



## Impact of overgrazing and documentation of wild fodder plants used by Gujjar and Bakerwal Tribes of district Rajouri (J&K), India

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**Abstract:** The present study aims to documents the wild plants used as fodder by Gujjar and Bakarwal tribes and their impact of utilization and overgrazing in the forests of district Rajouri (J&K), India. During the study period two blocks which were densely inhabited by Gujjar and Bakkerwal tribes were selected (Nowshera and Budhal) and frequent field trips were also made on other blocks of the district where the tribal people may reached. A total of 63 plants species were reported from the study area belong to 33 families and 51 genera, of all these 63 species, 22 were trees, 11 were shrubs and 30 were herbs. During the study it was observed that, due overgrazing, lopping, and cutting of forest plants in large scale by the tribes and local inhabitants for the expansion of agricultural lands and local settlements outside and inside of the forests and the number of livestock reported much more than the carrying capacity of forest, which resulted into the threatening of some plant species. It is also observed that some species like *Pinus wallichiana* and *Cedrus deodara* were not be reported in the area due to their commercial utilization and overgrazing purposes, and also due to their more litter fall which is not good for the growth of ground flora. The tribes sometimes also employ forest fire for better fodder, which leads to great loss to the regeneration of forest plants.

**Keywords:** District Rajouri, Fodder Plants, Forest, Gujjar and Bakarwal Tribes, Nomadic life, Overgrazing

### INTRODUCTION

District Rajouri is one of the important district of J&K having rich plant diversity. The district lies in western circle of Jammu division and bounded by district Poonch in North, district Reasi in West and Pakistan in South and East. It lies in between in 30°-50' N to 33°-30' N longitude and 74° E to 74°-10' E latitude with altitudinal range from 370-4600 masl. Gujjar and Bakarwal tribes are constitutes the major segment of the district population and the tribal race of J&K state, leading the nomadic life (Schultes, 1962; Prashad, 1992; Kapoor *et al.*, 1994; Gaur, 2008; Rashid *et al.*, 2008), who graze their herds of sheep, goat and cattle from south of Pir Panjal range to alpine pasture of the greater Himalaya in north, using mainly forest resources to fulfill their needs like food, fodder, forage, shelter, fuel wood, fibre, medicines, etc. As their nomadic life, some Gujjar tribes have their own permanent houses but they also migrate to alpine zone during spring as well as summer season. The Bakarwal tribes are purely nomadic, they migrate from one place to another place for obtaining better grazing opportunities (Prashad, 1992; Kapoor *et al.*, 1994), they are known for rearing goats and some other animals such as sheep, horses etc. The Gujjar tribe mainly rears cattle but sometimes all animals. In winter season they

migrates from alpine zone to subtropical zone of the district Kalakote, Nowshera, Sunderbani, and in summer season they migrate alpine zone of Pir Panjal, although sometimes they migrate to Kashmir for grazing and business purposes by the sale of their animals. The primary occupation of these tribes is livestock and secondary forest product on which they depend. Forest played a significant role in the development of civilization; they are not only indispensable sources of food, fuel, fodder, and material for shelters but also are essential for the protection and maintenance of natural environment (Negi *et al.*, 1997).

Fodder plants used as a crude food for livestock, usually the food is composed of entire plants including leaves, stalks and grains etc. Generally straw of various crops and wild grasses as well as plant residues of pulses constitute the major fodder components. Cattle generally graze the grasses that constitute the major element of fodder. Cattle and other animals also browse green leaves and twigs of many other shrubs and trees in the hilly forest, of these some plants are dried and stored for drought condition by the tribes for the fodder of cattle. Tree and shrubs can supplement the quality and quantity of pastures for grazing live stock. They are an effective insurance against seasonal feed shortage or the risk of drought (Schultes, 1962; Prashad, 1992;

disturbances and livestock grazing also cause change in species number, tree density and basal area (Rao *et al.*, 1990). Unrestricted and open accessibility may cause enhance utilization of forest resource and this may eventually leads to species poor state (Vetaas, 1993; Murali *et al.*, 1996).

Besides exploring floristic diversity and invention of the plant resources of the western Himalayas and the state J&K, documentation of the traditional knowledge on the ethno-botanical utilization of plants has been workout by several workers during last two decades (Kachroo and Nahvi, 1976; Gupta *et al.*, 1982; Kaul *et al.*, 1987; Jain, 1991; Lal *et al.*, 1996; Singh and Kumar, 2000; Anjula *et al.*, 2007; Dangwal *et al.*, 2011, 2012a, 2012b, 2013, 2014). The fodder plants can be utilized for agro-forestry purposes in the adverse condition of drought and also take some steps for the conservation of these plants and cultural heritage of the tribes. The present study will be helpful for obtaining the present scenario of forest. It would also provide information regarding the range of impact on the forest plants. The out coming of this study will also utilize for conservation purposes. Study will also be helpful for the development of social and agro forestry plants in the area which ultimately releases the grazing pressure from the forest. Thus, the main focus of the present study is to document the some wild fodder plants of the district Rajouri used by Gujjar and Bakarwal tribes and their impact on forest plants.

## MATERIALS AND METHODS

Frequent field trips were made during the period of 2010-2011 to survey the inhabiting area of the Gujjar and Bakarwal tribes. Two blocks (Nowshera and Budhal) of the district Rajouri were selected based on seasonal migration of Gujjar and Bakarwal tribes. Monthly field trips were made in both blocks of the district for the collection and more information of fodder plants. Interviews were conducted from the local inhabitants regarding the collection of fodder plants, parts used as fodder and their available vernacular names. The collected plants were identified with the help of published floras, literature and monographs, Hooker (1906); Sharma and Kachroo (1983); Swami and Gupta (1998); Gaur (1999). The authentication of the collected plants was confirmed from the regional Herbaria at Botanical Survey of India, Northern Circle (BSD), Dehradun, Herbarium of Forest Research Institute (DD), Dehradun and HNB Garhwal University, Herbarium (GUH), Srinagar Garhwal, Uttarakhand. These plants were deposited in the Herbarium of Department of Botany, S.R.T. Campus Badshahi Thaul, district Tehri Garhwal.

## RESULTS AND DISCUSSION

Main aim of the present study is to document the forest fodder plants commonly used by the Gujjar and Bakarwal tribes in drought conditions (scarcity of fodder). In the

present study a total of 63 fodder plants were reported from the study area. The reported plants belonging to 32 families and 51 genera, of these 22 were trees, 11 were shrubs and 30 were herbs. Family wise listing of fodder plants have been arranged with their botanical name, local name, flowering and fruiting season and parts used as fodder as given in Table 1. In contrast to present study Dangwal and Amandeep (2012) studied the fodder weeds of district Rajouri and reported 57 species belonging to 22 families, whereas Rashid and Anil (2012) studied the fodder plants of same district and reported 68 fodder plant species. Singh *et al.*, (2014) was reported 65 grassy weed species belonging to 05 families, while Dangwal and Tajinder, (2013) reported 29 species used as medicine by Gujjar tribe belonging to 22 families of district Rajouri. Based on the consumption as fodder, herbs are the dominant as compared to shrubs and trees shown in Fig.1. In herbs, the family Poaceae and Fabaceae have shown dominancy and mostly browsed and grazed by cattle and other animals of the tribes.

The average numbers of livestock per family commonly known as Kumba have been shown in Table 2. The yearly increasing population of livestock and these tribes mainly depend on forest for their livestock. Study also revealed that the number of livestock is much more than the carrying capacity of forest. In this area due overgrazing, lopping, and cutting of forest plants in large scale by the tribes and local inhabitants for the expansion of agricultural lands and local settlements outside and inside of the forests, which resulted into the threatening of some plant species. These plants are *Quercus leucotrichophora*, *Q. semecarpifolia*, *Spiraea* spp. etc. Similar to our present study, Kumar and Shahabuddin (2005) studied the impact of uncontrolled common land grazing and overstocking of live stock on forest. Ives (2006) studied the negative impact of land use in the Indian Himalayas. Negi and Todaria (1993) also observed the impact of high concentration of grazing animals in the growing regions which also harm the forest to the large extent.

The vegetation of *Oak* forest decreasing every year

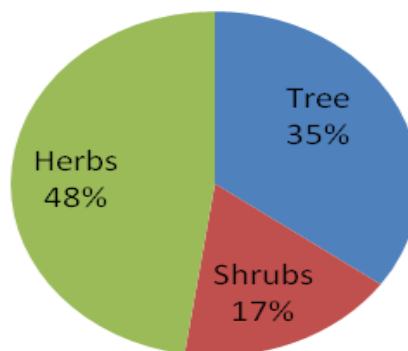


Fig. 1. Diversity of trees, shrubs and herbs used as fodder

*Toona serrata**Ficus palmata**Aesculus indica**Dalbergia sissoo**Spiraea canescens**Quercus semecarpifolia**Taraxacum officinale**Woodfordia fruticosa***Plate 1.** *Plants used as fodder.*

as shown in Plates 2 and 3, not only for fodder purpose but also cutting of trees for their multipurpose such trees are *Pinus roxburghii*, *Taxus baccata*, *Abies pindrow*, *Picea smithiana* etc. It is also observed that some species like *Pinus wallichiana* and *Cedrus deodara* could not be found in the area

due to their commercial utilization and overgrazing purposes, and also due to their more litter fall which is not good for the growth of ground flora. If litter fall is more, the tribes sometimes also employ forest fire for better fodder which leads to the great loss to the regeneration of forest plants.

**Table 1.** Documentation of forest fodder plants used by Gujjar and Bakarwal Tribes.

S. N.	Family	Botanical Name	Habit	Local name	Flowering and fruiting season	Plant parts used as fodder
1	Acanthaceae	<i>Dicliptera bupleuroides</i> Nees in Wallich.	Herb	-	Fl.: Sept.-Nov. Fr.: Oct.-Dec.	The whole plant used as fodder.
2	Anacardiaceae	<i>Lannea coromandelica</i> (Houttun) Merrill	Tree	Kalma	Fl.: Mar.-Apr. Fr.: Jun.-Aug.	Leaves used as fodder.
3	Apocynaceae	<i>Carissa opaca</i> Stapf ex Haines	Shrub	Granda	Fl.: Jan.-Mar. Fr.: Apr.-Jun.	Leaves browsed by sheep and goats.
4	Aquifoliaceae	<i>Ilex dipyrena</i> Wallich in Roxb.	Tree	Dratha	Fl.: Mar.-Apr. Fr.: Jun.-Oct.	Leaves rarely used as fodder.
5	Asclepiadaceae	<i>Cryptolepis buchananii</i> Roemer & Schultes	Herb	Dodi bale	Fl.: Mar.-Jul. Fr.: Oct.-Nov.	Sometime browsed by goats.
6	Asteraceae	<i>Bidens pilosa</i> L.	Herb	Saryla	Fl. & Fr.: Mar.-Aug.	Plant browsed as fodder.
7	Brassicaceae	<i>Taraxacum officinale</i> Weber <i>Lepidium sativum</i> L.	Herb Herb	Hand -	Fl. & Fr.: Mar.-Oct. Fl.: Feb.-Apr. Fr.: Apr.-May	Used as fodder. Browsed by cattle and goats.
10	Dioscoreaceae.	<i>Dioscorea bulbifera</i> L.	Herb	-	Fl.: Jul.-Nov. Fr.: Oct.-Jan.	Leaves provide good fodder.
11	Elaeagnaceae	<i>Elaeagnus parvifolia</i> Wallich ex Royle.	Shrub	-	Fl.: Mar.-Apr. Fr.: Jun.-Sept.	Leaves lopped for fodder.
12	Fabaceae	<i>Dalbergia sissoo</i> Roxb <i>Desmodium microphyllum</i> (Thunb.) DC. <i>Indigofera heterantha</i> Wallich ex Brandis <i>Lotus corniculata</i> L.	Tree Herb Shrub Herb	Tal - - Nethi	Fl. & Fr.: Mar.-Jun. Fl. & Fr.: Jan.-Dec. Fl.: May-Aug. Fr.: Sept.-Nov. Fl. & Fr.: Almost throughout the year	Leaves used as fodder. Fodder for cattle. Leaves lopped for fodder. Grazed by cattle.
		<i>Medicago lupulina</i> L. <i>Trifolium pratense</i> L.	Herb Herb	- -	Fl. & Fr.: Nov.-May Fl. & Fr.: Jul.-Sept.	Plant used as fodder. Whole plant used as fodder for cattle.
13	Fagaceae	<i>Vigna vexillata</i> L. <i>Quercus glauca</i> Thunb. <i>Quercus leucotrichophora</i> A. Camus in Riviera Sci. <i>Quercus semecarpifolia</i> J.E. Smith in Rees	Herb Tree Tree Tree	Jangli Dal Burai Rein Peli Rein	Fl. & Fr.: Aug.-Nov. Fl.: May-Jun. Fr.: Jun.-Aug. Fl.: Mar.-Aor. Fr.: Oct.-Jan. Fl.: Mar.-Apr. Fr.: Aug.-Sept.	Plant used as fodder. Leaves used as fodder. Leaves used as fodder. Leaves used as fodder.
14	Flacourtiaceae	<i>Flacourtia indica</i> (Burm.f.)	Tree	Jela	Fl.: Feb.-Mar. Fr.: Apr.-Jun.	Leaves used as fodder.
15	Hippocastanaceae	<i>Aesculus indica</i> (Coler. ex Cambess) Hook. in Curtis	Tree	Bankhori	Fl.: Mar.-Apr. Fr.: Jul.-Aug.	Leaves used as fodder.
16	Hypericaceae	<i>Hypericum oblongifolium</i> Choisy. <i>Hypericum perforatum</i> L.	Shrub Herb	- -	Fl.: Mar.-Apr. Fr.: May-Jun. Fl. & Fr.: Throughout the year	Leaves looped for fodder. Leaves used as fodder
17	Lythraceae	<i>Woodfordia fruticosa</i> (L.)	Shrub	-	Fl.: Jan.-Apr. Fr.: Apr.-Jun.	Leaves used as fodder for goats.
18	Meliaceae	<i>Melia azedarach</i> L. <i>Toona serrata</i> (Royle) M. Roemer.	Tree Tree	Dreek Toon	Fl.: Mar.-Apr. Fr.: Apr.-May Fl.: May-Jun. Fr.: Sept.-Dec.	Leaves used as fodder. Leaves used as fodder.
19	Mimosaceae	<i>Acacia eburnia</i> (L.f.) Willd. <i>Albizia lebbeck</i> (L.) Benth. in Hook. <i>Acacia modesta</i>	Shrub Tree Tree	Patki Sree Playi	Fl.: Sept.-Nov. Fr.: Feb.-Apr. Fl.: Apr.-Jun. Fr.: Sept.-Dec. Fl.: Mar.-May Fr.: Oct.-Dec.	Foliage used as fodder. Leaves provide palatable fodder for cattle. Foliage as fodder of goats and sheep.
20	Moraceae	<i>Ficus auriculata</i> Lour <i>Ficus palmata</i> Forsk. <i>Ficus semicordata</i> Buch.-Ham. ex J. E. Smith in Rees.	Tree Tree Tree	Tose Fagwara -	Fl.: Mar.-May. Fr.: Jun.-Jul. Fl.: May-Jun. Fr.: Jun.-Aug. Fl.: May- Jun. Fr.: Jun.-Oct.	Leaves are the good fodder for cattle. Leaves and twigs good fodder. Leaves and twigs lopped for fodder.

<i>Condt.</i>						
21	Oleaceae	<i>Olea ferruginea</i> Royle.	Tree	Kaaw	Fl.: Feb.-Apr. Fr.: Oct.-Nov.	Leaves used as fodder.
22	Oxalidaceae	<i>Oxalis corniculata</i> L.	Herb	Kathimli	Fl. & Fr.: Almost throughout the year.	Grazed by cattle.
23	Poaceae	<i>Alloteropsis cimicina</i> (L.)	Herb	-	Fl. & Fr.: Aug.-Nov.	Whole plant used as fodder.
		<i>Capillipedium assimile</i> (Steudel) A. Camus in Le-comte.	Herb	Gass	Fl. & Fr.: Aug.-Dec.	Plant is a good fodder.
		<i>Cenchrus ciliaris</i> L.	Herb	Seta Gass	Fl. & Fr. Aug.-Sept.	Plant used as fodder for cattle.
		<i>Cynodon dactylon</i> (L.) Persoon.	Herb	Khabal	Fl.&Fr.: Jan.-Dec.	Grazed by Cattle.
		<i>Echinochloa colona</i> (L.) Link.	Herb	Gass	Fl. & Fr.: Jul.-Oct.	Leaves used as fodder.
		<i>Panicum antidotale</i> Retz.	Herb	Gass	Fl.&Fr.: Dec.-Jan.	Whole plant used as fodder.
		<i>Paspalidium flavidum</i> (Michaux) Scribn.	Herb	Gass	Fl. & Fr.: Jul.-Nov.	Used as fodder.
		<i>Setaria glauca</i> (L.) P.Beav.	Herb	Seta gass	Fl. & Fr.: Aug.-Nov.	Whole plant used as fodder for cattle.
24	Polygonaceae	<i>Setaria viridis</i> (L.) P.Beauv.	Herb	Seta gass	Fl. & Fr.: Aug.-Dec.	Hay and green grass as fodder.
		<i>Themeda triandra</i> Forsk.	Herb	gass	Fl. & Fr.: Aug.-Oct.	Fodder for cattle.
		<i>Rumex hastatus</i> D.Don.	Herb	-	Fl.: Feb.-Jun. Fr.: Jun.-Oct.	Rarely used as fodder.
		<i>Rumex dentatus</i> L.	Herb	Arfali	Fl. & Fr.: Feb.-May	Also used as miner fodder.
25	Ranunculaceae	<i>Rumex nepalensis</i> Sprengel	Herb	Hebli	Fl.: Apr.-Aug. Fr.: Aug.-Oct.	Rarely used as fodder.
		<i>Clematis grata</i> Wallich.	Climber Herb	Tri Bale	Fl.: Aug.-Oct. Fr.: Oct.-Dec.	Leaves used as fodder for sheep and goats.
		<i>Clematis montana</i> Buch.-Ham. ex DC. <i>Ranunculus hirtellus</i> Royle	Climber herb Herb	Tri Bale -	Fl. & Fr. : Mar.-Aug. Fl.: Jul.-Aug. Fr.: Aug.-Sept.	Leaves browsed by sheep and goats. Plant browsed by goats.
26	Rhamnaceae	<i>Ziziphus glaberrima</i> (Sedgwick)	Tree	Bari	Fl.: Sept.-Oct. Fr.: Dec.-Feb.	Browsed by sheep and goats.
		<i>Ziziphus mauritiana</i> Lam.	Shrub	Bari	Fl.: Jun.-Aug. Fr.: Feb.-Mar.	Browsed by sheep and goats.
27	Rosaceae	<i>Pyrus pashia</i> Buch.-Ham. ex D.Don.	Tree	Kathari	Fl.: Feb.-Mar. Fr.: May-Dec.	Leaves and twigs used as fodder.
		<i>Spiraea canescens</i> D.Don	Shrub	Dhala	Fl.: May-Jun. Fr.: Jun.-Oct.	Branches looped for fodder.
28	Salicaceae	<i>Salix acemophylla</i> Boissier	Tree	Kankori	Fl.: Feb.-Mar. Fr.: Apr.-May	Leaves used as fodder.
		<i>Salix disperma</i> Roxb. ex D.Don	Tree	-	Fl.& Fr.: Mar.-Jul.	Leaves used as fodder.
		<i>Salix tetrasperma</i> Roxb.	Tree	-	Fl.& Fr.: Sept.-Dec.	Leaves used as fodder.
29	Smilacaceae	<i>Smilax parviflora</i> Wall	Climber	Kuler chog or kalra bale	Fl.: Apr.-Jun.	Lopped as fodder.
30	Tiliaceae	<i>Grewia optiva</i> J.R Drummond ex Burret in Notizbl.	Tree	Thaman or Dhaman	Fl.: Apr.-Jun. Fr.: Aug.-Nov.	Leaves provide good fodder.
31	Ulmaceae	<i>Celtis eriocarpa</i> Decne.	Tree	Kharik	Fl.: Mar.-Apr. Fr.: Sept.-Nov.	Leaves provide good fodder for cattle.
32	Urticaceae	<i>Debregeasia longifolia</i> (Burm.f.)Wedd. in DC.	Shrub	-	Fl.: Feb-Mar. Fr.: Apr.-Jul.	Plant is a good fodder.
33	Verbenaceae	<i>Premna barbata</i> Wallich ex Schauer.	Herb	-	Fl.: Mar. - May Fr.: Jun.-Aug.	Leaves used as fodder.

Kapoor *et al.*, 1994). On the other hand uncontrolled common land grazing and overstocking of live stock prevent regeneration of the tree cover to some extent (Kumar and Shahabuddin, 2005) even though the negative impact of land use in the Himalayas may be overstated (Ives, 2006). Presently the forests are highly

degraded due to the continuous anthropogenic disturbances and these disturbances play an important role in change as well as loss of the plant diversity of the region. These anthropogenic disturbances not only influence the soil, nutrients and water conditions but also influence climatic conditions. Human induced



**Plate 2.** *Gujjar and Bakarwal tribe grazing animals and using forest resources.*

**Table 2.** Average number of livestock per family depending on the forest.

Name of livestock	Average number of livestock		
	Gujjar tribe (total number per family/umba)	Bakarwal tribe (total number per family / Kumba)	Local Villagers (total number per family/ Kumba)
Sheep	More than 50	50-100	10-20
Goats	20-100	100-400	20-50
Buffaloes	7-20	-	3-10
Horses	3-7	20-50	2-5 rarely
Other cattle	10-15	-	2-6



**Plate 3.** Showing declining, clearing of forest and expanding agricultural fields.

### Conclusion

The present study reported a total of 63 plant species belong to 33 families and 51 genera, of all these 63 species, 22 were trees, 11 were shrubs and 30 were herbs. In this area due overgrazing, lopping, and cutting of forest plants in large scale by the tribes and local inhabitants for the expansion of agricultural lands and local settlements outside and inside of the forests, which resulted into the threatening of some plant species.

It is also observed that, Gujjar and Bakarwal tribes are mainly depends on forest products for their live-

lihood, their economy is totally depends on livestock. Due to overgrazing as well as unfavorable environmental conditions, the forest plants and cultural heritage of these tribes is at risk. Therefore, the Govt. and Forest Officer can advised to grow agroforestry based on these forest plants as well as multipurpose plant species within the area for the conservation of forest wealth and cultural heritage of the tribes in the area.

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