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Research Article

DIVERSITY, DISTRIBUTION, NATIVITY AND UTILIZATION PATTERN OF FODDER SPECIES IN WATERSHED *RISSA-KHAD*, H.P. INDIA

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A B S T R A C T

The present study was conducted to understand fodder utilization pattern in Watershed *Rissa-Khad* located in Mandi district of the Himachal Pradesh. Surveys and samplings of the fodder species were conducted throughout the study area between 2010 to2013. The representative villages namely Thankar, Kathogan, Kas, Khadi, Balh, Rissa, Ropri, Samsoh, Balyan, Chail, Janjehal, Gujar, Thauna, Pingla, Alayana etc., were selected at different elevations to generate information on the resource utilization pattern of fodder species. Total 52 woody species (46 Trees and 06 Shrubs) were used as fodder. Species like *Albizzia chinensis, Quercus leucotrichophora*, *Grewia oppositifolia, Bauhinia variegata, Ficus roxburghii, Ficus hispida, Morus alba, Terminalia tomentosa, Prunus cerasoides, Lonicera quinqulocularis, Indigofera atropurpurea, Desmodium elegans* and *Celtis australis* are mostly used as fodder. Utilization pattern, preference, distribution, nativity, mean collection value probavility of use (PU), resource use indices (RUI), of these species were determined.

INTRODUCTION

Forests are deemed to be the green lung of the nation and act as important natural resource for rural livelihood in India, providing variety of products and services. The rural population in most of the developing countries depends mostly on forests mainly for fuel wood and fodder. (Qureshi *et al.,* 2015). With the increasing human population, multifold demand of the forest resources has increased the pressure on the useful plant resources. The unmanaged lopping of the fodder species, reckless felling of trees for timber and fuel, has increased the rate of habitat degradation. Many shade loving species have been disappeared from these degraded forests and hardy and spiny species with low value for the mankind are establishing rapidly (Dhar *et al.,* 1997, and Samant *et al*., 2000, 2006). Such unmanaged activities are changing the whole forest ecosystems gradually (Singh & Singh, 1992). Due to unplanned exploitation fodder resources, there is a detrimental impact on the forests which results in deforestation, erratic rainfall, soil erosion, loss of habitat, loss of biodiversity making forest resources scarce. Such trends of biodiversity necessitate initiating studies on assessment and monitoring of biodiversity in Himachal Pradesh. Significant study on fodder plant species in Himalayan states of India has been conducted by various workers (Samant *et al*., 2007, Chettri and Sharma 2009: Singh and Sundriyal 2009: Dhyani *et al* 2011, Dhanai *et al.,*2014, Qureshi *et al.,*2015, Gaikwad *et al*., 2017). Such studies are not available for the *Rissa-Khad* Watershed. Therefore, the present study has been conducted on the *Rissa-Khad* watershed to assess the Diversity, Distribution, Utilization Pattern and Prioritization of Fodder Species for Conservation

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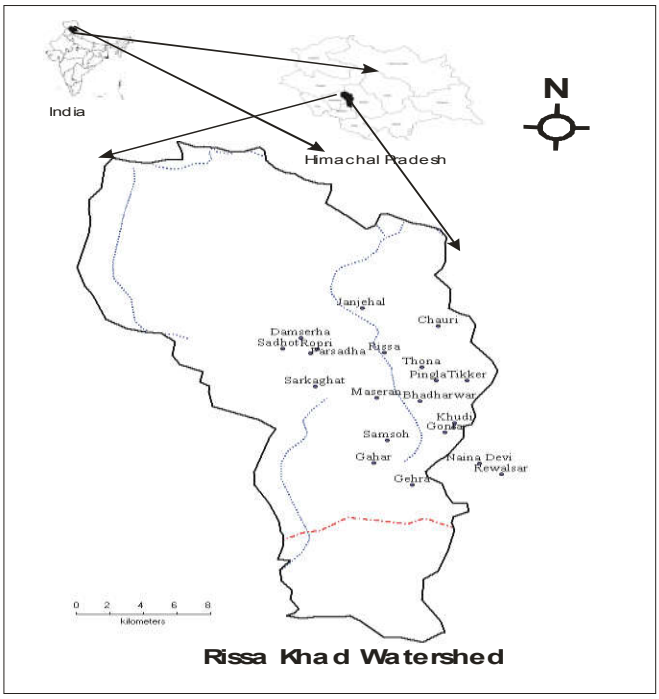
METHOD

Study area and trend of collection

The *Rissa khad* watershed is located in Mandi district of the Himachal Pradesh. It covers approximately 123.07 Km2 area representing 20 panchyats and 132 villages. The altitude of the watershed ranges from 700-2051m. Climatically, the area faces three main seasons, i.e., winter, summer and rainy. The watershed represents the mid Himalayan zone. The study area supports diverse habitats, species, communities and Ecosystems. The vegetation mainly comprises of subtropical and temperate types mostly dominated by broad leaved deciduous, evergreen coniferous species. The watershed is inhabited by a large number of villages with 11,258 household and 33,458 human populations. The total livestock population is 11,214. The inhabitants are dependent on floristic diversity for their sustenance. They used plant diversity in various forms *i.e.,* medicine, wild edible/food, fodder, fuel, timber, making agricultural tools and various other purposes (Samant & Dhar, 1997). The increasing human and livestock population and decrease in floristic diversity have created imbalance in the ecosystem of the Watershed. Therefore, there is a need to assess and prioritise the floristic diversity of the watershed. Therefore, that adequate planning for the conservation of

floristic diversity and sustainable development of the watershed could be done.



During the surveys, it was observed that fuel collection was usually done from mid September to March every year whereas fodder collection was done in mid December to March and August to October and stored for the lean period. Based on these observations, we assumed that the inhabitants collect fuel and fodder for about 120 and 70 days, respectively, and considered as total collection days (TCD). Interview with the local people in each village revealed that on an average two persons per day were involved in fuel and fodder collection from each household. They travel about 2-5 km to collect fuel and fodder resources from the village

Site selection, sampling and species identification of fodder Species

In general, surveys and samplings of the fodder species were conducted throughout the study area between 2010 to2013.The representative villages namely Thankar, Kathogan, Kas, Khadi, Balh, Rissa, Ropri, Samsoh, Balyan, Chail, Janjehal, Gujar, Thauna, Pingla, Alayana etc., were selected at different elevations to generate information on the resource utilization pattern of the fodder species.. Surveys were conducted in the identified villages to identify and quantify the fodder resources. The collection of fodder species brought in bundles (*bojha*) to the villages by the inhabitants were assessed and quantified; sixty bojhas, 20 Bojhas in one day, each for f fodder species were sampled in each village for consecutive three days. The species collected in each sample were separated by local names, and weighed using a spring balance. Samples of each species were identified with the help of flora (Collett, 1902; Dhaliwal & Sharma, 1999; Aswal & Mehrotra, 1994, Singh & Rawat, 2000). The list of fuel and fodder species for each village was prepared.

Data Analysis

Suveys of the villages were conducted to identify and quantify the fodder resources. The information generated from different samples was pooled for each village. For each species average quantum collection (kg sample^{-1}day^{-1}, kg household^{-1}day^{-1} and kg household^{-1} year $^{-1}$), Probability of Use (PU) and Resource Use Index (RUI) were calculated following Samant *et al*., 2000b, 2006 as below:

$$\text{Mean collection (kg) of the species (Cy)} = \frac{T}{N}$$

Where T= Total collection of the species in all the samples
N= Number of samples

$$\text{Mean Collection sample}^{-1}\,\text{day}^{-1}\,\text{(Cs)} = \frac{\sum_{i}^{n} \text{ATPR}_i}{\sum_{i}^{n} \text{TPR}_i}$$

where A=mean collection of the species, and TPR_i =total population responsible for collection in the ith village;
Mean collection household^{-1} day^{-1}, Cd=2Cs
Mean collection household^{-1} year^{-1}, Cy=90Cd
Where 90 was the total collection days per year;

$$\text{Probability of Use (PU)} = \frac{\sum_{i}^{n} \text{Fi Pi}}{\sum_{i}^{n} \text{Pi}}$$

Where Fi= Frequency of collection of a species in the i^{th} village

Pi= Population of the i^{th} village
The collection (kg sample^{-1}day^{-1} and kg household^{-1}day^{-1}) and Probability of Use for different villages were pooled and mean values calculated.
Resource Use Index (RUI) = Cy PU
Where Cy = Mean collection household^{-1}year^{-1}and PU = Probability of Use

Diversity, Distribution, Nativity and utilization pattern

Total 52 woody species (46 Trees and 06 Shrubs) were used as fodder. Out of these (11) were native to Himalaya while (5) species were native with extension to surrounding area while (5) species were near endemic and (1) species endemic(Table 2). in the *Rissa-Khad* Watershed. Number of species used in the studied villages in descending order are as follows; in Bhalyan (22 spp.), Rissa (18 spp.), Ropri (17 spp.), Chail (16 spp.), Kaas (15 spp.), Kalar Ropri (14 spp.), Gujar Gehra & Janjehal (13 spp. each), Khadii (12 spp.), Thankar (11 spp.). Species like *Albizzia chinensis, Quercus leucotrichophora*, *Grewia oppositifolia, Bauhinia variegata, Ficus roxburghii, Ficus hispida, Morus alba, Terminalia tomentosa, Prunus cerasoides, Lonicera quinqulocularis, Indigofera atropurpurea, Desmodium elegans* and *Celtis australis* are mostly used as fodder. Use pattern did not vary much with low altitude whereas along the vertical (Elevation) gradient it varied consideravly. At high altitudinal villages like Kaas, Thankar, Gujar Gehra species such as *Quercus leucotrichophora*, *Desmodium elegans, Rhus javanica Euonymus pendulus, Rhododendron arboretum, Salix acmophylla, Populus ciliate, Morus serrata*, *Ulmus wallichiana*, *Rhamnus purpureus* Contributed most to collection, while at low altitudinal villages Janjehal, Chail, Ropri, Rissa species such as *Bauhinia variegate,*

Table 1 Human population statistics and number of fuel and fodder species (trees and shrubs) used in Water-Shed Rissa-Khad

S.N.	Name of Village	A.R. (m)	Latitude	Longitude	Total Population	No. of Household	Population Responsible for Collection	No. of Fodder Species
1.	Janjehal	790	31°45‘14.07"N	76°44‘47.06"E	575	132	200	13
2.	Chail	900	31°43‘33.01"N	76°43‘51.02"E	277	48	98	16
3.	Ropri	1013	31°44‘24.02"N	76°44‘30.04"E	152	24	30	17
4.	Rissa	1150	31°45‘33.06"N	77°47‘26.02"E	323	75	121	18
5.	Kalar Ropri	1230	31°38‘27.06"N	76°45‘54.07"E	142	27	40	14
6.	Bhalyan	1285	31°41‘30.07"N	76°46‘00.07"E	176	39	80	22
7.	Khadii	1340	31°39‘30.07"N	76°46‘20.00"E	499	102	152	12
8.	Gujar Gehra	1400	31°42‘54.04"N	76°44‘47.06"E	330	32	48	13
9	Thankar	1448	31°41‘42.09"N	76°49‘02.09"E	150	30	60	11
10	Kaas	1551	31°37‘27.00"N	76°47‘07.05"E	118	25	42	15

Table 2 Diversity, distribution, utilization pattern, Overall Mean collection value, Provability of use and Recourse Use Index value for fodder species in Water-shed *Rissa-Khad*

Taxa	Pre	L.N.	L.F	A.R. (m)	Nativity	Uses	Mean collection (Kg/HH/Year)	PU	RUI
*Grewia oppostifolia** Roxb. Ex Mast.	1	Beul	700-1700	T	Reg Himal	Fl, T, H,R	1501.6	0.27	453.27
.Albizzia. chinensis Osbeck	2	Oyee	700-1500	T	As Trop Austr	Md,Fl,T Wood packing pupose; T	963.6	0.18	267.88
Bauhinia variegata L	3	Kachnar	700-1400	T	Ind Or Burma China	Md, Ed, Fl, R	825.6	0.17	18.12
Ficus roxburghii Wall.	4	Trayambalu	700-1500	T	As Trop	Md, Ed, Fl, R	565.3	0.12	129.84
Quercus leucotricophora A. Camus	5	Ban	1400-2100	T	Reg Himal	Md Ed, T	459.6	0.1	134.5
Ficus hispida L.	6	Dhaebri	700-1400	T	As et Austr Trop	Md, Ed, Fl	391.2	0.075	119.24
*Pittosporum eriocarpum*** Royle	7	Thira	700-1700	T	Reg Himal	Md	288.8	0.06	79.5
Dendrocalamus strictus Nees	8	Bans	700-1400	T	Ind Or	Md ,Ed,T, R	202.8	0.045	23.52
Bombax ceiba L.	9	Sembal	700-1500	T	Amer Austr	Md, Ed, R, Fl	194.4	0.055	30.78
Morus alba L.	10	Shtoot	700-1400	T	As Temp	Md, Ed, T	170.4	0.05	29.82
Grewia elastica L	11	Pharsa	700-1700	T	Ind Or	Fl, T	170.8	0.06	39.96
Prunus cerasoides Don	12	Pajja	700-1700	T	Reg Himal	Md,Ed,Rl,Fl	148.8	0.04	15.06
Boehmeria platyphylla D.Don	13	Chamarala	700-1700	Sh	As et Afr Trop Pacif	Md, T	137.4	0.06	20.76
Terminalia tomentosa (Roxb.) Wt. & Arn.)	14	Alshahan	700-1200	T	Bras	Fl	136.8	0.05	23.16
Acacia catechu (L.f.) Willd.	15	Khair	700-1700	T	Ind Or	Md,Fl.	122.4	0.05	20.58
Butea monosperma (Lamk.) Taub.	16	Palas Dhak	700-1400	T	Ind Or Burma	Md, Ed, R,T	114	0.04	14.36
Cordia dichotoma ***Frost.***	17	Lasora	700-1700	T	As Trop Auster	Md, Ed, Fl	100.8	0.015	13.14
Ficus lacor	18	Plakhre	700-1200	T	Ind Or	R, Fl	99.6	0.035	8.94
Debregeasia longifolia Wedd.	19	Shyaaru	700-1400	T	Ind Or	Md,Ed,T, Fl	96.6	0.045	11.58
Indigofera atropurpurea DC.	20	Kathi	700-1600	Sh	Afr Trop	Fl	93.6	0.045	14.46
Celtis australis DC.	21	Kharik	700-1700	T	Europe As Temp Ind Or	Md, Ed, Fl .	90	0.02	7.74
*Euonymus pendulus** Wall.	22	Charmadae	1700-2100	T	Reg Himal	Fl,H,Cosmatic	84.8	0.03	9.48
Rhododendron arboreum Sm.	23	Burans	1500-2100	T	Reg Himal India Or Zeylan	Md, Ed, R,Fl	84	0.025	10.8
Debregeasia salicifolia (D.Don) Rendl.	24	Shyaaru	1500-1900	T	Ind Or	Md, Ed, T, Fl	82.8	0.025	10.92
Pistacia integerrima Bin *8976*.	25	Kakarsingi	700-1400	T	Reg Himal Aegypt Persia	Md, Fl, H (CrafT & Toyes)	73.2	0.025	9.18
Salix acmophylla Boiss.	26	Bhains	1700-2000	T	Orins Ind Or	Fl,T, STicks	73.2	0.03	8.64
Syzygium cuminii (L.) Skeels	27	Jamun	700-1600	T	As et Austr Trop	Md, Ed, Fl, T, R	69.6	0.02	7.56
Emblica officinalis L.	28	Amala	700-1600	T	As Trop	Md, Ed, R	68.4	0.035	12.54
Dalbergia sissoo Roxb.	29	Sihn	700-1400	T	Ind Or Afghan	Md, Fl, T, Construction; T	67.2	0.045	15.36
Quercus glauca Thunb.	30	Bani	800-1800	T	Reg Himal Japon	Fl, T,Ag	66	0.02	9.9
Acer oblongum Wall. ex DC.	31	Parange	T	900-1100	Reg Himal	Fd, Ag,T	64.8	0.03	9.73
*Cinnamomum tamala** L.	32	Tejpata, meethapata	700-1400	T	Reg Himal	Md, Ed	61.2	0.035	7.98
Spondias pennata Willd.	33	Ambara	700-1200	T	As Trop	Md, Ed, Fl	54	0.016	7.26
Terminalia arjuna (Roxb.ex DC.) Wt.& Arn.	34	Haryan	700-1000	T	Ind Or	Md,R,Fl	46.8	0.015	3.72
Terminalia bellirica (Gaertn.) Roxb.	35	Behera	700-1200	T	Ind Or Malaya	Md, Ed	45.6	0.02	4.56
Albizzia lebbeck (L.) Willd.	36	Siris	700-1200	T	Geront Trop	Md,Ed,R,Fl, T	43.2	0.025	5.64
Litsea monopetala (Roxb.)Pers.	37	Gwanyu	700-1400	T	Ind Or Malaya	Md, Ed,Fl	43.2	0.025	5.46
Mallotus philippensis Muell. -Arg.	38	Kambhal	700-1200	T	As et Austr Trop	Md, Fl, T ,Red dye,H	43.2	0.025	3.96
Woodfordia fruticosa (L.) Kurz	39	Dhoth	700-1400	Sh	As et Afr Trop	Md	38.4	0.03	5.76
Phoenix sylvestris Roxb.	40	Khajara	700-1200	T	Ind Or	Md, Ed	36	0.015	2.94
Populus ciliata Wall.	41	Popular	1700-2000	T	Reg Himal	Md T,Pulp paper,Plywood	34	0.01	2.4
Morus serrata Roxb.	42	Chemu	1500-2000	T	Reg Himal	Ed, T	26	0.01	2.04
Pterocarpus marsupium Roxb.	43	Laxmi pata	700-1200	T	Ind Or Arab	Md, R, H (Various pupose)	25.2	0.02	2.52
Ulmus wallichiana Planch.*	44	Mairu	1000-1800	T	Reg Himal	Md,Fl	25.1	0.02	2.41

Desmodium elegans DC.	45		1400-2150	Sh	Reg Himal China	Fl	21.6	0.015	3.24
Viburnum continifolium Wall. ex CI.	46	Ghenu	1600-2100	T	Ind Or	Md,Ed, Fl	19.2	0.01	1.92
*Rhamnus purpureus** Edgew.	47	Ghabadadha	1200-200	Sh	Reg Himal	Md T,Ag	19.2	0.01	1.92
Glochidion velutinum Juss	48	Sama	700-1600	T	Ind Or Malaya	Md, Fl	18	0.01	1.8
Flacourtia indica (Burm.f.) Merr.	49	Kangu	700-1700	T	Ind Or Malaya Madag	Md, Ed Fl	16.8	0.01	1.68
Rhus javanica L.	50	Sohma	1500-2100	Sh	Reg Himal Ins Sandv	Md, Ed Fl	13.2	0.01	1.32
Ficus semicordata Buch. - Ham.ex Sm	51	Khaina	700-1500	T	Ins Selebes	Md,Ed	8.28	0.01	0.01
Ficus. palmata Forsk.	52	Phaegda	700-1700	T	Afr Trop Arab Ind Or	Md,Ed	6.84	0.03	0.03

Abbreviations used: Pre=Preference, L.N.=Local name, L.F.= Life form, A.R.= altitudinal range,PU= probavility of use, RUI =resource use indices, T=Tree; Sh=Shrub; Reg Himal= Himalayan region; As=Asia; Trop= Tropical; Ind Or=Indian Oriental; Amer= America; Trop=Tropical. Md=Medicinal, Fd=Fodder, Ed=Edible =Religious, H=Household, T=Timber, Fib=Fibre, Ag= Agricultural Tool*=Near Endemic; **=Endemic

Ficus hispida, Dendrocalamus strictus, Morus alba, Terminalia tomentosa , *Butea monosperma, Debregeasia longifolia, Pistacia integerrima, Dalbergia sissoo, Acer oblongum, Terminalia arjuna, Albizzia lebbeck*, *Litsea monopetala* were used and remaing species such as *Albizzia chinensis*, *Grewia oppostifolia, Bauhinia variegata*, *Grewia elastica, Indigofera atropurpurea and Quercus glauca* Contributed most to collection at mid elevational villages Kalar Ropri, Bhalyan and Khadii (Table1, 2). Utilization pattern, preference, distribution, nativity, mean collection value probavility of use (PU), resource use indices (RUI), of these species were determined (Table 2)

Mean collection rate

Overall, average collection of the fodder species ranged from 6.84-1501.6 kg household^{-1} year^{-1}, it was highest for *Grwia opposinifolia* (1501.6 kg household^{-1} year^{-1}), followed by *Albizzia chinensis* (963.6 kg household^{-1} year^{-1}), *Bauhinia variegata* (825 kg household^{-1} year^{-1}) and *Ficus roxburghii* (565.0 kg household^{-1} year^{-1}).

Probability of Use (PU)

Overall, PU ranged from 0.01-0.27, it was highest for *Grewia oppositifolia* (0.27), followed by *Albizzia chinensis* (0.18), *Bauhinia variegata* (0.17), *Ficus roxburghii* (0.12, each), and *Quercus leucotrichophora* (0.10, each). The remaining species showed < 0.10 PU.

Resource Use Index (RUI)

Overall, RUI ranged from 0.03-453.27. It was highest for *Grewia oppositifolia* (453.27), followed by *Albizzia chinensis* (267.88), *Quercus leucotrichophora* (134.5) and *Ficus roxburghii* (129.84). The remaining species showed < 129.84 RUI.

High PU of *Albizia chinensis*, *Grewia oppositifolia, Pyrus pashia, Bauhinia variegata, Quercus leucotrichophora and Toona ciliate* and RUI of *Albizia chinensis, Pinus roxburghii, Grewia oppositifolia and Quercua leucotrichophora* among fuel species and high PU of *Grewia oppositifolia, Albizia chinensis, Bauhinia variegate, Ficus roxburghii;* and *Quercus leucotrichophora* and RUL of *Grewia oppositifolia, Albizia chinensis; Quercus leucotrichophora* and *Ficus roxbughii* among the fodder species showed high demand and pressures. Population assessment of these species is essentially required for developing appropriate strategy for conservation.

CONCLUSION

Fodder tree and shrubs have always played a role in feeding livestock and are increasingly recognized as important component of animal feeding (Gaikwad *et al*.2017)

The broad-leaved species of the watershed were mostly lopped for fodder and felled for fuel and timber. This has caused the loss of forest area (Singh *et al*. 1998). It has been observed that due to unplanned collection of the resources, ecology of the forests has been seriously affected. Also, it can influence vegetation by altering its composition and structure (Briske & Richards, 1995,). Similar problems are also prevalent in the *Rissakhad Watershed***.** Therefore, adequate conservation measures have to be taken to maintain current status of the habitats of economically important floristic diversity for effective management of the *Rissakhad* Watershed.

Awareness among the villagers need to be created for the collection techniques so that sustainable utilization of the economically important floristic diversity could be done by the inhabitants. Further, the degraded forests may be re-established through plantations of the seedlings of multipupose tree species particularly species preferred for fuel, fodder, and timber with the participation of local inhabitants.

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References

Aswal, B.S. and Mehrotra, B.N.(1994). *Flora of Lahaul-Spiti.(A Cold Desert in North-West Himalayas).* Bishen Singh Mahendra Pal Singh, Dehradun.

Briske, D. and Richards, J. (1995) Plant responses to defoliation: A physiological, morphological and demog-raphic evaluation, Wildland Plants: Physiological Ecology and Developmental Biology, Society for Range Management, Denver.

Chettri N., and Sharma, E.A. (2009) Scientific assessment of traditional knowledge on firewood and fodder values in Sikkim, India. *Forest Ecology and Management. 257: 2073-2078*

Collett, H. (1902). *Flora Simlensis*.Thacker Spink & Co Calcutta and Simla, Reprinted 1971. Bishen Singh Mahendra Pal Singh, Dehradun.

Dhaliwal, D.S. & Sharma, M.(1999). *Flora of Kullu District* (*Himachal Pradesh*). Bishen Singh Mahendra Pal Singh, Dehradun.

Dhyani, S., Maikhuri, R.K., and Dhyani, D. (2011).Energy budget of fodder harvesting pattern along the altitudinal

gradient in Garhwal Himalaya, India. *Biomass and Bioenergy*. 35:1823-1 832

Dhanai R, Negi RS, Parmar MK, Singh S (2014) Fuel wood & Fodder Consumption Pattern in Uttarakhand Himalayan Watershed. *International Journal of Environmental Biology 4: 35-40.*

Dhar,U., Rawal, R.S. and Samant, S.S. (1997). Structural diversity and representativeness of forest vegetation in a protected area of Kumaun Himalaya, India.*Implications for conservation.Biod. & Cons.,* 6: 1045-1062.

Gaikwad, U S., Pawar, A B., Kadlag, A D.(2017) Nutritional Status of Fodder Tree Leaves and Shrubs of Scarcity Zone of Maharashtra *Advances in Life Sciences p-ISSN: 2163-1387 e-ISSN: 2163-1395*

Qureshi S, Akhter S, Mahaviya P.(2015) Resource Utilization Pattern with Special Reference to Fodder and Fuel in Village Shahdarah Sharief,District Rajouri (J&K),*Curr World Environ 2015:10(1)*

Rankoana, S.A.(2016), Sustainable Use and Management of Indigenous Plant Resources: A Case of Mantheding Community in Limpopo Province, South Africa *Sustainability 2016, 8, 221*

Samant, S.S.(1998).Diversity, distribution and conservation of fodder resource of west Himalaya, India. In: B. Misri (ed.), *Proceedings of the Third Temperate Pasture and Fodder Network (TAPAFON)*, Pokhra, Nepal,9-13 March, 1998, sponsored by F.A.O. Rome. pp. 109-128.

Samant, S.S. and Dhar, U.(1997). Diversity, endemism and economic potential of wild edible plants of Indian Himalaya. *International Journal of Sustainable Development and World Ecology*, 4: 179-191

Samant, S.S. and Pant, S.(2003). Diversity, distribution pattern and traditional Knowledge of sacred plants of Indian Himalayan Region. *Indian Journal of Forestry,* 26(3): 201-213.

Samant, S.S. and Joshi, H.C.(2004). Floristicdiversity, community patterns and changes of vegetation in Nanda Devi National Park. In: *Biodiversity Monitoring Expedition Nanda Devi 2003*. Bishen Singh Mahendra Pal Singh, Dehradun.

Samant, S. S., Dhar, U. and Rawal, R. S.(1998b). Biodiversity status of a Protected area of West Himalaya: Askot Wildlife Sanctuary. *Int. J. Sustain. Dev. World Ecol.,* 5: 192-203.

Samant, S.S., Dhar, U. and Rawal, R.S. (2000b). Assessment of Fuel resource diversity and utilization patterns in Askot Wildlife Sanctuary in Kumaon Himalaya, India, for conservation and management. *Environment Conservation,* 27(1): 5-13.

Samant, S.S., Rawal, R.S. and Dhar, U.(2006). Diversity, extraction, and status of fodder species in Askot Wildlife Sanctuary, West Himalaya, India.*Int. J. Biod. Sci. Manag*., 2:29-42.

Shah, S.I. (1982). Agriculture degradation and future of agriculture in Himalaya. *Indian Journal of Agriculture Economics* 37(1):1-22

Singh,J.S. and Singh, S.P. (1992). *Forest of Himalaya: Structure, Functioning and Impact of Man*. Gyanodya Prakashan, Nain

Singh, N., and Sundriyal, R.C. (2009). Fuelwood, fodder consumption and deficit pattern in Central Himalayan village. *Nature and Science. 7: 85-88*

SinghJS, Singh SP, Ram J(1998) Fodder and fuelwood resources of central Himalayan. Problems and Solutions. Report Submitted for Study Group on Fueland Fodder, Planning Commission, Government of India, New Delhi.

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