



Documentation, Ethno-botanical and Ethno-medical Survey of Wild Leguminous Plants from Some Areas of District Rajouri, J&K State, India

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Authors' contributions

This work was carried out in collaboration between all authors. Authors NB and NS designed the study, wrote the protocol and the first draft of the manuscript. Authors NB and MJ managed the analyses of the study and performed the statistical analysis. Author SD managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: To explore and collect data about ethno-botanical and ethno-medical uses of wild leguminous plants, growing in three tehsils of district Rajouri.

Study Design: Data about the various wild leguminous plants growing in the study area was gathered from the local people with the help of a self designed questionnaire.

Place and Duration of Study: Three tehsils (Nowshera, Sunderbani and Rajouri) of district Rajouri were visited for complete 2 year i.e. March 2012 to March 2014.

Methodology: Periodic field trips were conducted in rural and mountainous areas of the study area. During these trips, personal interviews were conducted with locals of the study area. These included the nomads (Gujjars and Bakkarwals), livestock rears, elderly community members, traditional healers and practitioners. These people were specifically interviewed for the traditional knowledge about legumes.

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Results: A total of 51 species of family Fabaceae were collected from the study areas. These species cover an altitudinal gradient of 426-1015 masl and are known by different local names. Out of the 51 enlisted legume species, only 43 were found to carry immense ethno-botanical and ethno-medicinal importance.

Conclusion: Legumes are of huge importance to human beings. The plants species enlisted and studied in the present communication represent low priced and regionally available quality nutrition for the local people. Detailed work is needed on the same aspect that will further enhance our understanding about the medicinal and nutritional values of ethno-botanically and ethno-medicinally important plant species of the family Fabaceae.

Keywords: Legumes; ethno-medicinal use; traditional knowledge; documentation.

1. INTRODUCTION

Family Leguminosae now termed as Fabaceae. It is the third largest family of flowering plants following Orchidaceae and Compositae with approximately 730 genera and 19,400 species distributed worldwide [1]. The family is further divisible into three subfamilies- **a)** Mimosoideae with about 80 genera and 3,200 species growing mostly in tropical and warm temperate areas across the globe **b)** Caesalpinioideae with 170 genera and 2,000 species [1], showing cosmopolitan distribution and **c)** Papilionoideae with about 470 genera and 14,000 species again cosmopolitan in distribution. The members of this family are reported to occur in diverse environments including arid, alpine, temperate, tropical and sub-tropical types, but the greatest diversity is found in the tropical and sub-tropical regions [2]. In terms of economic importance Fabaceae. It is the most important family of class Dicotyledoneae [3] whereas in terms of agricultural importance and total production, this family is second to Poaceae (Gramineae) [4,5]. Plants belonging to this family were among the earliest plants to be domesticated by mankind. Many of these form an important part of the human diet since the early ages of agriculture and are still an irreplaceable source of dietary proteins for humans, especially the vegetarian diets of developing countries [6]. One-third of dietary protein and processed vegetable oil is obtained from legumes [7]. Besides proteins, grain of legumes are also an important source of 15 essential minerals, required by the man [6]. Trypsin inhibitors, tannins, phytate, saponins, and oligosaccharides present in the legumes are associated with various health benefits, such as protective effects against cardiovascular diseases, cancers and diabetes [8, 9]. The Scientific community has also recently directed its focus on various antioxidant components such as aminoacids, proteins, trace

elements, and sugars present in the legumes [10 – 21].

Many legume species with different varieties are grown all over the world as an important source of commercial crops. While few of them are still underutilized or unexplored for their enormous benefits. These occur in remote areas and are used by local populations only. In this context, it is important to inventory these species and report their plausible uses. Survey for specific plant groups is thus important. With this aim in mind, we explored the unexplored area of J&K state i.e. Rajouri district for its legume flora and put a record on the diversity of legume flora of the region along with their local uses in the present communication.

2. MATERIALS AND METHODS

District Rajouri lies towards the western part of Jammu division in the foothills of Pirpanjal range and shares its boundaries with district Poonch in North, district Jammu in South, Udhampur in East and Mirpur (Pakistan) in the West, covering an area of 2630 km², lying between 30°50' N to 33°30' N longitude and 74° E to 74°10' E latitude. This area has a wide altitudinal range of 490-4700 m and harbours great floral diversity. The district has seven tehsils namely Rajouri, Darhal, Koteranka, Nowshera, Sunderbani, Thanamandi and Kalakote. The data compiled in the present communication is based on the explorations carried out in the areas of only three tehsils, namely Rajouri, Nowshera and Sunderbani.

Periodic field trips were undertaken for consecutive two years i.e. March 2012 – March 2014 in rural and mountainous areas of the study area (Rajouri, Nowshera and Sunderbani). The habitats explored include forests, meadows, valleys, open grasslands, wetlands, hilly slopes,

roadsides and riverbanks. During the surveys, personal interviews were conducted with local people of the study area. A total of 58 people were interviewed. These included nomads (Gujjars and Bakkarwals), Livestock rearers, elderly community members, traditional healers and practitioners (Table 1). These people were interviewed for the traditional knowledge about legumes and data obtained was then systematically compiled. Trips to distant areas were of 3 to 7 days of duration. Same site was visited again and again in different seasons of the year, so as to raise collections of all seasons of the year. Plant specimens collected in different seasons were identified with the help of the specimens deposited in the Herbarium of Indian Institute of Integrated Medicine (IIIM)

Jammu, Botanical Survey of India (BSI), Dehradun and Herbarium of University of Jammu.

3. RESULTS AND DISCUSSION

A total of 51 legume species were collected and identified from the study area out of which only 43 species were found to be of ethno-botanical and ethno-medicinal importance (Table 2). Whereas the remaining 8 species, for which no record of use was obtained are: (*Crotalaria mysorensis* Roth., *Desmodium giganticum* (L.) DC., *Gueldenstaedtia verna* (Georgi) Boriss, *Lotus corniculatus* L., *Cassia absus* L., *Cassia mimosoides* L., *Uraria picta* (Jacq.) DC. and *Indigofera hebeptala* Ali).

Table 1. Socio demographic characteristics of local inhabitants of the district Rajouri from whom the knowledge about legumes was gathered

S. no.	Characters	Frequency	% age
1.	Sex		
A	Male	36	62.06
B	Female	22	37.93
2.	Educational status		
A	Illiterate	27	46.55
B	Grade 1-5	06	10.34
C	Grade 6-10	04	06.89
D	Grade 11-12	11	18.96
E	Graduates	03	05.17
F	Post-graduates	07	12.07
3.	Age		
A	20-30 years	3	05.17
B	31-40 years	11	18.97
C	41-50 years	09	15.52
D	51-60 years	07	12.07
E	61-70 years	14	24.14
F	71-80 years	08	13.79
G	81-90 years	06	10.34
4.	Source of knowledge		
A	Traditional healers and practitioners.	04	06.89
B	Family members	05	08.62
C	Friends	06	10.34
D	Gujjars	15	25.86
E	Bakkarwals	12	20.69
F	Livestock rearers	09	15.51
G	Elder community members	07	12.06

Males=36, Females=22, Total no. of plants=43

Table 2. List of plant species collected from the study area along with their ethno-botanical and ethno-medicinal uses

S. no.	Name of the plant species	Voucher number	Common name	Local name	Sub-family	Altitude (msl)	Habitat	Habit	Plant parts used	Ethno-botanical and Ethno-medicinal uses
01	<i>Abrus precatorius</i> L.	Nazia JUH*.14317	Indian liquorice	Ratti	Papilionoideae	863	Wild	Shrub	Leaves	The decoction of leaves is used to treat the gastric problems. Leaf paste is applied to skin inflammations in cattles.
02	<i>Argyrolobim roseum</i> (Cambess.) Jaub & Spach	Nazia JUH.14318	Makhan Booti	Hazardan, Bahu Phalli	Papilionoideae	924	Wild	Herb	Seeds	The seeds are consumed in raw form by the children. The seeds are crushed and then taken orally along with butter or cold milk to treat the sexual problems.
03	<i>Astragalus Leucocephalus</i> Bunge	Nazia JUH.14319	-	Pattri	Papilionoideae	1015	Wild	Herb	Leaves and flowers	The leaves and flowers are given to the cattle to treat the cold like condition (commonly known as takku in the area).
04	<i>Atylosia Scarabaeoides</i> (L.) Benth.	Nazia JUH.14320	Wild Kulthi	Sayali	Papilionoideae	796	Wild	Herb	Roots	The roots of the plant are chewed by the rural people and it is considered to be good for their health. These are also used for treating mumps and various other throat infections.
05	<i>Butea monosperma</i> (Lam.) Taub	Nazia JUH.14321	Flame of the Forest	Kaagboot, Kinji	Papilionoideae	825	Wild	Tree	Flowers	Flowers are used for enhanced urination in animals as well as humans, for treating throat problems in horses. It is a belief of the local inhabitants that when flowers are tied on the throat, the animals get rid of throat problems.
06	<i>Caragana gerardiana</i> Royle ex Benth.	Nazia JUH.14322	-	Pattaki	Papilionoideae	946	Wild	Shrub	Pods	The pods of this plant are finely powdered, mixed with oil, made into a paste and applied on the boils, burns and swellings to treat them.
07	<i>Crotalaria medicaginea</i> Lam.	Nazia JUH.14323	Trefoil Rattlepod	Kuuchni	Papilionoideae	985	Wild	Herb	Whole plant	The whole plant is used as a scrubber in order to wash the utensils by the rural people.
08	<i>Crotalaria mysorensis</i> Roth.	Nazia JUH.14324	Siberian Pea shrub	Chitryavalli	Papilionoideae	912	Wild	Herb	Whole plant	The plant is used as a forage crop. The seeds are boiled and given to the cattle for enhanced urination. The fresh green leaves are well crushed, made into a paste and taken orally in order to treat the gastric problems.
09	<i>Dalbergia sissoo</i> (Roxb.)	Nazia JUH.14326	Mysore Rattlepod	Shisham, Talli	Papilionoideae	503	Wild	Tree	Bark, wood and	The wood is used on a large scale for making furniture and is considered to be an excellent

S. no.	Name of the plant species	Voucher number	Common name	Local name	Sub-family	Altitude (msl)	Habitat	Habit	Plant parts used	Ethno-botanical and Ethno-medicinal uses
									leaves	timber. The bark is finely powdered and made into a paste to treat the skin diseases. The oil obtained from its wood is used to treat the diseases caused by ringworms and also to treat the deep cracks in the skin. The leaves are boiled in water and the juice thus obtained is used to prevent the hair fall as well as to reduce the formation of white hairs. The branches are used for making ordinary fences around the agricultural fields.
10	<i>Desmodium laxiflorum</i> DC.	Nazia JUH.14328	Linear-leaved Tick-trefoil	Baboorikuuchni	Papilionoideae	945	Wild	Herb	Whole plant	Whole plant is used by the tribal people to wash the milk pots.
11	<i>Desmodium triflorum</i> (L.) DC.	Nazia JUH.14329	3-flowered Beggar Weed	Jangli methi	Papilionoideae	922	Wild	Herb	Whole plant	The whole plant is used as a fodder. Leaves and tender twigs are also cooked as a vegetable in some parts of the study area.
12	<i>Eriosema himalaicum</i> H. Ohashi	Nazia JUH.14330	Chinese bush Carrot	-	Papilionoideae	986	Wild	Herb	Whole plant	Whole plant act as a forage crop.
13	<i>Indigofera heterantha</i> Wall.	Nazia JUH.14333	Cool Indigo	Kathi	Papilionoideae	936	Wild	Shrub	Whole plant	Whole plant is used as a fuel. The flower buds and flowers are boiled and cooked as a vegetable. The branches are used for making brooms.
14	<i>Indigofera linifolia</i> (L.f.)	Nazia JUH.14334	Pandhar phali	-	Papilionoideae	994	Wild	Herb	Whole plant	Whole plant is used as a scrubber to wash the utensils.
15	<i>Indigofera tinctoria</i> L.	Nazia JUH.14335	Nili	Kathi	Papilionoideae	885	Wild	Shrub	Flower buds, flowers and leaves	The flower buds and flowers are boiled, cooked and used as a vegetable. Goats and sheep also feed on its leaves.
16	<i>Lathyrus aphaca</i>	Nazia	Yellow	Bandkla, Jangli	Papilionoideae	847	Wild	Herb	Leaves	The leaves are cooked as a vegetable. The

S. no.	Name of the plant species	Voucher number	Common name	Local name	Sub-family	Altitude (msl)	Habitat	Habit	Plant parts used	Ethno-botanical and Ethno-medicinal uses
	L.	JUH.14336	vetchling	matter					and seeds	seeds are consumed as a pulse.
17	<i>Lespedeza juncea</i> (L.f.) Persoon	Nazia JUH.14337	Bush clover	-	Papilionoideae	796	Wild	Herb	Whole plant	Whole dried plant is used along with other fuel wood for speedy and intense fire. The plant is also used as a scrubber for washing the utensils (mostly the milk pots) in rural area.
18	<i>Medicago lupulina</i> L.	Nazia JUH.14339	Black Hay	Sariri	Papilionoideae	426	Wild	Herb	Whole plant	Whole plant is used as a fodder. The leaves and tender branches are cooked and used as a vegetable.
19	<i>Medicago polymorpha</i> L.	Nazia JUH.14340	California burclover	Sariri, Khitmi	Papilionoideae	449	Wild	Herb	Whole plant	Leaves and tender branches are cooked as a vegetable. This vegetable prevents constipation and cough. The regular use of this vegetable enhances eyesight and blood formation. Whole plant is used as fodder. The drink obtained from boiling the whole plant in water is used to treat jaundice, typhoid and liver problems. The juice of this plant is mixed with honey and used to treat the cough. This juice when mixed with Amla juice is also used to cure jaundice.
20	<i>Melilotus indica</i> (L.) All.	Nazia JUH.14341	Indian Sweet clover	Barseem	Papilionoideae	918	Wild	Herb	Whole plant	Whole plant is used as a fodder crop and it is believed to be an excellent fodder used for increasing the milk yield in cattle's (mostly cows and buffaloes).
21	<i>Rhynchosia minima</i> (L.) DC.	Nazia JUH.14342	Burn mouth vine	Jangli Moath	Papilionoideae	963	Wild	Herb	Leaves	Leaf paste is applied to skin inflammations and wounds. It is used as a bath after delivery.
22	<i>Robinia pseudo-acacia</i> L.	Nazia JUH.14343	Black Locust	Kikar	Papilionoideae	911	Wild	Tree	Whole Plant	Leaves are used as a fodder for cattle (mostly goats and sheep).The stem and branches are used as pillars for the fencing of agricultural fields.
23	<i>Tephrosia purpurea</i> (L.)	Nazia JUH.14344	Wild Indigo	Sirphonka	Papilionoideae	499	Wild	Herb	Roots	Decoction of roots is used to treat toothache.
24	<i>Trifolium alexandrinum</i>	Nazia JUH.14345	Barseem clover	Barseem	Papilionoideae	549	Both (Cultivated)	Herb	Whole plant	Plant is widely grown as fodder for cattle, mainly for buffaloes by the local people.

S. no.	Name of the plant species	Voucher number	Common name	Local name	Sub-family	Altitude (msl)	Habitat	Habit	Plant parts used	Ethno-botanical and Ethno-medicinal uses
	(L.)						&Wild)			
25	<i>Trifolium campestre</i> Schreb.	Nazia JUH.14346	Low Hop Clover	-	Papilionoideae	946	Both	Herb	Whole plant	Whole plant is used as a fodder.
26	<i>Trifolium pratense</i> L.	Nazia JUH.14347	Red clover	Shattal	Papilionoideae	785	Both	Herb	Whole plant	Whole plant is used as a fodder.
27	<i>Trifolium repens</i> L.	Nazia JUH.14348	White clover	Jangli Shattal	Papilionoideae	537	Both	Herb	Whole plant	Whole plant is used as a fodder.
28	<i>Trifolium resupinatum</i> L.	Nazia JUH.14349	Persian clover	Shatala	Papilionoideae	801	Both	Herb	Whole plant	Whole plant is used singly or with a mixture of other plants in order to increase the milk yield. It is considered to be an excellent fodder.
29	<i>Vicia hirsuta</i> L. Gray	Nazia JUH.14351	Tiny vetch	Papda	Papilionoideae	503	Wild	Herb	Whole plant	Whole plant is used as a forage crop.
30	<i>Vicia sativa</i> L.	Nazia JUH.14352	Common vetch	Jowal, Phalli	Papilionoideae	454	Wild	Herb	Whole plant	Whole plant is used as a forage crop.
31	<i>Bauhinia purpurea</i> L.	Nazia JUH.14353	Butterfly tree	Kachnar	Caesalpiinoideae	734	Wild	Tree	Bark, flower buds and flowers	Flower buds and flowers are boiled, cooked and eaten as a vegetable. The wood is also burnt as a fuel during wood scarcity in the rural areas. Flowers, flower buds and bark are boiled, cooled and this drink is used to treat the swellings in the throat and body. The syrup prepared from its flowers is used to treat the liver problems and also to improve intestinal weakness. The bark is boiled and made into a drink and this is useful as a blood purifier and also improves blood clotting.
32	<i>Bauhinia variegata</i> L.	Nazia JUH.14354	Mountain ebony	Kaliari	Caesalpiinoideae	995	Wild	Tree	Leaves, flower buds, flowers and bark.	Bark is finely powdered, made into a paste and used to treat dysentery and diarrhoea. Flower, flower buds and tender leaves are cooked as a vegetable.
33	<i>Caesalpinia decapetala</i> (Roth) Alston	Nazia JUH.14355	Cat's claw	-	Caesalpiinoideae	851	Wild	Tree	Leaves	Leaves are used as a source of fodder for cattles.

S. no.	Name of the plant species	Voucher number	Common name	Local name	Sub-family	Altitude (msl)	Habitat	Habit	Plant parts used	Ethno-botanical and Ethno-medicinal uses
34	<i>Cassia fistula</i> L.	Nazia JUH.14357	Golden Shower tree	Karangal, Amaltas	Caesalpinioidea-e	512	Wild	Tree	Whole plant	Leaf paste is used to treat headache. The leaves are finely powdered, made into a paste and applied on the skin to cure the skin diseases. The finely powdered bark is also used to treat the skin diseases and jaundice. The bark is burnt, oil is obtained and then used to treat the burns and scars on the skin. The sugar is mixed with the flowers and kept for many days and then used to treat constipation and intestinal pains. The pods are boiled in water, cooled and sugar or milk is added to it and given to the person suffering from constipation and intestinal pain. The wood is also used for making the agricultural implements. The leaves are used as fodder.
35	<i>Cassia occidentalis</i> L.	Nazia JUH.14359	Foetid Cassia	-	Caesalpinioidea-e	537	Wild	Shrub	Seeds	Seeds are dried, finely powdered and taken along with water to treat various liver problems.
36	<i>Cassia tora</i> L.	Nazia JUH.14360	Sickle Senna	Panwar, Ehrma	Caesalpinioidea-e	548	Wild	Shrub	Seeds	Seeds are crushed, mixed with oil or curd and then this mixture is applied on the skin in order to treat the diseases caused by ring worms. This is also used to treat polio.
37	<i>Acacia catechu</i> (L.F.) Willd.	Nazia JUH.14361	Cutch tree	Khair, Khadar	Mimosoideae	895	Wild	Tree	Whole plant	Whole plant is used as a firewood. The wood is burnt, made into ash and this ash is then applied on the infected udder (a disease locally known as Gandwal) to cure it. The bark is boiled in water, sugar is added to it and then used as a blood purifier.
38	<i>Acacia nilotica</i> (L.) Willd. ex Delile	Nazia JUH.14362	Gum Arabic tree	Kikar, Babul	Mimosoideae	605	Wild	Tree	Whole plant	Oil obtained from this plant is used to treat the deep skin cracks (disease locally known as Chambal) by the people. Leaves and pods are fed to cattle in order to increase the milk yield.
39	<i>Acacia modesta</i> Wall.	Nazia JUH.14363	Blacksally	Phalai, Kallmai	Mimosoideae	822	Wild	Tree	Whole plant	The plant is used as a firewood. Cattle feed on its leaves. The wood is used for making agricultural implements. The pods are crushed,

S. no.	Name of the plant species	Voucher number	Common name	Local name	Sub-family	Altitude (msl)	Habitat	Habit	Plant parts used	Ethno-botanical and Ethno-medicinal uses
										fried in ghee, and then used to treat back pain and also given after delivery. The inner bark of this plant is mixed in water, a juice is made and then taken to prevent the joint pains and cough. The juice of its flowers make the heart strong. It is also used to treat the allergies which are caused due to air pollution.
40	<i>Albizia lebbbeck</i> (L.)	Nazia JUH.14364	Lebbeck tree	Sariin	Mimosoideae	822	Wild	Tree	Leaves and wood	Leaves are given as a feed to goats and buffaloes in order to increase the milk yield. The wood is used for making agricultural tools such as handles of axes etc. The bark, fruits and leaves are used to treat the cough and asthma. The bark and juice of leaves is used for making Kajjal and it is supposed to increase the eyesight. The seeds are boiled in water, kept for 24 hours, sieved and juice obtained is used to treat prolonged cough and asthma.
41	<i>Leucaena leucocephala</i> (Lam.) de Wit.	Nazia JUH.14365	Horse tamarind	Pallai	Mimosoideae	770	Wild	Tree	Stem and leaves	The wood is used as a fuel wood and for making the handles of axes and agricultural implements. The leaves are used as a fodder mostly for goats and sheep.
42	<i>Mimosa pudica</i> L.	Nazia JUH.14366	Sensitive Plant	Chui-mui	Mimosoideae	879	Wild	Shrub	Leaves and seeds	The paste of the leaf is used to treat skin inflammations. The seeds are used to treat sexual problems.
43	<i>Mimosa rubicaulis</i> Lam.	Nazia JUH.14367	Himalayan Mimosa	Raal (Raali)	Mimosoideae	652	Wild	Tree	Leaves, flowers and bark	Goats and sheep feed on the leaves of the plant. The flowers, bark and leaves are boiled into a drink and then this is used to treat pneumonia and to reduce obesity. The leaves are finely powdered, mixed with jaggery and then used to treat the snake bite.

*JUH - Jammu University Herbarium (accession number)

4. CONCLUSION

Present communication puts on record 51 species of family Fabaceae collected from three tehsils (Sunderbani, Nowshera and Rajouri) of district Rajouri of J&K state (India). Out of the 51 legume species collected during the present survey, only 43 are found to be of ethno-medicinal importance. Whereas for rest 8 species, no record of use is found. These plant species cover an altitudinal gradient of 426-1015 masl and are known by different local names.

The plant species explored during the present survey have dual significance. Some of them are promising future food, while others carry immense medicinal importance and can have active constituents for future phytochemical analysis. These plants also represent an inexpensive source of locally available quality nutrition for the locals. Detailed research on these plants can further provide us better understanding of their medicinal and nutritional values.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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