



AN ECONOMIC ANALYSIS OF IMPORTANT FODDER PLANTS OF HIMACHAL PRADESH

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Abstract: *In the present study an attempt has been made to study economic analysis of important fodder plants of Himachal Pradesh. The present study has been done in district Mandi of Himachal Pradesh. A total number of 30 fodder plants were studied in Sarkaghat area of Distt. Mandi and the socioeconomic impact of these fodder plants have also been studied. The fodder plants studied belongs to the eighteen angiosperm families. The local name of the plant, season of availability, parts used etc. details were also made. It was found after the study that these plants directly or indirectly influence the financial status of people of that particular area. Information was also gathered showing the financial benefit to the families rearing the milch animals. The present study suggests that the fodder plants are the main source of food to the livestock in the hilly areas like Himachal Pradesh. Local people have the knowledge about the fodder plant species and how and when they are used. These fodder plants are well known by indigenous people of that particular area. Semi- structured interviews, local surveys and direct observations were used to collect the data.*

Key words: Fodder plants, seasonal, availability, Livestock, income.

INTRODUCTION:

Agriculture has an impact on overall economic growth in developing economies like India. For the vast majority of individuals in rural areas, it remains their primary source of income. Fodder plants have an impact on the economic situation of individuals in rural areas where livestock is the main source of income, both directly and indirectly. The majority of the population in a hilly state like Himachal Pradesh lives in rural areas, and due to favourable climatic circumstances, a huge variety of fodder plants thrive in the wild as well as cultivated by farmers. The majority of the fodder plants on hand have strong therapeutic properties and help to maintain the animals healthy and disease-free. Livestock farming is an important part of the rural economy. Livestock yield depends upon to a large extent on fodder plants. Most commonly cows, goats, buffaloes, oxen, sheep are reared by the people of Himachal Pradesh. Except in hilly states, where trees and shrubs are a major source of green fodder, the potential of trees and shrubs for green fodder production has not been completely exploited in India. Different fodder-producing trees and bushes grow in different places and trees that are heavily lopped for fodder in one region may not be lopped at all in another region. The consumption of cattle products will continue to rise in the near future as per capita income and urbanisation rise. As a result, the need for feed and fodder for livestock feeding and fattening will rise. There are already signs of livestock production intensification in India; however it is happening at a different rate in different parts of the country. Human population density, urbanisation, and small-scale farms, among other factors, have a favourable and considerable impact on cattle production intensification. Therefore, the knowledge of different fodder plants will definitely help the local people to increase the yield.

OBJECTIVES AND METHODOLOGY:

The specific objectives of the present study are to examine an economic analysis of important fodder plants of Himachal Pradesh. For the present empirical investigation Sarkaghat area of Mandi district has been selected purposively mainly due to the reason that the topography of the area is more or less similar to that of the state of Himachal Pradesh.

Sarkaghat is one of the hilly areas of Mandi district in Himachal Pradesh. The study was carried out in ten villages viz: Behar, Barchwaar, Paplog, Kharoh, Sadhot, Dhanrasi, lathera, kothi, Muker and Lukanu villages of tehsil Sarkaghat. The climate in the study area can be divided into three seasons, cool and relatively dry winter (November to March), warm and dry summer (mid-April to June) and rainy (July to mid-September). The area is hilly covered by Shivalik range and the altitude varies from 450 meters-1,100 meters. Temperature ranges between 2⁰ C to 43⁰ C. The hilly slopes are mostly covered with *Pinus roxburghii* forest. The socio-economic survey of the area was done with local visits and direct observations. Socio-economic status of the study area was very diverse. It offers a tremendous scope to study indigenous traditional knowledge of fodder plants. Survey questionnaire, participatory observations and field visits were conducted.

ANALYSIS AND RESULT:

A total of thirty plant species of fodder plants belonging to eighteen families has been identified (Table 1). The fodder plants were represented by Rutaceae, Teliaceae, Fabaceae, Poaceae, Leguminosae, Chenopodiaceae, Bignoniaceae, Moraceae, Meliaceae, Amaranthaceae, Menispermaceae, Oxalidaceae, Moringaceae, Euphorbiaceae, Myrtaceae, Rosaceae, Rhamnaceae and Cannabinaceae families contribute two plant species each. Local people were benefited directly or indirectly by these fodder plants as most of the fodder plants which are lopped by the local people as fodder, also have great medicinal value and besides enhancing the lactation of milch animals also keeps the livestock healthy. Therefore, local people get more milk from the livestock for sale which improves their financial status on monthly basis and improve their standard of living.

Table 1 Botanical Description and Socio-Economic Importance of Fodder Plants

S.N.	Season	Botanical Name	Botanical Description	Common Name	Socio Economic Importance
1	Winter	<i>Grewia oppositifolia</i>	Belongs to the family Teliaceae, medium sized tree, leaves are petiolate with ovate shape, serrate margins and inflorescence is solitary peduncle and fruit is a drupe.	Beul	It is a medium to large Improve lactation and therefore increases the milk yield of the milch animals. Also known to increases the fat content of the milk. Latex present in the bark also protects the animals from the worm infection.
2	Winter	<i>Bauhinia variegata</i>	Belongs to family Fabaceae, medium sized tree attaining a height of about 15 meter, leaves are petiolate with lamina ovate to circular and inflorescence is racemes.	Karalya, Kachnaar	Provides fodder of good quality to the livestock. Improves the lactation of the milch animals and also improves the digestion.
3	Winter	<i>Celtis australis</i>	Belongs to family Cannabinaceae, is a medium sized tree rough textured, sharply-toothed, ovate-lanceolate, dark green leaves, unisexual or bi-sexual flowers appear in spring (April-May) and fruit is a drupe.	Khirk	Besides improving the lactation, it also reduces the exposure of the animals to the gastrointestinal parasites.
4	Winter	<i>Dendrocalamus hamiltonii</i>	Belongs to family poaceae, 12–15 cm in diameter and growing up to 15–18 m in height aerial roots are present in all nodes. Stem walls are 0.5-1.5 cm thick. Stem sheaths are green when young and turn yellowish brown when mature, inflorescence is spikelet.	Bainjh	Fast growing fodder grass, liked by the animals as fodder and enhances the lactation in milch animals.
5	Winter	<i>Trifolium alexandrinum</i>	Belongs to family Fabaceae, has a shallow taproot, stems are hollow, branching at the base, with alternate leaves bearing 4-5 cm long 2-3 cm broad leaflets. Flowers are yellowish-white and form dense, elliptical clustered heads about 2 cm in diameter. The fruit is a pod containing one single white to purplish-red seed.	Barseem	In scarcity of green and quality fodder trees in the area which results in drastic decrease in milk production it is a very low-cost fodder crop which is very fast growing being cut many times in a single season, also enhances the milk yielding capacity of the milch animals.
6	Winter	<i>Mallotus philippinensis</i>	(Fabaceae)The tree can grow up to 10 m tall. Alternately arranged, ovate or rhombic	Kambal	Besides being a good fodder to the animals, all parts of this tree can be applied externally

			ovate leaves are rusty-velvety. Male and female flowers occur in different trees. Female flowers are borne in lax spike like racemes at the end of branches or in leaf axils. Male flowers occur three together in the axils of small bracts.		to treat parasitic infections of the skin.
7	Winter	Avena sativa	(Poaceae), is an annual crop, culms are 40-180 cm long, leaves are ligulate leaf-blades are 14-40 cm long and 5-15 mm wide.	Joi	The plant is a commonly grown fodder crop which generally improves the lactation in milch animals and also improves the quality of the milk.
8	Summer	Cyanodon dactylon	(Poaceae) is a long lived perennial grass Culms are numerous (8-40), usually prostrate but flowering culms can be erect or geniculated, and may be 10-90 cm high Leaf blades are blue green, 2-20 cm long, and 2-6 mm wide, smooth on the lower surface and somewhat pubescent at the upper one.	Doob grass	Improves cudging and is easily available in large quantity also increases the fat content of the milk.
9	Rainy	Ficus palmata	Belongs to the family moraceae, is a deciduous shrub or much-branched small tree growing up to 5 meter in height, leaves are ovate, broad with reticulate pinnate venation.	Khasra	The plant is used as fodder when other fodder plants are not present in sufficient number.
10	Rainy	Ficus racemose	Belongs to family Moraceae is a deciduous tree up to 30 m high, leaves are simple, alternate, stipulate 12-18 mm long and flowers are unisexual.	Taryamblu	The plant is used as fodder when other fodder plants are not present in sufficient number.
11	Summer	Syzygium cumini	Belongs to the family myrtaceae an evergreen tropical tree. The oblong berries having deep purple to violet colour with pinkish pulp are widely consumed as fruit.	Jamun	Provide fodder of good quality.
12	summer	Chenopodium ambrosoides	Belongs to the family Chenopodiaceae, is a herb, stem is erect, leaves are simple and alternate, oval to obovate.	Bathu	Used as fodder along with other fodder shrubs. Prevent the expulsion of placenta.
13	Winter	Laucaena leucocephala	Belongs to family fabaceae, is a fast growing, evergreen, thornless shrub, reaching a height of 5 meters, leaves are bipinnate bearing numerous leaflets.	Ipil-ipil	Improves the milk quality.
14	Rainy	Tinospora cordifolia	Belongs to family menispermaceae is a climbing shrub with weak and fleshy stem, leaves are heart shaped.	Giloy	Enhances the lactation.
15	Rainy	Cedrella toona	Belongs to family Meliaceae, is a fast growing deciduous tree can grow up to the height of 20-35 meters, leaves are pinnate, leaflets oblique, long petiolate and inflorescence is	toon	Leaves are generally used as fodder at the time of scarcity.

			drooping panicles.		
16	Rainy	Moringa oleifera	Belongs to family Moringaceae, grows in tropical and subtropical regions, tree has an open crown of drooping, fragile branches and the leaves build up a feathery foliage of tripinnate leaves.	Saguna, Sahjan	Yields good quality of fodder with 20-50 percent proteins, tender pods are also fed.
17	Summer	Pyrus pashia	Belongs to the family rosaceae, is a small to medium sized tree with ovate and finely toothed leaves, have attractive white flowers with red anthers.	Kainth	A medium sized tree which is lopped as fodder for the sheep and goats
18	Rainy	Ziziphus mauritiana	Belongs to family Rhamnaceae, is a small sized tree upto 15 meter in height and have many drooping branches.	Ber	A small sized tree browsed by cattle and also lopped for fodder
19	Rainy	Ziziphus oxyphylla	Belongs to family Rhamnaceae, is a small sized tree or shrub; leaves are ovate to lanceolate with cyme inflorescence.	Ber	Small sized shrubs which are browsed by cattle.
20	Winter	Oroxylum indicum	Belongs to family Bignoniaceae, pinnate leaves, petiolate and fruit is a pod.	Arlu	Generally used as a fodder by the local people at the time of scarcity.
21	Rainy	Murraya koenigii	Belongs to family Rutaceae, pinnately compound leaves with 15-25 leaflets is a deciduous aromatic shrub, inflorescence is a terminal panicles and fruit is a sub-globose berry.	Gandelu	Used as a fodder by the locals when other fodder plants are not present in sufficient amount.
22	Summer	Bombax ceiba	Belongs to family Berberidaceae, is a tropical tree and leaves are deciduous in winter, seed is a capsule.	Simbal	During harsh summer leaves of the tree are used as fodder when other fodder trees are not present in sufficient amount
23	Summer	Dalbergia sissoo	Belongs to family Fabaceae, is a medium to large sized tree with 10-15 meter in height, leaves are compound with about five alternate leaflets.	Tali	It is a medium sized tree which is used as a fodder at the time of scarcity.
24	Summer	Ficus religiosa	Belongs to family Moraceae, is a large sized deciduous tree, leaves are simple, alternate, stipulate and flowers are unisexual.	Pipal	Tree is lopped for fodder only at the time of scarcity.
25	Winter	Bambusa arundinacea	Belongs to family Poaceae, culms are erect, culm sheath triangular with spiny hairs, inflorescence is compound pannicles, simple leaves with entire margins.	Bans	Besides being one of most liked fodder by the cattle, it is present in abundance and also enhances the lactation.
26	Summer	Oxalis corniculata	Belongs to family Oxalidaceae, is a small soft herbaceous plant, leaves show alternate venation, have three veinlets, flowers are yellow coloured.	Khatti pili buti	Whole plant is used as fodder.
27	Summer	Ficus benghalensis	Belongs to family Moraceae, is a large sized tree, 20-30 meter in height.	Bar	Tree is lopped as fodder only at the time of scarcity.
28	Summer	Acacia catechu	Belongs to family Mimosaceae, is a deciduous	Khair	Young branches are used as fodder.

			thorny tree with height upto 15 meter, leaves are bipinnate, stipulate and alternate and fruit is a pod.		
29	Summer	Acacia nilotica	Belongs to the family Mimosaceae, is a tree of 2.5-14 meter in height, leaves are compound, fruit is a pod.	Babul	Young branches are lopped as fodder.
30	Rainy	Berberis lycium	Belongs to the family Berberidaceae, is a semi-deciduous shrub upto 3-4 meters in height, leaves are inverted lence shaped and fruit is a berry.	Kashmal	Leaves are used as a fodder to the goats and sheep.

Besides being used as fodder these plants are also used by the local people for treating various diseases.

Bauhinia vareigata: The locals eat flowers and buds in large quantities. Flowers are sweet, cooling, and astringent, and are used to treat blood illnesses such as bronchitis and headaches. The caustic buds are utilised in piles, cough, eye disorders, and liver problems, while the buds and flowers are used as vegetables by locals in the research region throughout flowering season.

Tinospora cordiflora: The plant is highly medicinal and is used to treat asthma, diabetes, dyspepsia, jaundice, and dysentery, among other maladies. It's also useful for treating heart problems, leprosy, and rheumatoid arthritis.

Grewia inaquilis: Rheumatism has been treated with root and bark, and the infusion has been used as a demulcent. On skin outbreaks, the leaves were used. Several therapeutic studies on various parts of this plant, such as the fruits, leaves, and stem, have been conducted.

Bombax ceiba: The plant was tested for analgesic, anthelmintic, anti cancer, antibacterial, antidiabetic, anti-inflammatory, hepatoprotective, immunomodulatory, cardioprotective, antiulcer, anti-diarrheal, antiviral, and hypotensive properties, among other things.

Moringa oleifera: Minerals, vitamins, and other phytochemicals are abundant in the leaves. The leaves' extracts are used to treat malnutrition and to supplement breast milk in breastfeeding mothers. Plant extracts have also been shown to be effective in the treatment of cancer and diabetes.

Toona ciliata: The plant has been used for centuries to treat chronic diarrhoea, leprosy, fever, headaches, blood problems, and ulcers.

Acacia nilotica: The plant's roots are used to treat cancer and tumours; the gum derived from the plant is astringent, emollient, and liver tonic; and the stem bark is used as an antibacterial, antioxidant, and diuretic, among other things.

Oxalis corniculata : The entire plant is high in vitamin C. Anti-inflammatory, anticonvulsant, antifungal, antiulcer, and wound-healing effects are all found in this plant.

Murraya koenigii: The leaves of the plant are used in the creation of curry by the locals. Piles, inflammation, itching, fresh cuts, diarrhoea, and edoema are all treated using plant extracts.

Zizyphus maurtiana: The plant is used to treat coughs, nausea, and headaches, while the fruits are used to treat sickness, burns, and blood bone ailments as a digestive, tonic, and laxative.

Ficus religiosa: Herbal medicines are made from almost every part of this tree, including the leaves, bark, seeds, and fruits. The abundance of bioactive substances in this tree, including as flavonoids, alkaloids, tannins, saponins, and phenols, can be ascribed to its therapeutic properties in healing a wide range of ailments. It is a popular herbal tree because to its antibacterial, anti-diabetic, anticonvulsant, wound healing, anti-inflammatory, and analgesic effects.

Syzygium cumini: The fruits are used as a tonic in general. They are used as a liver tonic and blood enrichment. They function as an astringent and strengthen teeth and gums. Fruit vinegar has a tonic effect. It is beneficial in the treatment of spleen illness. The fruits are high in iron, which is used as a treatment for heart disease.

Celtis australis: Cuts and wounds are treated using a paste made from young roots and branches.

Berberis lyciem: People use various components of the plant as medicinal or food, including the root, bark, stem, leaves, and fruits. This plant is also well-known for its medicinal potential in Ayurvedic medicines. The plant is used to treat liver problems, stomach problems, skin problems, coughs, and ophthalmic problems, among other things. The plant's fruits are also high in vitamins, minerals, antioxidants, and anthocyanin, among other nutrients. The locals eat these fruits raw or use them to make juices, jellies, preserves, and other dishes.

Acacia catechu: This plant's extract is used to treat sore throats and diarrhoea, as well as hypertension, dysentery, colitis, gastrointestinal issues, bronchial asthma, cough, leucorrhoea, and leprosy. It's a mouthwash that's used to treat mouth, gum, sore throat, gingivitis, dental, and oral infections.

Ficus benghalensis: *F. benghalensis* leaves are used to treat ulcers, leprosy, fever, and inflammations (Ayurvedic). The milky liquid is an aphrodisiac, tonic, vulnerary, and maturant that can help with piles, nasal problems, and gonorrhoea. The aerial root of Yunani is styptic, syphilis, and biliousness.

Ficus religiosa : It has been used for a variety of diseases affecting the central nervous system, endocrine system, gastrointestinal tract, reproductive system, respiratory system, and infectious problems in Diarrhea, dysentery, and liver inflammation.

Bambusa aurandinacea : The plant's extract was previously utilised in traditional medicine to treat a variety of inflammatory diseases. The leaves, stems, and roots are employed as astringents, laxatives, and diuretics in Ayurveda. Cirrhosis and hard tumours are claimed to be treated using an ointment made from the root. Leprosy, hematenesis, fever, and haemoptysis can all benefit from the leaves. Cough paralytic problems and snake bites are also treated with leaves.

Dalbergia sissoo: It is a folk cure for excoriations, gonorrhoea, and skin disorders. The wood and bark have been described as abortifacient, anthelmintic, and antipyretic in Ayurveda, and a decoction is used in the treatment of gonorrhoea. Antipyretic and analgesic properties are found in the leaves.

Oroxylum indicum : The plant's root bark is astringent to the bowels, cooling, aphrodisiac, tonic, improves appetite, and is used to treat "vata," biliousness, fevers, bronchitis, intestinal worms, vomiting, dysentery, leucoderma, asthma, inflammation, and anal problems. It's used to treat diarrhoea, dysentery, and other gastrointestinal issues.

CONCLUSION:

In the present study it is concluded that the availability of fodder species varied from season to season in the study area. Fodder plants are the main source of food to the livestock in Himachal Pradesh. Seasonal variation was observed in the availability of these plants. In winter season 10 number of species were studied which are used as fodder by the local people. Rainy season of the area have the favorable conditions for the growth of a large number of fodder plants. A large number of grasses and herbaceous plants are used as fodder during this season. In summer season 11 number of plant species were studied which are used as fodder. Socioeconomic analysis was also done by local surveys, field visits and direct observations through interviews of the local people were done showing the financial benefits to the families who are rearing the milch animals and how these fodder plants help them to provide zero cost healthy fodder to their animals.

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