

# Fodder Resources in Temperate Fruit Valley of Western Himalaya, India.

Lokender Singh<sup>\*</sup>, Neelam Sharma<sup>\*\*</sup>, S. P. Joshi<sup>\*\*</sup>

<sup>\*</sup> Department of Drinking water & Sanitation (SWAJAL)

<sup>\*\*</sup> Department of Drinking water & Sanitation (SWAJAL)

**Abstract-** In developing nations agriculture is the bone of economy, which is directly related to livestock farming. Fodder resources are key factor in the hilly area where the economy of local people is much more dependent on their livestock. More than 65 % of fodder requirements of animals met out from pasturelands and forests in hilly regions. A sound understanding of utilizations and availability of resources and the impact of herbivores on grassland landscapes is essential for long-term sustainable pastoral production, implying of management practices and for both on-and off-reserve biodiversity conservation.

Chhachpur Valley in Himachal Pradesh is rich in natural resources and people of the area have got the advantage of the good climatic conditions of this valley. Peoples of the area are economically prosperous. Horticulture and livestock farming are the important occupations of the villagers. In this paper fodder resources of Chhachpur valley has been assessed with special reference to animals' dietary preference to browsing in various seasons.

A total of 240 species from different life forms were listed as fodder species in study area, out of which 122 (50.83%) forbs, 40 (16.66%) grasses, 7 (2.91%) sedges, 15 (6.25%) climbers, 43 (7.91%) shrubs and 13 (5.41%) trees. During the winter season in hills availability of fodder is very less about one fourth of all the resources available mostly grasses and few trees or shrubs.

**Index Terms-** Fodder resources, Ice-cream species, Livestock, Palatability indices

## INTRODUCTION

Livestock is an integral part of environment and economy especially in the rural part of the Himalaya. A large livestock population cannot be maintained on the fodder produced on arable land alone; therefore, they have to largely depend on the forest resources. A sound understanding of the impact of herbivores on grassland landscapes is essential for long-term sustainable pastoral production, implying of management practices and for both on-and off-reserve biodiversity conservation. One aspect of that understanding concerns plant palatability.

Palatability, an intrinsic biological characteristic of plants Vallentine (1990), is an important factor in the selection and, in the consideration of which plants are actually eaten; Vesk and Westoby (2001) and Fletcher and Russell (2003) make it clear that palatability is relative, not absolute. Palatability varies with the driving factors like nutrition value, life span, animal preferences, habit of feeding, part used, availability of fodder resources, growing season etc. It is always site specific and depends on the choice of ungulates and availability of fodder species. In our observation there are many species, which are browsed or eaten in one region by cattle but ignored in other region. Investigate these aspects, it becomes imperative to ascertain benchmark of animal preferences the ice-cream species, the species that are browsed, consumed frequently or rarely, eaten in scarcity or never consumed. Hussain and Mustafa (1995) conducted ecological studies on pasture plants. Noor (1978) compared the grazed and ungrazed vegetation of sub-alpine pasture. Awasthi et al., (2003) give food plants and feeding habits of Himalayan ungulates. Manjrekar (1997) conducted a detail study on the feeding ecology of Himalaya region, ibex (*Capra ibex sibirica*) in the trans-Himalaya region. Food habits of bharal (*Pseudois nayaur*) and domestic livestock formed a part of another study carried out by Mishra (2001) in the trans-Himalayan region. There is a very few studies and concise information on plant palatability. For example, the standard and comprehensive reference "Arid Shrub land Plants of Western Australia" (Mitchell and Wilcox 1994), provides only general palatability information (along with 'Indicator Value' and 'Forage Value') for many of the described plants, using terms such as "palatable", "non-palatable", "unknown" or "not relished by stock". In a similar vein, Vesk and Westoby (2001) in their Australia-wide literature review of plant responses to grazing, developed a 5-class ranking of species' palatability to domestic grazers, relying solely on key-words and phrases from the literature. Clearly then, only very generalized palatability

information is available for most species-but in reality, does this level of information provide an adequate contribution to the development of a sound understanding of plant utilization, the use of plants as indicators of grazing pressure and the broader subject of rangeland ecological health. Availability of Fodder resources are key factor in the hilly area where the economy of local people much more dependent on their livestock. More than 65 % of fodder requirements of animals met out from pasturelands and forests in hilly regions.

Present study was carried out in Chhachpur Valley of district Shimla, H.P. in western Himalayan region. An analysis of livestock population shows that the cattle population has declined in last two decades drastically, however, the buffalo or stall fed jersey's (breed of cow) population increased significantly due to shift in landuse especially for horticultural practices. Crop grown fields or grasslands are now converted into the orchards. Although villagers have reduced the cattle population but still high pressure on resources exists due to migratory cattle population of gujjars and bakarwals. Favourable climatic conditions and geographical feature of the valley had made it rich in natural resources viz., forests, grasslands, water etc. Singh (2007) had given an enumeration of plants of Chhachpur Valley. This study deals with the fodder resources and animal preference to palatability which will give the better understanding of management of fodder resources in future.

## **MATERIALS AND METHODS**

### **Study Area:**

The Chhachpur Valley lies in the Jubbal forest division of district Shimla, Himachal Pradesh in Western Himalaya. It falls between 30° 57' 00" to 31° 25' 20" N latitude and 77° 29' 40" to 78° 18' 42" E longitude. The valley is one of the major apple producing areas of the state.. Altitude varies widely from about between 1250m (Kuddu) to 3000m (Chhachpur, Panju) and falls in the lesser Himalayan Ranges. This wide range of altitude and favourable climatic condition make the valley rich in natural resources.

## **METHODOLOGY**

### **Palatability Assessment**

Palatability and non-palatability of the plant species were categorized through personal observation and with the help of information collected from local peoples. Enumerated plant species were examined for the animal preference or rejection to browsing and the species, those are harvested in winter when the fodder resources are very limited, were also listed, plant species, which are otherwise undesirable but only grazed half heartily during scarcity of fodder or droughts, are taken as "non-palatable" and not considered in the list. Putting these facts in mind a palatability indices (PI) i.e. numerals (1, 2, 3 & 4) were made on the basis of best preference of animals for plant during grazing and stall-feeding or their rejection to plant component.

- Species grazed by most of the animals every time has given PI (1).
- Species grazed certain span of life or in vegetative or during new sprouting has given PI (2)
- Species which browsed rarely or in very young stage of sprouting has given PI (3)
- Species, which are undesirable grazed in scarcity of fodder resources, has considered "non-palatable" PI (4) is not counted in list.

After this categorization animals have also special preference or choice for a particular species in other word 'ice-cream' species, on this basis rating of their choice for species had categorized as Very High (VH), High (H), Medium (M), Low (L) and Very Low (VL).

## **RESULTS AND DISCUSSION**

Natural resources are the bone of the economy of the rural area of a country. Livestock is an integral part of environment and economy of the rural areas dependent on these resources. Managements of any forest and grasslands depend on the availability of fodder resources and pressure exerted on them. In this paper an attempt has been made to assess the fodder resources of Chhachpur Valley.

The results of study revealed that valley is rich in fodder resources. A total of 240 species from different life forms as palatable species has been reported, out of which 122 (50.83%) are forbs, 40 (16.66%) grasses, 7 (2.91%) sedges, 15 (6.25%) climbers, 43 (17.91%) shrubs and 13 (5.41%) trees (Table 1). Awasthi (2003) reported 140 wild palatable species for different ungulates of Himalaya.

Among the available resources animals have different choice for browsing, from total palatable species about 43.33% (94 & 12 Species) have less and very less preference for browsing, 25 % (57 species) have moderate and remaining 31.16% have high & very high (33 & 44 species) preference for browsing (Table 1). Name of the ice-cream species has given in Table 2. This shows that only one third of the total available resources come in better nutritive fodder as ice-cream species. This can be varying with site, availability of resources and grazing habit of the animals.

Seasonal variation shows remarkable changes in the availability of fodder species in the area. Summer months are abundant with fodder resources. 103 species restricted to summer months, 31 spring & summer, 31 summer to autumn, 11 rainy and 8 for winter. There are only 41 species present in all the seasons mostly grasses (Table-2), and most of the fodder requirements meet from these species during the scarcity of fodder resources during winter grasses are browsed in their dead stage or as dried for hay, Brown Oak (*Quercus semicarpifolia* and *Q. floribunda*) formed important diet component during winter at upper reaches where most of the forbs under snow and dried up, this similar observation given by Miashra and Johnsigh (1996).

In Appendix I-V, Palatable plant species from different life forms with their palatable indices (PI), part used, seasons, dietary preference, frequency and animals feed has been reported.

**CONCLUSION**

Better understanding of palatability will help in the management of fodder resources. Non-scientific and unmanaged traditional grazing system deteriorating these rangeland, in grazed area undesirable or non-palatable plant species were received mostly, ice-cream highly palatable species mainly recorded in managed area i. e. agro-ecosystem and control burning and protection or moderately grazed area.

**APPENDIX**

**Table 1:** Animals preference to browsing of various life forms of plant species in Chhachpur Valley.

<i>Preference for browsing by animals</i>	<b>Forbs</b>	<b>Grasses</b>	<b>Sedges</b>	<b>Climbers</b>	<b>Shrubs</b>	<b>Trees</b>	<b>Total</b>
Very High (VH)	17	13	0	04	06	04	44
High (H)	11	11	0	05	04	02	33
Moderate(M)	23	09	01	06	15	03	57
Less (L)	67	07	02	0	15	03	94
Very Less (VL)	04	0	04	0	03	01	12
<b>Total</b>	<b>122</b>	<b>40</b>	<b>7</b>	<b>15</b>	<b>43</b>	<b>13</b>	<b>240</b>

**Table 2:** Palatable resources of high dietary preference (Ice-cream species) among animals in various Seasons.

<i>Seasonal availability/browsing period</i>	<b>Winter</b>	<b>Spring</b>	<b>Summer</b>	<b>Rainy</b>	<b>Autumn</b>
<b>Forbs</b>					
<i>Brassica campestris</i>	+	+	+	-	-
<i>Arabidopsis thaliana</i>	+	+	+	-	-
<i>Cardamine flexuosa</i>	+	+	+	-	-
<i>Cardamine impatiens</i>	+	+	+	-	-
<i>Cerastium cerastoides</i>	+	+	+	-	-
<i>Cerastium glomeratum</i>	-	-	-	-	-
<i>Gypsophila cerstioides</i>	+	+	+	-	-
<i>Stellaria latifolia</i>	+	+	+	-	-
<i>Stellaria media</i>	+	+	-	-	-
<i>Stellaria monosperma</i>	+	+	+	-	-
<i>Lathyrus aphaca</i>	+	+	+	-	-
<i>Lotus corniculatus</i>	-	+	+	-	-
<i>Trifolium corniculatus</i>	-	+	+	+	-
<i>Anagallis arvensis</i>	-	+	+	-	-
<i>Vicia hirsute</i>	+	+	-	-	-
<i>Vigna vexillata</i>	-	-	+	+	-
<i>Galinsoga parviflora</i>	-	-	+	+	+
<b>Grasses</b>					
<i>Capillipedium parviflorum</i>	+	+	+	+	+
<i>Heteropogon contortus</i>	+	+	+	+	+
<i>Chrysopogon serrulatus</i>	+	+	+	+	+
<i>Themeda anathera</i>	+	+	+	+	+
<i>Chrysopogon gryllus</i>	+	+	+	+	+
<i>Cymbopogon jwarancusa</i>	+	+	+	+	+
<i>Cynodon dactylon</i>	+	+	+	+	+

<i>Setaria glauca</i>	-	-	+	+	+
<b>Climber</b>					
<i>Rhynchosia himalensis</i>	-	-	+	+	+
<i>Vicia sativa</i>	+	+	+	-	-
<i>Vicia tetrasperma</i>	-	+	+	-	-
<i>Cuscuta reflexa</i>	-	-	+	+	-
<b>Shrubs</b>					
<i>Berberis chitria</i>	+	+	+	+	+
<i>Berberis lycium</i>	+	+	+	+	+
<i>Desmodium floribundum</i>	-	-	+	+	+
<i>Desmodium racemosum</i>	-	-	+	+	+
<i>Indigofera gangetica</i>	-	-	+	+	+
<i>Indigofera heterantha</i>	-	-	+	+	+
<b>Trees</b>					
<i>Morus serrata</i>	-	-	+	+	+
<i>Quercus floribunda</i>	+	-	-	+	+
<i>Quercus leucotrichophora</i>	+	-	-	+	+
<i>Grewia optiva</i>	+	+	+	+	+

**Table 3:** Seasonal fodder resources of Chhachpur Valley.

<i>Seasonal availability/browsing period</i>	<b>Forbs</b>	<b>Grasses</b>	<b>Sedges</b>	<b>Climbers</b>	<b>Shrubs</b>	<b>Tree lopped</b>
Winter	-	-	-	-	06	05
Winter -Spring	07	-	-	-	01	-
Spring - Summer	25	-	-	02	04	-
Summer	64	02	02	10	21	04
Summer-Rainy	06	-	05		-	-
Summer-Autumn	15	06	-	-	10	-
Present in all seasons	05	32	-	03	01	-

**Appendix I:** Palatable Forb of Chhachpur Valley in relation to animal use and preference (Cattle, sheep and Goat)

<i>Plant Species</i>	Habit	Part Used	Palatability Indices	Seasons	Preference for Browsing by animal	Harvesting time for storage of hay making	Frequency	Animal feed
<i>Brassica campestris</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	*Cattle, Goats & Sheep
<i>Arabidopsis thaliana</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Cardamine flexuosa</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Cardamine impatiens</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Cerastium cerastoides</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Cerastium glomeratum</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Gypsophila cerastiodes</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Stellaria latifolia</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Stellaria media</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Stellaria monosperma</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Rare	Cattle, Goats & Sheep
<i>Lathyrus aphaca</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Rare	Cattle, Goats & Sheep
<i>Lotus corniculatus</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Rare	Cattle, Goats & Sheep
<i>Trifolium pratense</i>	Forb	Wh., Pt.	1	Sum.	VH	-	Rare	Cattle, Goats & Sheep
<i>Anagallis arvensis</i>	Forb	Wh., Pt.	1	Spr., Sum.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Vicia hirsute</i>	Forb	Wh., Pt.	1	Wnt., Spr.	VH	-	Frqt.	Cattle, Goats & Sheep
<i>Vigna vexillata</i>	Forb	Wh., Pt.	1	Sum., Rainy	VH	-	Rare	Cattle, Goats & Sheep
<i>Galinsoga parviflora</i>	Forb	Wh., Pt.	1	Sum-Atm.	VH	Sept.-Oct.	V. Frqt.	Cattle, Goats & Sheep
<i>Viola canescens</i>	Forb	Wh., Pt.	1	Spr., Sum.	H	-	Frqt.	Cattle, Goats & Sheep

<i>Viola biflora</i>	Forb	Wh., Pt.	1	Spr., Sum.	H	-	Frqt.	Cattle, Goats & Sheep
<i>Viola pilosa</i>	Forb	Wh., Pt.	1	Spr., Sum.	H	-	Frqt.	Cattle, Goats & Sheep
<i>Artemisia roxburghiana</i>	Forb	Lvs., Yng St.	1	Thrht. Yr.	H	-	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Artemisia wallichiana</i>	Forb	Lvs., Yng St.	1	Thrht. Yr.	H	-	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Pilea umbrosa</i>	Forb	Wh., Pt.	1	Sum.	H	-	Rare	Cattle, Goats & Sheep
<i>Commelina benghalensis</i>	Forb	Wh., Pt.	1	Spr., Sum.	H	-	Frqt.	Cattle, Goats & Sheep
<i>Fagopyrum cymosum</i>	Forb	Lvs.	1	Sum-Atm.	H	-	Frqt.	Cattle, Goats & Sheep
<i>Fagopyrum esculentum</i>	Forb	Lvs.	1	Sum-Atm.	H	-	Frqt.	Cattle, Goats & Sheep
<i>Chenopodium album</i>	Forb	Lvs., Yng St	1	Spr., Sum.	H	-	Frqt.	Cattle, Goats & Sheep
<i>Chenopodium botrys</i>	Forb	Lvs., Yng St	1	Spr., Sum.	H	-	Frqt.	Cattle, Goats & Sheep
<i>Mazus pumilis</i>	Forb	Wh., Pt.	2	Spr.-Sum.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Physalis minima</i>	Forb	Lvs.	2	Sum.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Launaea secunda</i>	Forb	Lvs., Yng St	2	Sum.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Corydalis cornuta</i>	Forb	Lvs., Yng St	2	Wnt., Spr.	M	-	Rare	Cattle, Goats & Sheep
<i>Fumaria indica</i>	Forb	Lvs., Yng St	2	Wnt., Spr.	M	-	Rare	Cattle, Goats & Sheep
<i>Capsella bursa-pastoris</i>	Forb	Lvs., Yng St	2	Wnt., Spr.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Erysimum hieracifolium</i>	Forb	Lvs., Yng St	2	Wnt., Spr.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Sisymbrium wallichii</i>	Forb	Lvs., Yng St	2	Wnt., Spr.	M	-	Frqt.	Cattle & Sheep
<i>Thlaspi alpestre</i>	Forb	Lvs., Yng St	2	Wnt., Spr.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Thlaspi arvense</i>	Forb	Lvs., Yng St	2	Wnt., Spr.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Thlaspi montanum</i>	Forb	Lvs., Yng St	2	Wnt., Spr.	M	-	Frqt.	Cattle, & Sheep
<i>Oxalis corniculata</i>	Forb	Wh., Pt.	2	Spr.-Sum.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Trifolium repens</i>	Forb	Wh., Pt.	2	Sum.	M	-	Rare	Cattle, Goats & Sheep

<i>Duchesnea indica</i>	Forb	Lvs., Yng St	2	Sum.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Primula denticulata</i>	Forb	Lvs., Yng St	2	Sum.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Houttuynia cordata</i>	Forb	Lvs.	2	Sum.	M	-	Rare	Cattle, Goats & Sheep
<i>Achyranthes aspera</i>	Forb	Yng Lvs.	2	Sum.-Atm.	M	-	L. Frqt.	Cattle, Goats & Sheep
<i>Amaranthus cruentus</i>	Forb	Lvs., Yng St.	2	Sum.-Atm.	M	-	Rare	Cattle, Goats & Sheep
<i>Amaranthus spinosus</i>	Forb	Lvs., Yng St.	2	Sum.-Atm.	M	-	Rare	Cattle, Goats & Sheep
<i>Siegesbeckia orientalis</i>	Forb	Lvs., Yng St	2	Sum.-Atm.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Solidago virga-aurea</i>	Forb	Lvs., Yng St	2	Sum.-Atm.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Dicliptera roxburghiana</i>	Forb	Yng Lvs.	2	Sum.-Atm.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Micromeria biflora</i>	Forb	Lvs., Yng St	2	Sum.	M	-	Frqt.	Cattle, Goats & Sheep
<i>Hibiscus trionum</i>	Forb	Lvs.	2	Sum.-Atm.	L	-	Rare	Cattle, Goats & Sheep
<i>Impatiens roylei</i>	Forb	Lvs.	2	Sum.-Atm.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Impatiens thomsoni</i>	Forb	Lvs.	2	Sum.-Atm.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Lactuca dissecta</i>	Forb	Lvs., Yng St	2	Sum.-Atm.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Lactuca longifolia</i>	Forb	Lvs., Yng St	2	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Lecanthus wallichii</i>	Forb	Lvs.	2	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Parietaria debilis</i>	Forb	Lvs.	2	Sum.	L	-	Rare	Cattle, Goats & Sheep
<i>Hypericum elodeoides</i>	Forb	Lvs.	2	Sum-Atm.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Hypericum perforatum</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Malv.a neglecta</i>	Forb	Yng Lvs.	3	Sum.	L	-	L. Frqt.	Cattle, Goats & Sheep
<i>Malv.a verticellata</i>	Forb	Yng Lvs.	3	Sum.	L	-	L. Frqt.	Cattle, Goats & Sheep
<i>Sida rhombifolia</i>	Forb	Yng Lvs.	3	Sum.	L	--	Frqt.	Cattle, Goats & Sheep
<i>Impatiens balsamina</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats &



								Sheep
<i>Impatiens racemosa</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Impatiens scabrida</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Hartmannia rosea</i>	Forb	Lvs.,Yng St	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Bupleurum tenue</i>	Forb	<b>Lvs.,Yng St</b>	<b>3</b>	<b>Sum.-Rainy</b>	<b>L</b>	<b>-</b>	<b>Frqt.</b>	<b>Cattle, Goats &amp; Sheep</b>
<i>Bupleurum lanceolatum</i>	Forb	<b>Lvs.,Yng St</b>	<b>3</b>	<b>Sum.-Rainy</b>	<b>L</b>	<b>-</b>	<b>Frqt.</b>	<b>Cattle, Goats &amp; Sheep</b>
<i>Bupleurum falcatum</i>	Forb	<b>Lvs.,Yng St</b>	<b>3</b>	<b>Sum.-Rainy</b>	<b>L</b>	<b>-</b>	<b>Frqt.</b>	<b>Cattle, Goats &amp; Sheep</b>
<i>Chaerophyllum reflexum</i>	Forb	Lvs.,Yng St	3	Sum.-Rainy	L	-	Frqt.	Cattle, Goats & Sheep
<i>Chaerophyllum acuminatum</i>	Forb	Lvs.,Yng. St.	3	Sum.-Rainy	L	-	Frqt.	Cattle, Goats & Sheep
<i>Pimpinella acuminata</i>	Forb	Lvs.,Yng St	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Pimpinella diversifolia</i>	Forb	Lvs.,Yng St	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Bidens bipinnata</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Bidens pilosa</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Myriactis nepalensis</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Pentanema indica</i>	Forb	Yng Lvs.	3	Sum.	L	-	L. Frqt.	Cattle, Goats & Sheep
<i>Picris hieracioides</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Prenanthes brunoniana.</i>	Forb	Yng Lvs.	3	Sum.	L	-	L. Frqt.	Cattle, Goats & Sheep
<i>Senecio chrysanthemoides</i>		Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Senecio graciliflorus</i>	Forb	Yng Lvs.	3	Sum.	L		Frqt.	Cattle, Goats & Sheep
<i>Senecio nudicaulis</i>	Forb	Yng Lvs.	3	Sum.	L	--	Frqt.	Cattle, Goats & Sheep
<i>Senecio rufinervis</i>		Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep

<i>Sonchus asper</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Sonchus oleraceus</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Xanthium indicum</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Campanula colorata</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Geranium divaricatum</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Geranium nepalense</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Geranium ocellatum</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Geranium robertianum</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Geranium rotundifolium</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Geranium wallichianum</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Geranium sibiricum</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Fragaria vesca</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Potentilla gerardiana</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Potentilla nepalensis</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Parnassia nubicola</i>	Forb	Lvs.	3	Sum.	L	-	L. Frqt.	Cattle, Goats & Sheep
<i>Valeriana jatamansi</i>	Forb	Lvs.	3	Sum.	L	--	Frqt.	Cattle & Sheep
<i>Valeriana pyrolaefolia</i>	Forb	Lvs.	3	Sum.	L	-	Frqt.	Cattle, & Sheep
<i>Veronica agrestis</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Barleria cristata</i>	Forb	Yng Lvs.	3	Sum.-Atm.	L	-	Rare	Cattle, Goats & Sheep
<i>Leucas cephalotes</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Goats & Sheep
<i>Leucas lanata</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Goats & Sheep
<i>Nepeta elliptica</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Goats & Sheep
<i>Nepeta eriostachya</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Goats & Sheep
<i>Origanum vulgare</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Goats & Sheep

<i>Prunella vulgaris</i>	Forb	Lvs., Yng St	3	Sum.	L	-	Frqt.	Cattle, & Sheep
<i>Salv.ia glutinosa</i>	Forb	Lvs., Yng St	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Salv.ia nubicola</i>	Forb	Lvs., Yng St	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Salv.ia plebeia</i>	Forb	Lvs., Yng St	3	Sum.	L	-	L. Frqt.	Cattle, Goats & Sheep
<i>Scutellaria angulossa</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Scutellaria grossa</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Stachys sericea</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, Goats & Sheep
<i>Thymus linearis</i>	Forb	Yng Lvs.	3	Sum.	L	-	Frqt.	Cattle, & Sheep
<i>Urtica ardens</i>	Forb	Yng Lvs.	3	Thrht. Yr.	L		Frqt.	Cattle, Goats & Sheep
<i>Urtica dioica</i>	Forb	Yng Lvs.	3	Thrht. Yr.	L	--	Frqt.	Cattle, Goats & Sheep
<i>Anemone vitifolia</i>	Forb	Yng Lvs.	3	Spr., Sum.	VL	-	Rare	Cattle, Goats & Sheep
<i>Ranunculus laetus</i>	Forb	Yng Lvs.	3	Spr., Sum.	VL		Frqt.	Cattle, Goats & Sheep
<i>Elsholtzia pilosa</i>	Forb	Yng Lvs.	3	Sum.-Atm.	VL	-	Frqt.	Cattle, Goats & Sheep
<i>Juncus glaucus</i>	Forb	Yng Lvs.	3	Thrht. Yr.	VL	-	Rare	Cattle

**Appendix II: Palatable Grasses and sedges of Chhachpur Valley**

<i>Plant Species</i>	<b>Habit</b>	<b>Part Used</b>	<b>Palatability indices</b>	<b>Seasons</b>	<b>Preference for Browsing by animal</b>	<b>Harvesting time for storage of hay making</b>	<b>Frequency</b>	<b>Animal feed</b>
International Journal of Scientific and Research Publications, Volume 7, Issue 12, December 2017 ISSN 2250-3153								
<i>Capillipedium parviflorum</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Heteropogon contortus</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Chrysopogon serrulatus</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Themeda anathera</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	Sept.-Oct.	Abd.	Cattle, Goats & Sheep
<i>Chrysopogon gryllus</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	Sept.-Oct.	Abd. Mdl. Alt.	Cattle, Goats & Sheep
<i>Cymbopogon jwarancusa</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	Sept.-Oct.	Abd.	Cattle, Goats & Sheep
<i>Cynodon dactylon</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	-	Abd	Cattle, Goats & Sheep
<i>Setaria glauca</i>	Grass	Wh., Pt.	1	Sum.-atm.	VH	Sept.-Oct.	Abd.	Cattle, Goats & Sheep
<i>Chrysopogon echinulatus</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	Sept.-Oct.	Abd	Cattle, Goats & Sheep
<i>Andropogon tristis</i>	Grass	Wh., Pt.	1	Sum-Atm..	VH	Sept.-Oct.	Abd., Hgr Alt.	Cattle, Goats & Sheep
<i>Arthraxon ciliaris</i>	Grass	Wh., Pt.	1	Sum.-atm	VH	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Arthraxon lanceolatus</i>	Grass	Wh., Pt.	1	Thrh. Yr.	VH	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Avena fatua</i>	Grass	Wh., Pt.	1	Sum.	VH	-	Abd.	Cattle, Goats & Sheep
<i>Arundinella setosa</i>	Grass	Wh., Pt.	1	Thrh. Yr.	H	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Bothriochloa kumtseana</i>	Grass	Wh., Pt.	1	Thrh. Yr.	H	Sept.-Oct.	Abd, Lwr Alt.	Cattle, Goats & Sheep
<i>Digitaria stricta</i>	Grass	Wh., Pt.	1	Thrh. Yr.	H	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Digitaria ciliaris</i>	Grass	Wh., Pt.	1	Thrh. Yr.	H	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Oryzopsis munroi.</i>	Grass	Wh., Pt.	1	Thrh. Yr.	H	Sept.-Oct.	Abd., Lwr Alt.	Cattle, Goats & Sheep Cont. App....
<i>Koeleria cristita</i>	Grass	Wh., Pt.	2	Thrh. Yr.	H	Sept.-Oct.	Abd.	Cattle, Goats & Sheep
<i>Microstegium nudum</i>	Grass	Wh., Pt.	2	Thrh. Yr.	H	Sept.-Oct.	Abd .	Cattle, Goats & Sheep
<i>Cenchrus ciliaris</i>	Grass	Wh., Pt.	2	Thrh. Yr.	H	Sept.-Oct.	Abd.	Cattle, Goats & Sheep
<i>Cymbopogon stracheyi</i>	Grass	Wh., Pt.	2	Thrh. Yr.	H	Sept.-Oct.	Abd ., Lwr Alt.	Cattle, Goats & Sheep
<i>Agrostis pilosula</i>	Grass	Wh., Pt.	2	Thrh. Yr.	H	-	Abd., Hgr Alt.	Cattle, Goats & Sheep
<i>Apluda mutica</i>	Grass	Wh., Pt.	2	Thrh. Yr.	H	-	Abd., Hgr Alt.	Cattle, Goats & Sheep
<i>Arundinella nepalensis</i>	Grass	Wh., Pt.	3	Thrh. Yr.	M	Sept.-Oct.	Abd.	Cattle, Goats & Sheep
<i>Echinochloa colonum</i>	Grass	Yng Tilr	2	Sum.	M	-	Abd.	Cattle, Goats & Sheep
<i>Bromus asper</i>	Grass	Wh., Pt.	2	Thrh. Yr.	M	-	Abd., Lwr Alt.	Cattle, Goats & Sheep

<i>Calamagostis pilosula</i>	Grass	Wh., Pt.	2	Thrh. Yr.	M	-	Abd., Hgr Alt.	Cattle, Goats & Sheep
<i>Calamagostis littorea</i>	Grass	Wh., Pt.	2	Thrh. Yr.	M	-	Frqt., Hgr Alt.	Cattle, Goats & Sheep
<i>Eulaliopsis binata</i>	Grass	Wh., Pt.	2	Thrh. Yr.	M	-	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Polypogon fugax</i>	Grass	Wh., Pt.	2	Thrh. Yr.	M	-	Abd., Hgr Alt.	Cattle, Goats & Sheep
<i>Oplismenus compositus</i>	Grass	Wh., Pt.	2	Thrh. Yr.	M	-	Abd.	Cattle, Goats & Sheep
<i>Pennisetum purpureum</i>	Grass	Wh., Pt.	2	Thrh. Yr.	M	-	Abd.	Cattle, Goats & Sheep
<i>Imperata cylindrica</i>	Grass	Wh., Pt.	3	Thrh. Yr.	L	-	Abd., Lwr Alt.	Cattle, Goats & Sheep
<i>Pennisetum orientale</i>	Grass	Wh., Pt.	3	Thrh. Yr.	L	-	Abd.	Cattle, Goats & Sheep
<i>Eragrostis nigra</i>	Grass	Wh., Pt.	3	Sum.-atm.	L		in grazed area	Cattle & Sheep
<i>Eragrostis tenella</i>	Grass	Wh., Pt.	3	Sum.-atm.	L		in grazed area	Cattle & Sheep
<i>Poa annua</i>	Grass	Wh., Pt.	3	Sum.-atm.	L		in grazed area	Cattle & Sheep
<i>Erianthus filifolius</i>	Grass	Wh., Pt.	3	Thrh. Yr.	L	-	Abd.	Cattle, Goats & Sheep
<i>Cymbopogon gidarba</i>	Grass	Wh., Pt.	3	Thrh. Yr.	L	-	Abd., Lwr Alt.	Cattle, Goats & Sheep

<b>Sedges</b>								
<i>Cyperus niveus</i>	Sedger	Yng Tlir	2	Sum.	M		Rare	Cattle, & Sheep
<i>Carex aristata</i>	Sedges	Yng Tlir	3	Sum.	L	-	Frqt., Hgr Alt.	Cattle, & Sheep
<i>Carex nubigena</i>	Sedges	Yng Tlir	3	Sum.	L	-	Frqt., Hgr Alt.	Cattle, & Sheep
<i>Bulbostylis densa</i>	Sedges	Yng Tlir	3	Sum.	VL		Frqt with grass	Cattle, & Sheep
<i>Cyperus squarrosus</i>	Sedges	Yng Tlir	3	Sum.	VL		Rare	Cattle, & Sheep
<i>Fimbristylis ferruginea</i>	Sedges	Yng Tlir	3	Sum.	VL		Rare	Cattle, & Sheep
<i>Kobresia capikkifolia</i>	sedges	Yng Tlir	3	Sum.	VL		Rare	Cattle, & Sheep

**Appendix III: Palatable Climbers of Chhachpur Valley**

<i>Plant Species</i>	<b>Habit</b>	<b>Part Used</b>	<b>Palatability indices</b>	<b>Seasons</b>	<b>Preference for Browsing by animal</b>	<b>Frequency</b>	<b>Animal feed</b>
<i>Rhynchosia himalensis</i>	Climber	Wh., Pt.	1	Sum.	VH	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Vicia sativa</i>	Climber	Wh., Pt.	1	Spr., Sum.	VH	Frqt.	Cattle, Goats & Sheep
<i>Vicia tetrasperma</i>	Climber	Wh., Pt.	1	Spr., Sum.	VH	Frqt.	Cattle, Goats &

							Sheep
<i>Cuscuta reflexa</i>	Climber	Wh., Pt.	1	Sum.-Atm.	VH	Frqt.	Cattle, Goats & Sheep
<i>Cissampelos pareira</i>	Climber	Wh., Pt.	1	Sum.-Atm.	H	Frqt.	Cattle, Goats & Sheep
<i>Cocculus villosus</i>	Climber	Wh., Pt.	1	Sum.	H	Frqt.	Cattle, Goats & Sheep
<i>Atylosia volubilis</i>	Climber	Wh., Pt.	1	Sum.	H	Frqt.	Cattle, Goats & Sheep
<i>Hedra nepalensis</i>	Climber	Lvs.	1	Winter	H	Frqt.	Goats & Sheep
<i>Caesalpinia decapetala</i>	Climber	Lvs.	1	Spr.-Atm.	H	Frqt.	Goats & Sheep
<i>Euonymus echinatus</i>	Climber	Lvs.	2	Sum.	M	Frqt.	Cattle, Goats & Sheep
<i>Clematis grata</i>	Climber	Lvs.	2	Sum.	M	Frqt.	Cattle, Goats & Sheep
<i>Melothria heterophyllum</i>	Climber	Wh., Pt.	2	Sum.	M	Frqt.	Cattle, Goats & Sheep
<i>Ipomoea obscura</i>	Climber	Lvs.	2	Sum.	M	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Ipomoea purpurea</i>	Climber	Lvs.	2	Sum.	M	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Smilax glaucophylla</i>	Climber	Lvs.	3	Thrht. Yr.	M	Frqt.	Cattle, Goats & Sheep

Appendix IV: Palatable Shrubs of Chhachpur Valley

Plant Species	Habit	Part Used	Palatability indices	Seasons	Preference for Browsing by animal	Frequency	Animal feed
<i>Berberis chitria</i>	Shrub	Lvs. Twigs	1	Winter.	VH	Frqt., Lwr Alt.	Goats & Sheep
<i>Berberis lycium</i>	Shrub	Lvs. Twigs	1	Winter.	VH	Frqt., Lwr Alt.	Goats & Sheep
<i>Desmodium floribundum</i>	Shrub	Lvs. Twigs	1	Sum., Atm.	VH	Frqt.	Cattle, Goats & Sheep
<i>Desmodium racemosum</i>	Shrub	Lvs. Twigs	1	Sum., Atm.	VH	Frqt.	Cattle, Goats & Sheep
<i>Indigofera gangetica</i>	Shrub	Lvs. Twigs	1	Sum., Atm.	VH	Frqt.	Cattle, Goats & Sheep
<i>Indigofera heterantha</i>	Shrub	Lvs. Twigs	1	Sum., Atm.	VH	Frqt.	Cattle, Goats & Sheep
<i>Reinwardtia indica</i>	Shrub	Wh., Pt.	1	Spr., Sum.	H	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Debregeasia velutina</i>	Shrub	Lvs. Twigs.	1	Winter.	H	Frqt., Lwr Alt.	Goats & Sheep
<i>Zanthoxylum armatum</i>	Shrub	Lvs., twigs	2	Winter.	H	Frqt., Lwr Alt.	Goats & Sheep
<i>Cotoneaster rotundifolia</i>	Shrub	Lvs.	2	Thrht. Yr.	H	Frqt., Lwr Alt.	Goats & Sheep
<i>Indigofera dosua</i>	Shrub	Lvs. Twigs	2	Sum.-Atm.	M	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Rosa brunonii</i>	Shrub	Lvs.	2	Spr., Sum.	M	Frqt., Hgr Alt.	Cattle, Goats & Sheep
<i>Rubus ellipticus</i>	Shrub	Lvs.	2	Winter.	M	Frqt.	Goats & Sheep
<i>Rubus lasiocarpus</i>	Shrub	Lvs.	2	Sum.-Atm.	M	Frqt.	Goats & Sheep
<i>Rubus macilentus</i>	Shrub	Lvs.	2	Winter.	M	Frqt.	Goats & Sheep

<i>Spiraea canescens</i>	Shrub	Lvs. Twigs	2	Sum.	M	Frqt., Hgr Alt.	Goats & Sheep
<i>Spiraea sorbifolia</i>	Shrub	Lvs. Twigs	2	Sum.	M	Frqt., Hgr Alt.	Goats & Sheep
<i>Lespedeza gerardiana</i>	Shrub	Lvs. Twigs	2	Sum.-Atm.	M	Frqt.	Cattle, Goats & Sheep
<i>Cotoneaster bacillaris</i>	Shrub	Lvs.	2	Winter-Spr.	M	Frqt., Hgr Alt.	Goats & Sheep
<i>Inula cappa</i>	Shrub	Yng Lvs.	2	Sum.-Atm.	M	Frqt.	Cattle, Goats & Sheep
<i>Inula cuspidate</i>	Shrub	Yng Lvs.	2	Sum.	M	Frqt.	Cattle, Goats & Sheep
<i>Lonicera quinquelocularis</i>	Shrub	Lvs.	3	Sum.	M	Frqt.	Goats & Sheep
<i>Viburnum mullaha</i>	Shrub	Yng Lvs.	3	Sum.	M	Frqt.	Goats & Sheep
<i>Viburnum nervosum</i>	Shrub	Yng Lvs.	3	Sum.	M	Frqt.	Goats & Sheep
<i>Roylea calycina</i>	Shrub	Lvs.	3	Sum.	M	Rare	Cattle, Goats & Sheep
<i>Sarcococca saligna</i>	Shrub	Lvs.	3	Sum.	L	Rare	Goats & Sheep
<i>Berberis aristata</i>	Shrub	Lvs.	3	Sum.	L	Frqt., Hgr Alt.	Goats & Sheep
<i>Berberis asiatica</i>	Shrub	Lvs.	3	Sum.	L	Frqt., Hgr Alt.	Goats & Sheep
<i>Hypericum oblongifolium</i>	Shrub	Yng Lvs.	3	Sum.	L	Frqt., Lwr Alt.	Goats & Sheep
<i>Lespedeza juncea</i>	Shrub	Yng. Lvs.	3	Sum.	L	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Lespedeza sericea</i>	Shrub	Yng. Lvs.	3	Sum.	L	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Deutzia staminea</i>	Shrub	Lvs..	3	Sum.-Atm.	L	Frqt., Hgr Alt.	Goats & Sheep
<i>Cyathula capitata</i>	Shrub	Yng. Lvs.	3	Sum.	L	Frqt., Lwr Alt.	Goats & Sheep
<i>Cyathula tomentosa</i>	Shrub	Yng. Lvs.	3	Sum.	L	Frqt., Lwr Alt.	Goats & Sheep
<i>Lamium album</i>	Shrub	Yng. Lvs.	3	Sum.	L	Frqt.	Goats & Sheep
<i>Calamintha umbrosa</i>	Shrub	Yng. Lvs.	3	Sum.	L	Frqt.	Goats & Sheep
<i>Urena lobata</i>	Shrub	Yng. Lvs.	3	Sum.	L	Rare	Cattle, Goats & Sheep
<i>Potentilla fruticosa</i>	Shrub	Lvs.	3	Sum.	L	Rare	Goats & Sheep
<i>Jasminum humile</i>	Shrub	Lvs.	3	Spr., Sum.	L	Frqt., Hgr Alt.	Goats & Sheep
<i>Cynanchum vincetoxicum</i>	Shrub	Lvs.	3	Sum.	L	Frqt.	Goats & Sheep
<i>Elsholtzia cristata</i>	Shrub	Yng. Lvs.	3	Sum.	VL	Frqt., Hgr Alt.	Goats & Sheep
<i>Coriaria nepalensis</i>	Shrub	Lvs.	3	Sum.	VL	Frqt., Hgr Alt.	Cattle, Goats & Sheep
<i>Buddleja asiatica</i>	Shrub	Yng. Lvs.	3	Spr., Sum.	VL	Frqt., Lwr Alt.	Goats & Sheep

Appendix V: Palatable Tree Species lopped by local people to feed their animals in Chhachpur Valley

Plant Species	Habit	Part Used	Palatability indices	Seasons	Preference for Browsing by animal	Lopping seasons	Frequency	Animal feed
<i>Quercus floribunda</i>	Tree	Lvs., Twig	1	Winter.	VH	Wnt.	Frqt., Hgr Alt.	Cattle, Goats & Sheep
<i>Quercus leucotrichophora</i>	Tree	Lvs., Twig	1	Winter.	VH	Wnt.	Frqt.	Cattle, Goats & Sheep
<i>Grewia optiva</i>	Tree	Lvs., Twig	1	Winter	VH	Wnt.	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Pistacia khinjuk</i> Stocks.	Tree	Lvs., Twig	1	Sum.	H	Sum.	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Prunus cerasoides</i>	Tree	Lvs., Twig	1	Sum.	H	Sum.	Frqt., Lwr Alt.	Cattle, Goats & Sheep
<i>Quercus semecarpifolia</i>	Tree	Lvs., Twig	2	Sum.	M	Sum.	Frqt., Hgr Alt.	Cattle, Goats & Sheep
<i>Ficus auriculata</i>	Tree	Lvs.	2	Sum.	M	Winter	L. Frqt.	Cattle, Goats & Sheep

<i>Machilus gamblei</i>	Tree	Lvs., Twig	2	Sum.	M	Wnt.	L. Frqt.	Cattle, Goats & Sheep
<i>Pyrus pashia</i>	Tree	Lvs.	3	Sum.	L	-	Frqt.	Goats & Sheep
<i>Symplocos paniculata</i>	Tree	Lvs.	3	Thrh. Yr.	L	-	Frqt.	Goats & Sheep
<i>Ficus palmate</i>	Tree	Lvs.	3	Atm.-Wint	L	-	L. Frqt.	Goats & Sheep
<i>Alnus nitida</i>	Tree	Lvs.	3	Sum.	VL	-	Frqt.	Goats & Sheep
<i>Morus serrata</i>	Tree	Lvs., Twig	1	Sum.	VH	Sum.	L. Frqt.	Cattle, Goats & Sheep

\***Cattle:** Buffalos, Cows and Oxen; **Wh., Pt.:** Whole Plant; **Lvs.:** Leaves; **Lvs., Yng St.:** Leaves, Young shoot or stem; **Yng Lvs.:** Young Leaves; **Yng Tiltr.:** Young Tillers; **VH:** Very High; **H:** High; **M:** Medium; **L:** Low; **VL:** Very Low; **V. Frqt.:** Very Frequent; **Frqt.:** Frequent; **Frqt., Hgr Alt.:** Frequent Higher Altitude; **Frqt., Lwr Alt.:** Frequent Lower Altitude; **L. Frqt.:** Less Frequent; **VR:** Very Rare; **Wnt., Spr.:** Winter, Spring; **Sum.:** Summer; **Thrh. Yr.:** Throughout Year; **Wnt.:** Winter; **Atm.:** Autumn; **Abd:** Abundant

### REFERENCES

- 1) Awasthi A, Uniyal, SK, Rawat GS and Sathyakumar S, 2003. Food plants and feeding habits of Himalayan ungulates, *Current Science.*, 85 (6): 719-723.
- 2) Hussain F, and. Mustafa G, 1995. Ecological studies on some pasture plants in relation to animal use found in Nasirabad Valley, Hunza, Pakistan. *Pak. J. Pl. Sci.*, 1(2): 263-272.
- 3) Lokender Singh, 2007. Biodiversity conservation and management practices for the sustainable development of temperate grassland of district Shimla, Himachal Pradesh, Ph. D. Thesis, University of H. N. B. Garhwal, Srinagar, Garhwal.
- 4) Manjrekar N, 1997. Ph. D. thesis, Saurashtra University, Rajkot, p. 123.
- 5) Mishra C, 2001 Doctoral thesis, Wageningen University, Netharlands, p. 123.
- 6) Mishra C, and Johnsingh AJT, 1996. *Journal of zool.* (London), 240, 573-580.
- 7) Mitchel A A and Wilcox DG, 1994. *Arid Shrubland Plants of Western Australia.* University of Western Australia Press, Perth, 478 pp.
- 8) Noor E, 1978. Coparison of grazed and ungraged vegetation of sub-alpine ecological zone at Sari. *Pak. J. For.*, 28: 186-189.
- 9) Russel, P and Fletcher W, 2003. Relative Palatability of Selected Perennial Plants in the Southern Rangelands of Western Australia- Result of a Survey of Rangeland Practitioners, *Range Management Newsletter*, 03/03.



- 10) Valentine J F, 1990. Grazing Management. Academic Press, San Diego.
- 11) Vesk PA and Westoby M, 2001. Predicting plant species responses to grazing. *Journal of Applied Ecology*, 38: 897-909.

#### AUTHORS

**First Author** – Dr. Lokender Singh Chauhan, Phd in Botany, Department of Drinking water & Sanitation (SWAJAL)  
email :- [lscfri@rediffmail.com](mailto:lscfri@rediffmail.com)

**Second Author** – Dr. Neelam Sharma, Phd in Botany, Department of Drinking water & Sanitation (SWAJAL)  
email :- [nbbotdav@yahoo.com](mailto:nbbotdav@yahoo.com)

**Third Author** – Dr.S.P Joshi Phd in Botany Education department.

**Correspondence Author** – –Dr. Neelam Sharma, email address [nbbotdav@yahoo.com](mailto:nbbotdav@yahoo.com), [lscfri@rediffmail.com](mailto:lscfri@rediffmail.com)  
contact number 9412381157,9756600141.