



Plant Archives

Journal home page: www.plantarchives.org

DOI Url: <https://doi.org/10.51470/PLANTARCHIVES.2021.v21.no1.181>

STUDY OF FODDER PLANTS IN RAMNAGAR OF NAINITAL DISTRICT IN UTTARAKHAND INDIA

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(Date of Receiving-22-01-2021; Date of Acceptance-04-04-2021)

ABSTRACT

India, has a broad spectrum of eco-climate ranging from humid temperate to alpine and tropical to semi-arid, which possess a wide range of genetic diversity in forage resource *i.e.*, in form of grasses, legumes, trees, crop plants etc. Uttarakhand is well endowed with a variety of livestock along with the hallmark of large population and low productivity of livestock in the state. In hills of Uttarakhand, the major sources of forage are forests and pasture grassland, crop residue and cultivated fodder. The production and availability of green fodder is not uniform throughout the year. The contribution of leaves as forage, produced from forest trees, forest bushes and herbaceous plants is remarkable. During present study, a total of 34 species of non-cultivated plants, belonging to 26 genera of 17 families have been documented as fodder plant and Poaceae is the dominant family of fodder.

Keywords: non-cultivated fodder, grasses, browse, palatability.

INTRODUCTION

Fodder is an agricultural term for animal feed and non-cultivated fodder trees and shrubs are those plants (shoots or sprouts, especially tender twigs and stems of woody plants with their leaves, flowers, fruits or pods) that occurring naturally and do not have to be planted, used and managed to feed livestock. Fodder and shrub are important component of ruminant diet and they have been found to play an important role in the nutrition of grazing animals in areas where few or no alternatives are available (Chander & Kumar, 2018; Chettri & Sharma, 2009; R. V Singh, 1982). The earlier studies reveals that browses have multiple roles in farming systems such as fodder and veterinary medicines (Luseba & Van Der Merwe, 2006). In Uttarakhand, forests and other uncultivated lands play a key role in the livelihood system of hills, as they provide firewood, fodder (in form of grazing fields and forage) for livestock and agricultural implements and a variety of medicinal plants and other non-timber forest produce for local consumption (Nautiyal *et al.*, 2017). As a major source of animal feeds, fodder trees and shrubs are highly valued by farmers, in order to provide the nutritional needs. These forage species contain appreciable amounts of nutrients that are deficient in other feed resources such as grasses during dry seasons and dry periods (Vishnu Sankar, Prince George, 2013). Most browse plants have high crude protein content, ranging from 10% to more than 25% on a dry matter basis (Moleele, 1998).

On the potential of trees for green fodder some notable contributions have been made including Nautiyal *et al.*, (2017), Nunes *et al.*, (2015) V. Singh *et al.*, (2008). During present study, attempts have been made to enlist the non-cultivated fodder plant species which are commonly used for cattle, with the concept of better utilization of forage in livestock feeding growing in the area.

The present study was carried out in Bhalon and its nearby

villages, situated in Nainital district in Uttarakhand. Bhalon is the hilly village of Ramnagar block in Nainital. The study area lies between latitude and longitude of 29.05° N and 79.05° covering an area of 10 km². Bhalon has 6 small villages having an urban area, and agriculture and livestock mainstay of the peoples surrounded by forests consists of rich diversity of plant species.

MATERIAL AND METHODS

The present study was carried out during April, 2014-March, 2015. Fortnightly visits were made to different villages or cattle farmyards of the study area for collecting information about non cultivated fodder plant species used as fodder. Seasonal tours were made at bimonthly intervals to various localities of the village for collecting the tree fodder species. During the present study, semi-structured interviews, guided questionnaires and direct observations of the respondent of the study area were followed to collect the data. A questionnaire consisting of a mixture of open and close ended questions in face-to-face interviews with the aim to determine types of livestock and the plant species grazed by the cattle and perceptions about fodder availability. Interviews were conducted in the regional language (Kumauni) and were supplemented by direct observations.

RESULT AND DISCUSSION

A total of 34 species of non-cultivated plants, belonging to 26 genera of 17 families have been identified and documented as fodder plant. Poaceae has appeared to be the dominant family with 8 species of fodder grasses, followed by Moraceae with 7 species and Caesalpiniaceae with 3 species (Table-1). Trees and shrubs provide fodder which is of great importance during period of nutritional stress in the dry season when the nutritional value of dormant grasses and forbs is low. During the rainy season (Jun-Sept) the stall-feeding crossbred cattle are fed mostly with green grasses as they are rich in nutrients along with

Table 1: Diversity of fodder plants.

S.No.	Botanical Name	Family	Native Name	Habit	Use
1.	<i>Prunus cornuta</i> (Wall. ex Royle) Steud.	Rosaceae	Jaman	T	A medium sized tree is lopped only in scarcity for goat and sheep.
2.	<i>Bauhinia vahlii</i> (Wt. &Arn.) Benth.	Caeselpinaceae	Malu	Sh.	A woody climber mostly browsed by sheep.
3.	<i>Bauhinia variegata</i> L.	Caeselpinaceae	Queral	T	A tree leaves lopped for fodder.
4.	<i>Cassia occidentalis</i> L.	Caeselpinaceae	Banar	H	Usually browse by goat.
5.	<i>Flemingia fruticulose</i> Benth.	Papilionaceae	Bhatula	Sh.	Leaves are fed to cattle.
6.	<i>Quercusleuco trichophora</i> A. Camus	Fagaceae	Banj	T	Used the twig after lopping for fodder for the cattle.
7.	<i>Ficus palmata</i> Forsk.	Moraceae	Bedu	T	Trees are lopped for fodder.
8.	<i>Ficus roxburghii</i> Wall.	Moraceae	Timila	T	Trees are lopped for fodder purposes during the time of scarcity
9.	<i>Ficus nemoralis</i> Wall. ex. Miq.	Moraceae	Dudhila	T	Trees are lopped for fodder.
10.	<i>Moras alba</i> L.	Moraceae	Shahtut	T	Trees are lopped for fodder purposes during the time of scarcity
11.	<i>Moras serrate</i> Roxb.	Moraceae	Kemu	T	Trees are lopped for fodder.
12.	<i>Ficus faveolate</i> Zipp.exMiq.	Moraceae	Pilkhan	Sh.	Trees are lopped for fodder purposes during the time of scarcity.
13.	<i>Ficus hederaceae</i> Roxb.	Moraceae	Beduli	H	Leaves are fed to cattle.
14.	<i>Girardinia heterophylla</i> (Vahl) Decne.	Urticaceae	Dansh-Kandeli	T	Leaves and twigs are used as fodder.
15.	<i>Boehmeria rugulosa</i> Wedd.	Urticaceae	Gheti	T	Leaves are fed to cattle.
16.	<i>Grewia optiva</i> Drumm ex Burret	Tiliaceae	Bheemal	T	A medium sized tree, which are highly exploited as the winter approaches, for the fodder purposes.
17.	<i>Reinwardtia indica</i> Dumort.	Linaceae	Piuli	Sh.	Leaves are fed to cattle.
18.	<i>Excaecaria acerifolia</i> Didr.	Euphorbiaceae	Dudhila	Sh.	Young twigs are browsed by goats and sheep.
19.	<i>Melia azedarach</i> L.	Meliaceae	Vitain	T	A medium sized tree are used for fodder, young twigs cause damage to the cattle and also bitter in taste.
20.	<i>Buddleja paniculate</i> Wall.	Loganiaceae	Phurpattiya	Sh.	Young twigs are browsed by goats and sheep.
21.	<i>Berberis aristate</i> DC.	Berberidaceae	Kilmora	Sh.	Usually browse by goat.
22.	<i>Achyranthes aspera</i> L.	Amaranthaceae	Apamar	H	Leaves are fed to cattle.
23.	<i>Lagerstroemia parviflora</i> Roxb.	Lythraceae	Dhora/ Dhaura	T	Young branches used as fodder.
24.	<i>Ageratum conyzoides</i> L.	Asteraceae	Aalua	H	Whole plant is used as forage.
25.	<i>Strobilanthus tomentosa</i> (Nees) J.R.I. Wood	Acanthaceae	Jamila	H	Leaves are used as fodder during the time of scarcity.
26.	<i>Bothriochloa pertusa</i> (L) A. Camus	Poaceae	Jargi	H	Leaves are used as fodder during the time of scarcity.
27.	<i>Chrysopogon gryllus</i> (L) Trin.	Poaceae	Lamguchii	H	Leaves are used as fodder during the time of scarcity.
28.	<i>Chrysopogon fulvus</i> (Spreng.) Chiov.	Poaceae	Godia	H	Leaves are used as fodder during the time of scarcity.

Continue... Table 1

29.	<i>Heteropogon contortus</i> (L.) <i>Beauv. ex Roem. &Schult.</i>	Poaceae	Kumaria	H	Leaves are used as fodder during the time of scarcity.
30.	<i>Imperata cylindrica</i> (L.) <i>P.Beauv</i>	Poaceae	Siru	H	Leaves are used as fodder during the time of scarcity.
31.	<i>Pennisetum orientale</i> Rich.	Poaceae	Bhimalsa	H	Leaves are used as fodder during the time of scarcity.
32.	<i>Saccharum spontaneum</i> L.	Poaceae	Kans	H	During summer leaves are used as fodder.
33.	<i>Saccharum bengalense</i> Retz.	Poaceae	Manju	H	Leaves are used as fodder during the time of scarcity.
34.	<i>Chrysopogon zizanioides</i> (L.) <i>Roberty</i>	Poaceae	Khas	H	Leaves are used as fodder during the time of scarcity.

*T= Tree; H= Herb; Sh = Shrub



Figure. 1: Map of the study area (Source: <https://paintmaps.com/map-charts/269c/Uttarakhand-map-chart>& <http://www.nainitaltourism.com/maps.html>)

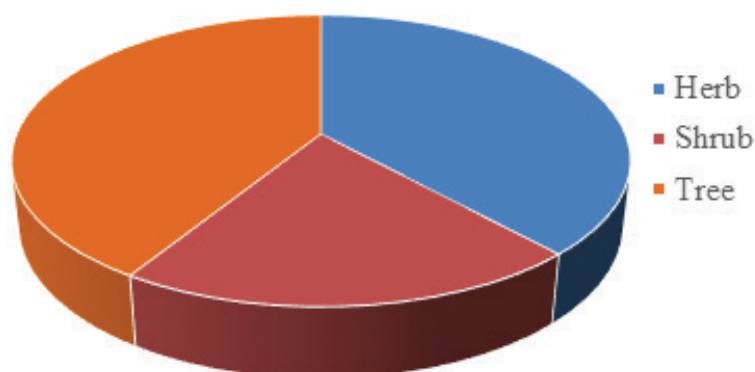


Fig. 2: Habitat based diversity of fodder plant

the usual concentrates. But during lean period (Oct-March) the cereal straw and dry grasses perhaps being very poor in protein content are supplemented with other green fodder of high nutrient value and this is generally met by the use of fodder lopped from a long number of tree species. In general, leaves are higher in crude protein (almost twice) than twigs, indicating that livestock have access to nutritious feed. Leaves also contain more crude protein on average than pods but the latter were found with higher organic matter and digestibility. Generally, cattle and goats are grazed during the warmer months and stall fed during the winter months, while buffaloes are stall fed year round. In Uttarakhand, agriculture along with animal husbandry

is still the principal occupation and source of livelihood for over 70% of its population. The potential of trees and shrubs for green fodder production has not been fully appreciated in India except in hilly states, where these are major source of green fodder. The excessive and indiscriminate lopping of some fodder yielding trees and shrubs has resulted in destruction by way of soil erosion and diseases. The fodder trees are particularly important because of usefulness of trees as fodder during drought. Paddy straw and dry grasses being less milk productive, villager usually supplements them with productive nutritious green broad leaves tree fodder due to high content of crude protein, hence, suitable particularly for milk cattle (Abusuwar & Ahmed, 2010; Dhungana *et al.*, 2013). Fodder from 16 plant species are found to be highly palatable, whereas from 11 species are moderately palatable. *Flemingia fruticulosa* have high crude protein (17.12 %), whereas *Saccharum spontaneum* have less crude protein (4.18 %). Majority of species have high crude protein and higher palatability (Mukherjee *et al.*, 2018), which are taken as positive attributes of the fodder trees by the villager. The palatability was noted by discussing with local villager. The main impact of feeding such as fodder during lean period as supplementary item has been observed to have maintained the sustainable production of cattle milk in

Bhalon.

Research, 73(2), 115–122. <https://doi.org/10.4102/ojvr.v73i2.156>**ACKNOWLEDGEMENT**

The authors are thankful to Km. Janki Arya, M.Sc. (Botany) student for providing assistance in questionnaire filling and interviewing the villagers for collection of the data.

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