

## ANIMAL PREFERENCES AND PALATABILITY OF VEGETATION OF KALASH VALLEY, DISTRICT CHITRAL, HINDUKUSH RANGE, PAKISTAN

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### ABSTRACT

Pakistan has great diversity of culture, civilization and plant resources. The present research work was carried out in the historical Kalash valley district Chitral that inhabits people with unique and indigenous culture, language and is considered to be the descendants of Alexander the Great. A detail survey was carried out to document the plants and their parts preferred by sheep, goats and cows in the valley. The cow grazed on 47 plant species, of these, 20 were highly palatable, 18 mostly palatable and 9 were less palatable. Whole plants of 25, leaves of 19, shoots of 2 and flower of 1 species were preferred by the cow. Goats grazed on 65 species, of which 20 each were highly palatable and less palatable, 21 mostly palatable and 4 were rarely palatable. Whole plants of 26, leaves of 24, shoots of 14 and fruit of one species were preferred by goats. Sheep grazed on 42 species, of which 18 were mostly palatable, 13 highly palatable, 10 less palatable and one species was rarely palatable. Whole plants of 17, leaves of 13, shoots of 10 and fruit of one species were preferred by sheep. Cattle rearing are main and traditional source of income generation for the Kalash people. Grazing is one of the factors that reduced the rangeland vegetation, species occurrence and caused decline in distribution of medicinal plants in the area.

**Keywords:** Forage availability, Animal preferences and selection, Kalash valley, Chitral, Pakistan.

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### INTRODUCTION

Pakistan is a country of great floral diversity having about 6000 identified plant species distributed from sub-tropical to sub-alpine and alpine regions. Most of these species are confined to the northern mountainous parts of the country (Ali and Qaiser, 1986). District Chitral is one of the beautiful mountainous areas of the country located to the extreme north-east of Pakistan. The district has great linguistic diversity and inhabits people speaking a dozen of indigenous languages and is influenced by Turk, Iranian, Mongolian, Chinese, Tatars and Greek cultures. The present study area Kalash valley inhabits people having unique, indigenous and old religion called Kalasha. They are considered to be the descendents of Alexander the Great and living in this rugged mountainous series of Hindukush for hundreds of years (Hadi and Ibrar, 2014). The valley lies at 71° 46' 55" East longitudes and 35° 50' 32" North latitudes to the extreme south-west of district Chitral of Khyber Pakhtunkhwa province of Pakistan. It is bounded with Nooristan Province of Afghanistan in the west and to other parts Chitral by three sides (Anonymous, 1998). The Kalash valley is comprised of three localities Bumburet, Birir and Rumbor located parallel to each other in Hindukush mountainous range (Fig. 1). Cattle rearing are the traditional sources to fulfill daily needs by the locals and the Kalash community also sell dairy product for income generation. The cattle mostly feed on natural plant resources during summers while in winters they feed on stored plant products.

Plant Palatability actually determines the acceptability of plants species by grazing animals. Different characteristics of plants i.e. growth stages, chemical nature, external structures and types of plants species affect the acceptability that either stimulate the selective response of animals or prevent them from grazing (Heady, 1964). Animal preference is the selection of a plant species by the animal as feed. The animal factors that affect the preference and palatability are the age, stage of pregnancy, energy requirement, general health and hunger of animal while the plant factors like seasonal availability, growth stage, degree of maturity, phenology, morphology, chemical nature, relative abundance of associated species, accessibility to plants/sites and climate may affect the preference and palatability by animals (Grunwaldt *et al.* 1994; Nyamangara and Ndlovu, 1995). Commonly goats prefer shrubs than grasses and forbs, while sheep prefer grasses and forbs more than shrubs (Wilson *et al.*, 1995; Provenza, 1996; Hussain and Durrani, 2009; Ekblom and Gillson, 2010).

### MATERIALS AND METHODS

Frequent field visits were made in the entire Kalash valley, District Chitral, Pakistan during the years 2013-2015 for the collection of data. The degree of preferences and palatability of plant species by cows, goats and sheep

were determined by observing their choices and grazing levels during the field studies. Separate lists of plants preferred by the livestock were also prepared. Identification of the plant species was carried out with the help of different volumes of Flora of Pakistan (Nasir and Ali, 1970-1989; Ali and Nasir, 1989-1991; Ali and Qaiser, 1993-2016) and other available literature. The classification of these species into palatable and non-palatable classes was done after Hussain and Durrani (2009).

## RESULTS AND DISCUSSIONS

The animal preference, palatability and grazing pattern were observed during different growth seasons in the valley. The results showed that Cows preferred 47 species, of which 9 (19.15 %) species were less palatable, 18 (38.30 %) mostly palatable and 20 (42.55 %) species were highly palatable (Table 1). Cows feed on flowers of one (2.13 %) species, shoots of 2 (4.25 %), leaves of 19 (40.42 %) and whole plants of 25 (53.19 %) species (Figures 3, 4). They preferred 28 (59.57%) herbaceous species, 14 (29.78%) trees and 5 (10.63%) shrubs. Some of the highly palatable species were *Morus alba*, *Morus nigra*, *Plantago lanceolata*, *Trifolium pretense* and *Zea mays*. Similarly, 65 plant species were palatable for goats, of which 4 (6.15 %) were rarely palatable, 20 (30.77 %) each were highly and less palatable and 21 (32.31 %) species were mostly palatable (Table 1). The preferences showed that fruit of one (1.54 %) species, shoots of 14 (21.54 %), leaves of 24 (36.92 %) and whole plants of 26 (40 %) species were preferred by goats (Figures 5, 6). They grazed on 33 (50.77 %) herbaceous species, 19 (29.23 %) shrubs and 13 (20 %) trees. Some of the highly palatable plant species included *Ailanthus altissima*, *Chenopodium botrys*, *Cynodon dactylon*, *Echinops cornigerus* and *Matricaria disciformis*. Sheep of the area preferred 42 species for feeding, of which 1 (2.38%) was rarely palatable, 10 (23.81 %) less palatable, 13 (30.95 %) highly palatable and 18 (42.86 %) were mostly palatable (Table 1). Fruit of one (2.38 %) species, shoots of 10 (23.81 %), leaves of 13 (30.95 %) and whole plants of 17 (40.48 %) species were preferred by sheep for grazing. 26 (61.90 %) herbs, 10 (23.81 %) shrubs and 6 (14.28%) trees were palatable species for sheep (Figures 7, 8). Some of the highly palatable plants for sheep were *Marrubium vulgare*, *Medicago lupulina*, *Sophora mollis* and *Taraxacum officinale*. Grazing usually start in lower lands and pastures from April to October and for the rest of the period stored food materials are used for feeding of the livestock.

Table 1. Palatability pattern, part used, availability and livestock preference of plants of Kalash valley, District Chitral, Pakistan.

S #	Plant name	Palatability	Part used	Availability	Livestock prefer		
					C	G	S
1	<i>Acantholimon lycopodioides</i> (Girard) Boiss.	MP	Sh	Aug	-	+	+
2	<i>Ailanthus altissima</i> (Mill.) Swingle	HP	Lvs	June	-	+	+
3	<i>Artemisia brevifolia</i> L.	MP	Sh	June	-	+	+
4	<i>Artemisia scoparia</i> Waldst. & Kit.	MP	Sh	September	-	+	+
5	<i>Astragalus grahamianus</i> Royle ex Bth.	LP	WP	August	-	+	
6	<i>Astragalus nivalis</i> Kar & Kar	LP	WP	August	-	+	+
7	<i>Bromus tectorum</i> L.	HP	WP	June	+	+	+
8	<i>Bumium persicum</i> (Boiss.) Fedtsch	MP	Sh	July	-	+	+
9	<i>Ceratocephalus falcatus</i> (L.) Pers	LP	WP	August	-	+	+
10	<i>Capsella bursa-pastoris</i> L.	MP	WP	June	+	-	-
11	<i>Carex orbicularis</i> L.	LP	WP	June	+	-	-
12	<i>Chenopodium album</i> L.	HP	WP	June	+	+	+
13	<i>Chenopodium botrys</i> L.	HP	WP	June	+	+	+
14	<i>Chenopodium foliosum</i> Aschers.	RP	WP	August	-	+	+
15	<i>Clematis orientalis</i> L.	HP	Sh	August	-	+	+
16	<i>Cotoneaster microphylla</i> Wall. ex Lindl.	LP	Lvs	August	-	+	+
17	<i>Cotoneaster nummularia</i> Fisch. and Mey	LP	Lvs	August	-	+	+
18	<i>Cichorium intybus</i> L.	MP	WP	June	+	+	-
19	<i>Convolvulus arvensis</i> L.	HP	WP	June	+	+	-
20	<i>Crataegus songarica</i> C. Koch.	LP	Lvs	July	+	+	-
21	<i>Cynodon dactylon</i> (L.)	HP	WP	June	+	+	+
22	<i>Datura stramonium</i> L.	HP	WP	August	-	+	-
23	<i>Echinops cornigerus</i> Roxb.	HP	WP	July	-	+	-
24	<i>Elaeagnus angustifolia</i> L.	MP	Lvs	July	+	+	+

25	<i>Ephedra gerardiana</i> L.	RP	Sh	September	-	+	-
26	<i>Euphorbia peplus</i> L.	LP	WP	July	-	+	-
27	<i>Equisetum ramosissimum</i> L.	HP	WP	August	+	-	-
28	<i>Gallium aparine</i> L.	HP	WP	June	+	+	-
29	<i>Indigofera heterantha</i> var. <i>heterantha</i> Wall.	MP	Lvs	August	-	+	+
30	<i>Inula rhizocephala</i> Schrenk.	HP	WP	August	+	-	-
31	<i>Iris germinia</i> L.	MP	Lvs	September	+	+	+
32	<i>Juglans regia</i> L.	MP	Lvs	October	+	-	-
33	<i>Juniperus squamata</i> Buch. Ham. Ex D. Don	LP	Lvs	August	-	+	-
34	<i>Kickxia ramosissima</i> (Wall.) Janchen	LP	WP	September	+	-	-
35	<i>Lamium amplexicaule</i> L.	HP	Sh	August	-	+	+
36	<i>Lotus corniculatus</i> L.	MP	WP	July	+	-	+
37	<i>Malva neglecta</i> Wallr.	MP	WP	June	+	-	-
38	<i>Matricaria aurea</i> L.	LP	WP	September	+	+	-
39	<i>Marrubium vulgare</i> L.	HP	Sh	August	-	+	+
40	<i>Matricaria disciformis</i> L.	LP	WP	September	+	+	-
41	<i>Medicago lupulina</i> L.	HP	WP	August	+	-	+
42	<i>Mentha longifolia</i> (L.) Huds	LP	WP	August	-	-	+
43	<i>Morus alba</i> L.	HP	Lvs	September	+	+	-
44	<i>Morus nigra</i> L.	HP	Lvs	September	+	+	+
45	<i>Myricaria squamosa</i> Desv.	MP	Sh	July	+	+	-
46	<i>Nepeta raphanorhiza</i> Beath.	LP	Sh	August	-	+	-
47	<i>Onosma dichroanthum</i> Boiss	LP	WP	June	+	+	+
48	<i>Peganum harmala</i> L.	LP	Sh	July	-	-	+
49	<i>Plantago lanceolata</i> L.	HP	WP	June	+	+	+
50	<i>Plantago major</i> L.	MP	WP	July	+	+	+
51	<i>Platanus orientalis</i> L.	MP	Lvs	June	+	+	+
52	<i>Populus alba</i> L.	MP	Lvs	June	-	-	-
53	<i>Populus nigra</i> L.	MP	Lvs	June	+	+	-
54	<i>Prunus armeniaca</i> L.	HP	Lvs	June	+	-	-
55	<i>Prunus persica</i> L.	HP	Lvs	June	+	-	-
56	<i>Pyrus communis</i> L.	HP	Lvs	July	+	-	-
57	<i>Pyrus pashia</i> Ham. ex D. Don	HP	Lvs	June	+	-	-
58	<i>Pyrus malus</i> L.	HP	Lvs	June	+	+	-
59	<i>Quercus baloot</i> Griffith	LP	Lvs	June	-	+	+
60	<i>Quercus dilatata</i> Lindl.	MP	Lvs	June	-	+	+
61	<i>Robinia psuedoacacia</i> L.	HP	Lvs	June	+	+	-
62	<i>Rosa webbiana</i> L.	MP	Sh	July	-	+	+
63	<i>Rumex hastatus</i> D Don	LP	Lvs	July	-	+	+
64	<i>Salix acmophylla</i> Boiss.	MP	Lvs	June	+	+	-
65	<i>Salix linearifolia</i> E. Wolf.	LP	Lvs	June	+	+	-
66	<i>Salix tetrasperma</i> Roxb.	MP	Lvs	June	+	+	-
67	<i>Salix denticulata</i> subsp. <i>denticulata</i> Anderson	MP	Lvs	July	+	+	-
68	<i>Salvia nubicola</i> Wall. ex Sweet	LP	Sh	July	-	-	+
69	<i>Scrophularia robusta</i> Penn.	MP	WP	August	-	-	+
70	<i>Sophora mollis</i> (Royle) Bakar	HP	Fr	September	-	-	+
71	<i>Taraxacum officinale</i> L.	MP	WP	June	+	+	+
72	<i>Thymus serpyllum</i> L.	MP	Sh	August	-	+	+
73	<i>Trifolium pretense</i> L.	MP	WP	Jun	+	-	+
74	<i>Trifolium repens</i> L.	HP	WP	June	+	-	+
75	<i>Tulipa stellata</i>	LP	Fl	August	+	-	-
76	<i>Verbena officinalis</i> L.	LP	WP	July	+	+	-
77	<i>Viola canescens</i> Wall. ex Roxb.	MP	WP	August	+	+	-
78	<i>Vitis venifera</i> L.	MP	Lvs	August	+	+	+
79	<i>Zea mays</i> L.	HP	Sh	July	+	+	+

Key: HP = Highly palatable, MP = Moderately Palatable, LP = Less Palatable, Fl= flowers, Fr= Fruits, Lvs= Leaves, Sh = Shoots, WP = whole Plant

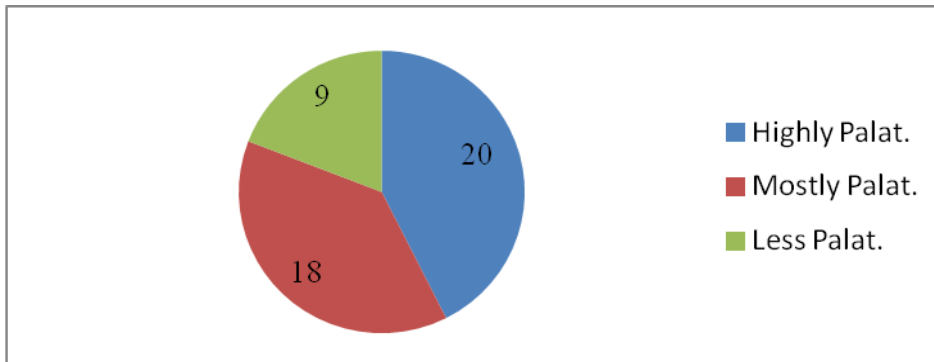


Fig. 1. Palatability preference of plants by Cow in Kalash valley.

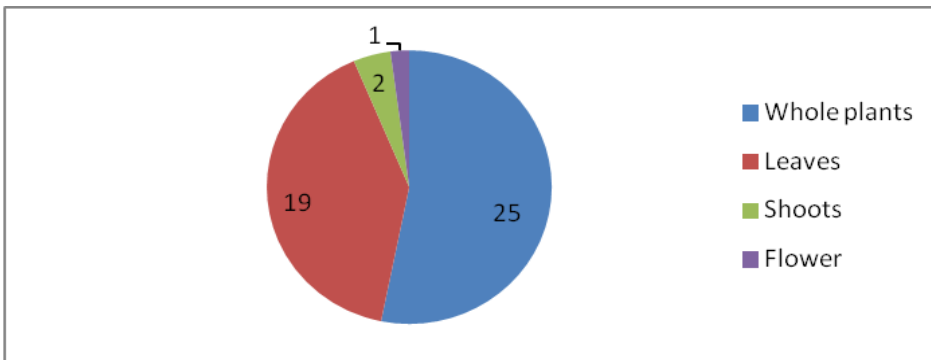


Fig. 2. Parts of plants preferred by cow as forage in Kalash valley.

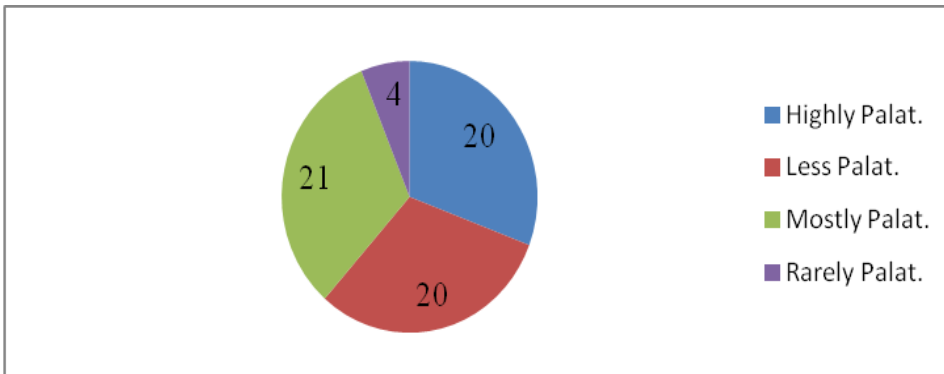


Fig. 3. Palatability preference of plants by Goats in Kalash valley.

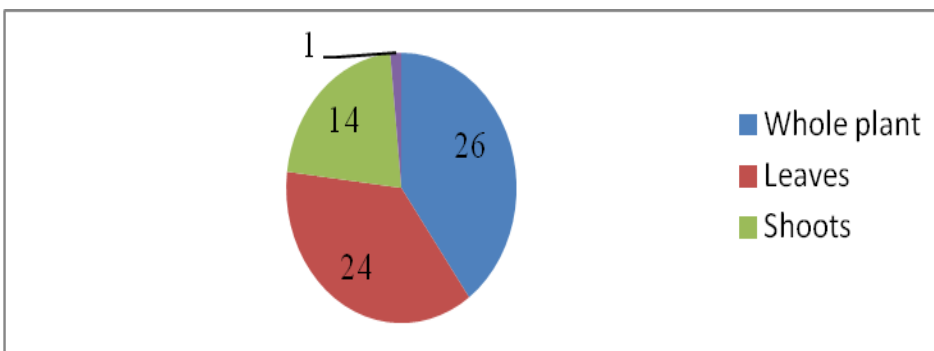


Fig. 4. Plant parts preferred by goat as forage in Kalash valley.

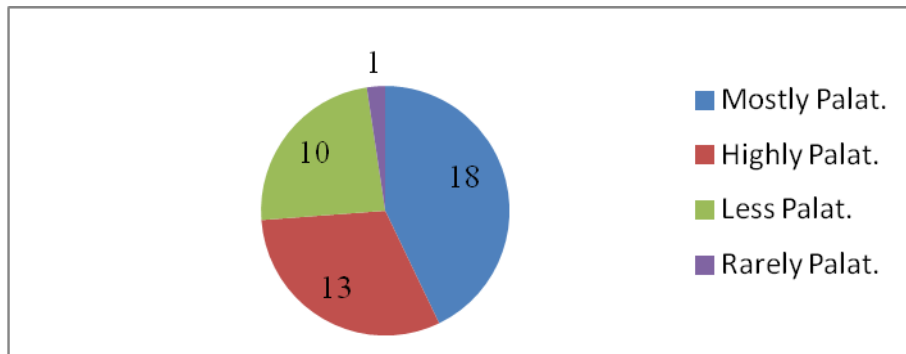


Fig. 5. Palatability of plants by goats in Kalash valley.

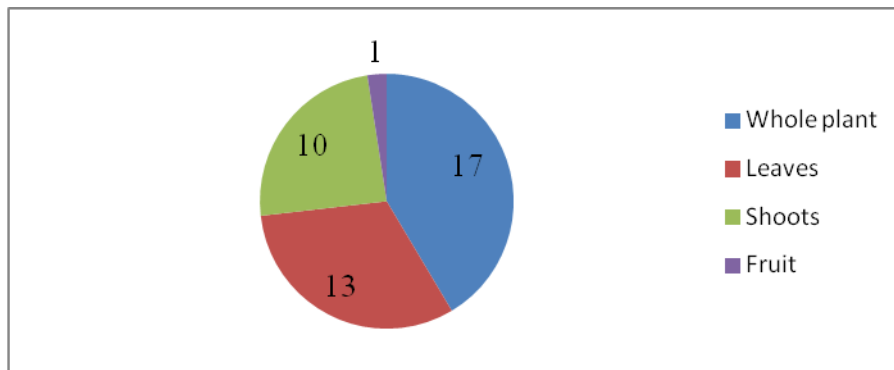


Fig. 8. Sheep preference of plant parts as forage in Kalash valley.

## CONCLUSION

The present findings suggest that the availability of forage for grazing animals reduces in the winter. Our findings are similar with those of Chocarro *et al.* (2005), Neal and Miller (2007), Akram *et al.* (2009), Glindemann *et al.* (2009), Sher *et al.* (2010), Badshah (2011) and Shah (2014). It was noticed that palatability by animals is one of the factors of reduction of rangeland productivity, species occurrence and distribution of medicinal plants in the study area. Similar reduction in species distribution and occurrence were observed by Peters (2007), Hussain and Durrani (2009) and Rahim *et al.* (2011) in their research areas.

The Kalash community mostly depends on cattle rearing for their daily life needs and they have some special places within their houses or in the higher pastures where they have large quantity of goats and sheep. They have engaged many local poor persons for the care of livestock and hence providing financial support to the poor people and good quality dairy products that are sold throughout the district for income generation.

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