus* Roxb.	+	+												
53.	*Ephedra intermedia* var *glauca* (Schren K. Regel) Stapf.	+	+						+						
54.	*Epilobium sp.*	+													
55.	*Eragrostis minor* Host	+													
56.	*Eremerus persicus* (Jaub & Spach) Boiss	+		+											
57.	*Eremostachys vicarys* Benth	+	+												
58.	*Euphorbia granulata* Forssk	+	+												
59.	*Euphorbia prostrata* Ait	+													
60.	*Farsetia heliophila* Bunge ex Coss	+													
61.	*Ferula foetida* Regal		+							+					
62.	*Festuca arundinacea* Schreb	+													
63.	*Filago hurdwarica* (DC.) Wagenitz	+													
64.	*Fumaria indica* (Hausskn.) H.N.	+	+												
65.	*Gagea pseudo-reticulata* Vved	+													
66.	*Gagea sp*	+													
67.	*Gaillonia eriantha* Jaub & Spach	+													
68.	*Galium aparine* L.	+	+												
69.	*Gnaphalium leutoallbum* L.	+													
70.	*Gypsophila lignose* Hemsl & Lace	+													
71.	*Haloxylon griffithii* (Moq) Bunge ex Boiss	+										+			
72.	*Heliotropium brahuicum* Stocks	+													
73.	*Hertia intermedia* (Boiss) O. Ktze	+	+		+	+									
74.	*Holosteum umbellatum* L.	+	+												
75.	*Hordeum bogdannii* Wilensky	+													
76.	*Hypecoun pendulum* L.	+													
77.	*Iris tenuifolia* Pall		+												
78.	*Isodon rugosus* Wall ex Bth	+			+										
79.	*Juniperus excelsa* M. Bieb	+	+		+	+				+	+			+	+

80.	*Kochia stellaris* Moq	+													
81.	*Lactuca auriculata* Wall. Ex DC.	+													
82.	*Lactuca orientalis* (Boiss) Boiss	+													
83.	*Lactuca persica* Boiss	+													
84.	*Lallementia royleana* (Bth) Bth.		+												
85.	*Lithorspermum arvensis* L.	+	+												
86.	*Lonicera hypoleuca* Dene	+			+										
87.	*Malcolmia africana* (Linn) R. Br.	+		+											
88.	*Malcolmia sp.*	+													
89.	*Malcolmia strigosa* Boiss	+													
90.	*Malva neglecta* Wallr.	+	+												
91.	*Marrubium vulgare* L.	+					+								
92.	*Medicago lupulina* L.	+													
93.	*Medicago polymorpha* L.	+													
94.	*Mentha longifolia* L.		+				+								
95.	*Minuartia meyeri* (Boiss) Bomm	+													
96.	*Nepeta sp*	+													
97.	*Nepeta juncea* Bth	+	+				+								
98.	*Neslia apiculata* Fisch & Mey & Avelal	+													
99.	*Nonnea caspica* (Willd) G. Don	+													
100.	*Onasma limitaneum* I.M. Johnton		+												
101.	*Orobanche cernua* (L) Desv	+													
102.	*Orobanche cernua* Loeffl	+													
103.	*Papaver macrostomum* Boiss & Heut ex Boiss		+												
104.	*Peganum harmala* L.	+	+										+		
105.	*Pennisetum oriental* L.	+													
106.	*Perovskia abrotanoides* Karel	+	+												
107.	*Perovskia atriplicifolia* Bth	+	+												
108.	*Phalaris sp*	+													
109.	*Piptatherum vicarium* (Grig) Rozhev	+													
110.	*Plantago lanceolata* L.		+												
111.	*Plantago major* L.		+												
112.	*Poa bulbosa* L.	+													
113.	*Poa sinaica* Steud	+													
114.	*Polygala hohenackeriana* Fisch & Mey	+													
115.	*Polygala Siberia* Linn	+	+												
116.	*Polygonum aviculare* L.		+	+											
117.	*Polygonum paronychioides* C.A. Mey	+													
118.	*Polypogon fagax* Nees ex Steud	+													
119.	*Prunus eburnea* Aitch	+	+	+											

120.	*Prunus sp.*	+													
121.	*Rosa lacerans* Boiss & Buhse	+													
122.	*Salsola kali* L.	+	+												
123.	*Salvia cabulica* Bth	+	+												
124.	*Scorzonera mollis* M. Bieb			+											
125.	*Senecio sp*	+													
126.	*Schismus arabicus* Nees	+													
127.	*Silene brahuica* Boiss	+	+	+											
128.	*Solanum nigrum* L.	+	+												
129.	*Sonchus maritimus* L.	+													
130.	*Sophora griffithii* Stocks	+	+												
131.	*Spiraea boissieri* Schneider	+	+												
132.	*Stellaria alsinoides* Boiss & Buhse	+													
133.	*Stipa pennata* L.	+													
134.	*Taraxacum officinal* Weber	+	+												
135.	*Tetrapogonn villosis* Desf	+													
136.	*Teucrium stocksianum* Boiss.		+												
137.	*Trichodesma stocksii* Boiss.	+	+												
138.	*Tulipa polychroma* Stapf	+		+											
139.	*Valerianella oxyrrhyncha* Fisch & Mey	+													
140.	*Vernoica didyma* Tenore	+													
141.	*Veronica biloba* L.	+													
142.	*Zizyphora clinopodioides* Lam	+	+												
143.	*Zizyphore tenuior* L.	+	+												
144.	*Unidentified* (97 – 108)	+													
145.	*Unidentified* (97 – 150)	+													
	Key:	**129**	**50**	**11**	**7**	**3**	**3**	2	2	2	1	1	1	1	1

1. Fodder = Fodder/Forage; 2. Med. = Medicinal Plants; 3. Veg./Fr. = Vegetable and Fruits; 4. Fuel = Fuel wood; 5. R/That. = Roof thatching; 6. H/Tea = Herbal tea; 7. H/bee = Honey bee nectar; 8. Tan/dye = Tanning and dying; 9. Resin = Resin; 10. Timber = Timber wood; 11. U/wash. = Utensil washing; 12. Evil/R. = Evil repellent; 13. Pen. Mak = Pencil making; 14. Fence = Fence for crop/orchards.

Poisonous species

1. *Daphne mucronota* Royle. 2. *Euphorbia falcate* L. 3. *Euphorbia coeladenia* Boiss. 4. *Euphorbia moddenii* Boiss. 5.*Euphorbia multiurcata* Rech *et al.*, 6. *Hyoscyamus pusillum* L. 7. *Onosma dichranhum* L. 8. *Melica persica* Kunth. 9. *Juncus articulate* L. 10. *Juncus* sp. 11. *Juncus inflexus* L.

Many plants such as Juniper, *Prunus*, *Artemesia*, *Iris*, *Eremurus* and a few grasses, etc., suffer the most due to their multiple uses. The dry climatic conditions further hamper their regeneration. People living around the rangeland depend on herding of sheep, goat and fuel wood for domestic and livelihood earning. Juniper wood is sold commercially while shrubby species such as *Astragalus*, *Artemesia*, *Prunus* and *Convolvulus* etc are uprooted for domestic fuels only. Overgrazing, deforestation, collection of medicinal plant and soil erosion has caused the deterioration of habitats not only for plants but also for animals. It is, therefore, important to conserve these resources with the participation of the local communities by managing grazing system to improve over all vegetation cover and biodiversity.

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