

## Diversity of Legumes of Betalghat, Kumaun, Western Himalaya

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### ABSTRACT

The Indian Himalaya is rich in socio-cultural values, biodiversity and having a vast treasure of medicinal plant. Uttarakhand is a part of Indian Himalayan Region, has vast number of rivers, tributaries and lakes. Betalghat is a block of Nainital district located at the bank of river Kosi. The study was conducted to document the diversity of Legumes of Betalghat, Kumaun, Western Himalaya. Total 127 plants species belonging to 55 genera of different habits such as herbs (65 species) dominates the area followed by shrubs (33 species), trees (18 species), and climbers (11 species) were recorded. The preserved plant specimens were deposited in the herbarium division of the Department of Botany, D.S.B. Campus, Kumaun University, Nainital.

**Key words:** Diversity, Fabaceae (Legumes), Betalghat, Kumaun, Western Himalaya.

### INTRODUCTION

The Indian Himalaya is rich in socio-cultural values, biodiversity and having a vast treasure of medicinal plant. In Himalaya, most of the people live in villages and utilize plants for food, fodder, fuel, medicine, timber and various other purposes (Samant & Dhar, 1997; Arya & Khan, 2015). In the Indian Himalayan region, about 1748 species of medicinal plants (Samant et al., 1998), 675 species of wild edibles (Samant & Dhar, 1997), 279 species of fodder (Samant et al., 1998), 118 species of essential oil yielding medicinal and aromatic plants (Samant & Palni, 2000), and 155 species of sacred plants (Samant & Pant, 2003) have been recorded.

Uttarakhand is a part of Indian Himalayan Region (IHR) situated between the latitudes of 28°43'45"-31°08'10" N and the longitudes of 77°35'5"-81°02'25" E (Uniyal et al., 2007) at the trijunction of Nepal, Tibet and India. It covers an area of 53,485 Km<sup>2</sup> with total forest area of about 65% of the total geographical area which is consisting 1.68% of the land area of the country (Srivastava & Singh, 2005).

The Fabaceae or Leguminosae which is known as legume family is thought to be the third largest family of plants in respect to total number of species, after Orchidaceae and Asteraceae. Fabaceae includes 730 genera and 19,400 species. It includes all the legumes,

pea or bean families, consisting of all trees, shrubs and herbaceous plants perennials or annuals, which can be easily identified by their fruits (legume) and compound, stipulated leaves (Kajita et al., 2001, Judd et al., 2002, Stevens, 2008, Sprent, 2009, Lewis et al., 2005, Rahman et al., 2014, Noreen et al., 2018).

The flora of Uttarakhand has been explored and worked out by several workers (Atkinson, 1882, Duthie, 1906, Osmaston, 1927, Kanjilal, 1928, Gupta, 1968, Raizada & Saxena, 1978, Kalakoti, 1983, Naithani, 1984-1985, Pande, 1984, Pant, 1986, Joshi, 1987, Pangtey & Rawat, 1987, Pangtey et al., 1991, Gaur, 1999, Joshi & Joshi, 2001, Singh & Prakash, 2002, Tewari et al., 2010, Pandey et al., 2016, 2017, Arya et al., 2018, Joshi et al., 2018). The aim of the present study is to document the Diversity of Legumes of Betalghat, Kumaun, Western Himalaya).

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Figure-1: Map of the study area (Source- <http://www.uttaranchal.org.uk>)

## MATERIALS AND METHODS

### Geographical description of study area

Betalghat block belongs to district Nainital which lies between 29°38'925" N latitudes and 79°49'465" E longitudes (Fig.-1). The region is bordered by Ramgarh block on the east, Sult block on the west, Tarikhet and Bhikyasain block on the north and Kotabag block on the south (Pandey et al., 2017).

### Data Collection and Sample Identification

The study was conducted in 2016-2019 includes nine sites (Betalghat, Bhatrojkan, Bhowali, Garampani, Korar, Niglaat, Pangkatara, Raatighat and Simalkha) of Betalghat block. Specimens of all the plants were collected and identified with the help of relevant floras and herbaria (Osmaston, 1927, Naithani, 1984-1985, Gaur, 1999, Joshi et al., 2018). The specimens collected from the field were deposited in the herbarium division of the Department of Botany, D.S.B. Campus, Kumaun University, Nainital.

## RESULTS AND DISCUSSION

The geography of the Himalayan region is very unique and diverse system that is high and rich source of plant diversity which supports the vast group of rural communities by providing all the necessary and important resources to make their livelihood easier thus it is the major source of economy. In the present study a total of 127 plant species with 55 genera of family fabaceae (legumes) from Betalghat, Kumaun, Western Himalaya were recorded. Diversity of herbaceous flora (65 species) dominates the area followed by shrubs (33 species), trees (18 species), and climbers (11 species) (Fig.-2). *Desmodium* (13 species), *Crotalaria* (12 species), *Cassia* and *Indigofera* (7 each species), *Vigna* (6 species), *Bauhinia* (5 species), *Acacia*, *Flemingia* and *Vicia* (4 each species), and *Albizia* (3 species) were the most dominant genera occurring in the region (Fig.-3). The recorded plant species have been enumerated along with their local names, habit, and altitudinal range (m) and flowering and fruiting time (Table-1).

Earlier, Gupta (1968) reported 69 species of family fabaceae from Nainital, Kalakoti (1983) reported 119 species from the Nainital hills, Pande (1984) reported 101 species from Almora District, Samant (1987) reported 114 species from central and south-eastern part

**Table 1. Diversity of Legumes of Betalghat, Kumaun, Western Himalaya**

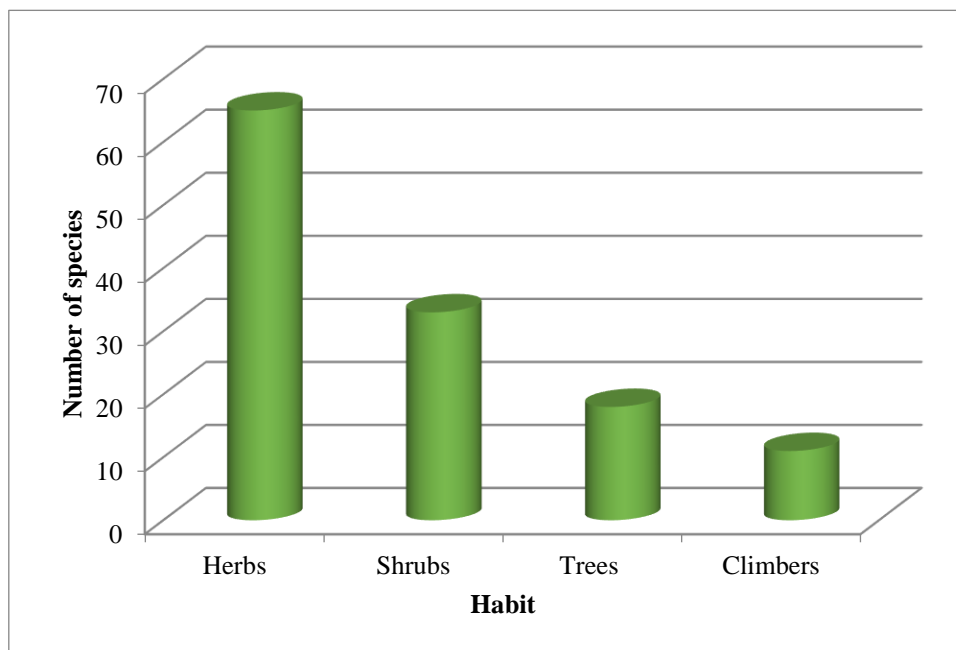
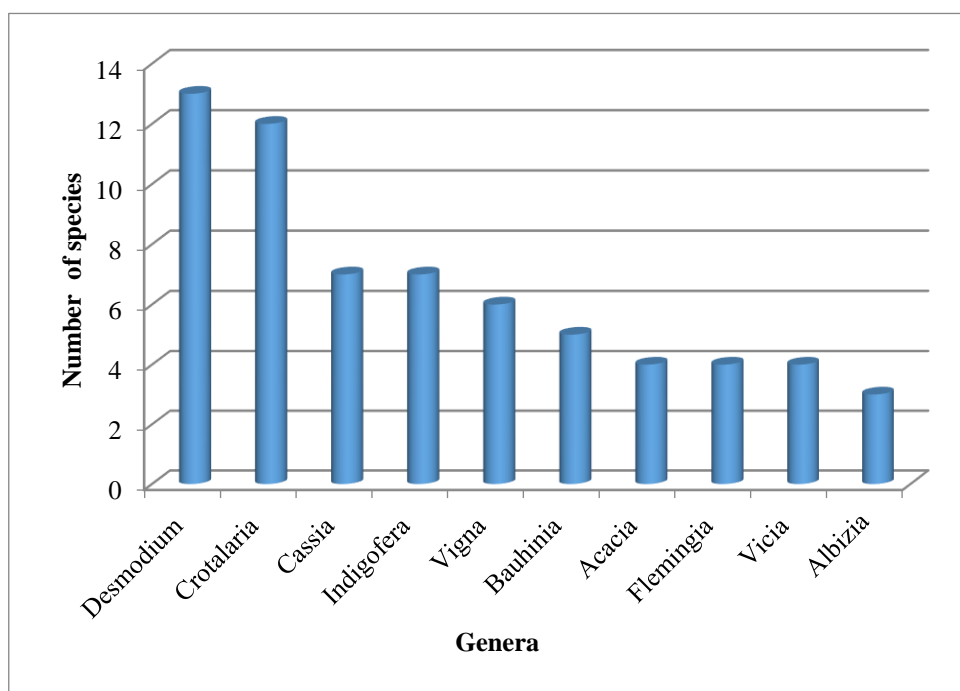
S. No.	Local Name	Botanical Name	Source	Habit	Altitudinal Range (m)	Fl & Fr Time
1.	Ratti	<i>Abrus precatorius</i> L.	W	Cl	700-1200	Aug-Mar
2.	Safed Ratti	<i>Abrus pulchellus</i> Wall. ex Thwaites	W	Cl	700-1200	Aug-Dec
3.	Khair	<i>Acacia catechu</i> (L.f.) Willd.	W	T	700-1300	May-Jan
4.	Acacia	<i>Acacia dealbata</i> Link.	W	T	1200-1800	Feb-Aug
5.	VilayatiKikar	<i>Acacia farnesiana</i> (L.) Willd.	W	Sh	700-1300	Jan-Jul
6.	Agali	<i>Acacia pennata</i> (L.) Willd.	W	Cl	700-1400	Aug-Sep
7.	Laugauni	<i>Aeschynomene indica</i> L.	W	H	700-1200	Aug-Dec
8.	Siris	<i>Albizia chinensis</i> (Osbeck) Merr.	W	T	300-1500	Apr-Mar
9.	Kuneri	<i>Albizia julibrissin</i> Durazz.	W	T	1200-2500	Apr-Dec
10.	Siris	<i>Albizia lebbeck</i> (L.) Benth.	W	T	400-1500	Apr-Nov
11.	Sherva	<i>Alysicarpus vaginalis</i> (L.) DC.	W	H	700-1400	Jul-Dec
12.	Mooghphali	<i>Arachis hypogaea</i> L.	C	H	700-1400	Aug-Dec
13.	Argyrobium	<i>Argyrobium flaccidum</i> (Royle) Jaub. & Spach	W	H	700-1500	Aug-Oct
14.	Argyrobium	<i>Argyrobium roseum</i> (Camb.) Jaub. & Spach	W	H	700-1800	Aug-Oct
15.	Rudravanti	<i>Astragalus leucocephalus</i> Grah. ex Benth.	W	H	1600-1800	Mar-Jun
16.	Ban-Tor	<i>Atylosia volubilis</i> (Blanco) Gamble	W	H	700-1500	Feb-Apr
17.	Kachnar	<i>Bauhinia malabarica</i> Roxb.	W	T	700-1100	Aug-Mar
18.	Kwiryal	<i>Bauhinia purpurea</i> L.	W	T	700-1600	Sep-Mar
19.	Kandela	<i>Bauhinia semla</i> Wunder.	W	T	700-1700	Sep-Apr
20.	Malujhan	<i>Bauhinia vahlii</i> Wight & Arn.	W	Cl	700-1500	Apr-Sep
21.	Kachnar	<i>Bauhinia variegata</i> L.	W	T	700-1700	Feb-Aug
22.	Karanj	<i>Caesalpinia bonduc</i> (L.) Roxb.	W	Cl	700-1000	Jul-Mar
23.	Karanj	<i>Caesalpinia decapetala</i> (Roth) Alston	W	Sh	700-1200	Feb-Nov
24.	Arhar	<i>Cajanus cajan</i> (L.) Huth.	C	H	700-1500	Aug-Nov
25.	Calliandra	<i>Calliandra haematocephala</i> Hassk.	C	Sh	700-1000	Aug-Nov
26.	Sakina	<i>Campylotropis eriocarpa</i> Schindl.	W	Sh	1500-1800	Jul-Dec
27.	Banar	<i>Cassia absus</i> L.	W	H	700-1000	Aug-Dec
28.	Amaltas	<i>Cassia fistula</i> L.	W	T	300-1400	Apr-Jan
29.	Taror	<i>Cassia floribunda</i> Cav.	W	Sh	800-1800	Jun-Feb
30.	Banar	<i>Cassia mimosoides</i> L.	W	H	700-1800	Jul-Oct
31.	Banar	<i>Cassia occidentalis</i> L.	W	Sh	700-1600	Jul-Oct
32.	Banar	<i>Cassia surattensis</i> Burm. f.	W	T	700-1500	Apr-Sep
33.	Banar	<i>Cassia tora</i> L.	W	H	700-1300	Jul-Dec
34.	Chana	<i>Cicer arietinum</i> L.	C	H	700-1800	Feb-Apr
35.	Chunchuni	<i>Crotalaria albida</i> Heyne ex Roth	W	H	700-1800	Mar-Nov
36.	Phatphaitya	<i>Crotalaria bialata</i> Schrank.	W	H	700-1800	Aug-Dec
37.	Phatphaitya	<i>Crotalaria calycina</i> Schrank.	W	H	700-1800	Jul-Dec
38.	Jhuri-Jhunia	<i>Crotalaria humifusa</i> Graham ex Benth.	W	H	700-1500	Jul-Dec
39.	Jhuri-Jhunia	<i>Crotalaria incana</i> L.	W	H	700-1200	Jun-Sep
40.	Phatphaitya	<i>Crotalaria medicaginea</i> Lam.	W	H	700-1300	Apr-Aug



41.	Phatphaitya	<i>Crotalaria mysorensis</i> Roth	W	H	700-1600	Aug-Jan
42.	Phatphatiya	<i>Crotalaria pallida</i> Aiton.	W	H	700-1400	Sep-Nov
43.	Phatphaitya	<i>Crotalaria prostrata</i> Rottl. ex Willd.	W	H	700-1800	Jul-Oct
44.	Phatphatiya	<i>Crotalaria sessiliflora</i> L.	W	H	700-1500	Aug-Oct
45.	Chun-Chuni	<i>Crotalaria spectabilis</i> Roth	W	H	700-1600	Sep-Apr
46.	Phatphatiya	<i>Crotalaria tetragona</i> Roxb. ex Andrews	W	H	700-1500	Aug-Dec
47.	Ghogra	<i>Dalbergia sericea</i> G. Don	W	T	700-1300	Mar-Aug
48.	Sisham	<i>Dalbergia sissoo</i> Roxb.	W	T	700-1500	Mar-Jun
49.	Sakina	<i>Desmodium concinnum</i> DC.	W	Sh	700-1800	Aug-Nov
50.	Chamlai	<i>Desmodium elegans</i> DC.	W	Sh	1400-1800	Apr-Oct
51.	Salprani	<i>Desmodium gangeticum</i> (L.) DC.	W	Sh	700-1800	Mar-Dec
52.	Sakina	<i>Desmodium heterocarpon</i> (L.) DC.	W	Sh	700-1800	Aug-Nov
53.	Sakina	<i>Desmodium laxiflorum</i> DC.	W	Sh	700-1800	Aug-Dec
54.	Sakina	<i>Desmodium microphyllum</i> (Thunb.) DC.	W	H	900-1800	Jan-Dec
55.	Sakina	<i>Desmodium motorium</i> Houtt.	W	H	700-1600	Jul-Nov
56.	Sakina	<i>Desmodium multiflorus</i> DC.	W	Sh	700-1600	Jul-Oct
57.	Sakina	<i>Desmodium oxyphyllum</i> DC.	W	H	1300-1800	Jul-Oct
58.	Sakina	<i>Desmodium podocarpum</i> (Thunb.) DC.	W	Sh	700-1800	Aug-Oct
59.	Sakina	<i>Desmodium pullchellum</i> (L.) Benth.	W	Sh	700-1000	Jul-Nov
60.	Sakina	<i>Desmodium triflorum</i> (L.) DC.	W	H	700-1800	Jul-Sep
61.	Sakina	<i>Desmodium velutinum</i> (Willd.) DC.	W	Sh	700-1500	Sep-Dec
62.	Basshur	<i>Dolichos tenuicaulis</i> (Baker) Craib	W	H	1500-1800	Aug-Oct
63.	Dumasia	<i>Dumasia villosa</i> DC.	W	H	700-1800	Aug-Oct
64.	Mandir	<i>Erythrina arborescens</i> Roxb.	W	Sh	1500-1800	Aug-oct
65.	Rungar	<i>Erythrina suberosa</i> Roxb.	W	T	700-1500	Mar-Jun
66.	Salprani	<i>Flemingia bracteata</i> (Roxb.) Wight	W	Sh	700-1800	Sep-Jan
67.	Cheena	<i>Flemingia procumbens</i> Roxb.	W	H	1600-1800	Jul-Oct
68.	Salprani	<i>Flemingia semialata</i> Roxb.	W	Sh	700-1800	Aug-Oct
69.	Salprani	<i>Flemingia strobilifera</i> (L.) R. Br.	W	Sh	700-1800	Sep-Dec
70.	Soyabean	<i>Glycine max</i> (L.) Merr.	C	H	700-1800	Aug-Nov
71.	Sakina	<i>Indigofera astragalina</i> DC.	W	H	700-1300	Aug-Nov
72.	Kala-sakina	<i>Indigofera atropurpurea</i> Hornem.	W	Sh	900-1600	Aug-Nov
73.	Sakina	<i>Indigofera cassioides</i> Rottler ex DC.	W	Sh	700-1800	Jan-Jun
74.	Sakina	<i>Indigofera cylindracea</i> Graham. ex Baker	W	Sh	1200-1800	Aug-Dec
75.	Sakina	<i>Indigofera dosua</i> Buch.-Ham. ex D. Don	W	Sh	1300-1800	May-Sep
76.	Sakina	<i>Indigofera heterantha</i> Wall. ex Brandis.	W	Sh	700-1800	May-Nov
77.	Sakina	<i>Indigofera linifolia</i> (L. f.) Retz.	W	H	700-1500	Mar-Nov
78.	Sem	<i>Lablab purpureus</i> (L.) Sweet	C	Cl	700-1300	Nov-Jun
79.	Kurphali	<i>Lathyrus aphaca</i> L.	W	H	700-1800	Feb-May
80.	Kurphali	<i>Lathyrus sphaericus</i> Retz.	W	H	700-1800	Feb-May
81.	Masoor	<i>Lens culinaris</i> Medik.	C	H	700-1800	Feb-Apr
82.	Khunja	<i>Lespedeza gerardiana</i> Graham. ex Maxim.	W	Sh	800-1700	Aug-Oct
83.	Khunja	<i>Lespedeza juncea</i> (L.f.) Pers.	W	Sh	1300-1800	Aug-Nov
84.	Khunja	<i>Lespedeza stenocarpa</i> Maxim.	W	Sh	700-1800	Feb-Jun

85.	Vilaiti Baval	<i>Leucaena leucocephala</i> (Lam.) De Wit.	C	T	700-1200	Sep-Dec
86.	Lotus	<i>Lotus corniculatus</i> L.	W	H	1200-1800	Apr-Oct
87.	Gehat	<i>Macrotyloma uniflorum</i> (Lam.) Verdc.	C	H	700-1800	Aug- Oct
88.	Bish-Kapru	<i>Medicago lupulina</i> L.	W	H	700-1600	Nov-May
89.	Banmethi	<i>Melilotus indica</i> (L.) All.	W	H	700-1500	Jan-May
90.	Gouj	<i>Milletia extensa</i> Benth. ex Baker f.	W	Cl	700-1300	Apr-Sep
91.	Aal	<i>Mimosa himalayana</i> Gamble	W	Sh	700-1600	Jun-Oct
92.	Chhui-Mui	<i>Mimosa pudica</i> L.	W	H	700-1200	Aug-Nov
93.	Bhaisalu	<i>Mucuna nigricans</i> (Lour.) Steud.	W	Cl	700-1300	Aug-Dec
94.	Gaunji	<i>Mucuna pruriens</i> (L.) DC.	W	Cl	700-1300	Sep-Dec
95.	Sandan	<i>Ougeinia oojeinensis</i> (Roxb) Hochst.	W	T	700-1600	Mar-Jun
96.	Bean	<i>Phaseolus lunatus</i> L.	C	H	700-1800	Jul-Nov
97.	Rajma	<i>Phaseolus vulgaris</i> L.	C	H	700-1800	Aug-Nov
98.	Kaliyon	<i>Pisum arvense</i> L.	C	H	700-1800	Mar-May
99.	Mattar	<i>Pisum sativum</i> L.	C	H	700-1800	Feb-May
100.	Bilaikand	<i>Pueraria phaseoloides</i> (Roxb.) Benth.	W	Sh	700-1600	Mar-Jun
101.	Bilaikand	<i>Pueraria tuberosa</i> (Roxb. ex Willd.) DC.	W	Sh	700-1500	Mar-Dec
102.	Rhynchosia	<i>Rhynchosia minima</i> (L.) DC.	W	H	700-1200	Jun-Sep
103.	Robinia	<i>Robinia pseudocasia</i> L.	C	T	700-1600	May-Oct
104.	Ghoytiya	<i>Shuteria involucrata</i> (Wall.) Wt. & Arn.	W	Cl	700-1800	Nov-Apr
105.	Smithia	<i>Smithia ciliata</i> Royle	W	H	1300-1800	Jul-Sep
106.	Peeli Sakina	<i>Sophora mollis</i> (Royle) Baker	W	Sh	700-1300	Mar-Jul
107.	Imali	<i>Tamarindus indica</i> L.	C	T	700-1100	May-Apr
108.	Sarphhoka	<i>Tephrosia candida</i> (Roxb.) DC.	W	Sh	700-1300	Jun-Feb
109.	Sarphhoka	<i>Tephrosia purpurea</i> (L.) Pers.	W	Sh	700-1400	Sep-Dec
110.	Berseem	<i>Trifolium alexandrinum</i> L.	C	H	700-1200	Mar-May
111.	Tipatiya	<i>Trifolium repens</i> L.	W	H	700-1800	Apr-Jul
112.	Ban Methi	<i>Trigonella corniculata</i> (L.) L.	W	H	700-1800	Apr-Jul
113.	Methi	<i>Trigonella foenum-graecum</i> L.	C	H	700-1800	Mar-May
114.	Sainji	<i>Trigonella incisa</i> DC.	W	H	700-1500	Mar-Jun
115.	Uraria	<i>Uraria lagopus</i> DC.	W	H	700-1300	Sep-Nov
116.	Bakla	<i>Vicia faba</i> L.	C	H	700-1800	Dec-May
117.	Kura	<i>Vicia hirsuta</i> (L.) Gray.	W	H	700-1800	Mar-May
118.	Kura	<i>Vicia rigidula</i> Royle	W	H	1600-1800	Aug-Nov
119.	Ankra	<i>Vicia sativa</i> L.	W	H	700-1800	Aug-Sep
120.	Rayans	<i>Vigna angularis</i> (Willd.) Ohwi & Ohashi.	C	H	700-1800	Aug-Nov
121.	Mash	<i>Vigna mungo</i> (L.) Hepper	C	H	700-1800	Aug-Nov
122.	Moong	<i>Vigna radiata</i> (L.) Wilczek	C	H	700-1400	Aug-Nov
123.	Moth	<i>Vigna trilobata</i> (L.) Verdc.	C	H	700-1400	Aug-Nov
124.	Bhotiya Dal	<i>Vigna umbellata</i> (Thunb.) Ohwi & Ohashi	C	H	700-1800	Sep-Dec
125.	Machali	<i>Vigna vexillata</i> (L.) Rich.	W	H	900-2500	Aug-Nov
126.	Wisteria	<i>Wisteria chinensis</i> (Sweet) DC	C	Cl	700-1800	Apr-Jul
127.	Dwipat	<i>Zornia gibbosa</i> Span.	W	H	700-1800	Aug-Nov

**Abbreviations Used- C- Cultivated; W- Wild; T- Tree; Sh- Shrub; H- Herb; Cl- Climber; Fl & Fr- Flowering and Fruiting.**

























**Figure 2: Habit of plant species of the region****Figure 3: Dominant Genera of the region**

of Pithoragarh, Gaur (1999) reported 178 species from Garhwal, North-West Himalaya, Chaudhary (2010) reported 51 species from Vindhya region of Uttar Pradesh, Kumari (2011) reported 99 species from Almora District, Wariss et al., (2013) reported 154 species from Cholistan Desert, Pakistan, Kumar et al., (2014) reported 41 species from Papagini river catchment areas, Andhra Pradesh, India, Rahman and Parvin (2014) reported 32 species from Rajshahi,

Bangladesh, Nagarajan et al., (2017) reported 100 species from Indian Institute of Technology-Madras, Chennai, Joshi et al., (2018) reported 99 species from Ranikhet, West Himalaya and Kushwaha et al., (2018) reported 110 species from Sonbhadra District, Uttar Pradesh. Pictures of certain plants are given in [Figure-4](#).



Figure-4. Diversity of Plants Belonging to Family Fabaceae

			
<i>Abrus precatorius</i>	<i>Bauhinia semla</i>	<i>Bauhinia vahlii</i>	<i>Bauhinia variegata</i>
			
<i>Cassia occidentalis</i>	<i>Cassia tora</i>	<i>Crotalaria spectabilis</i>	<i>Crotalaria tetragona</i>
			
<i>Dalbergia sissoo</i>	<i>Desmodium concinnum</i>	<i>Desmodium elegans</i>	<i>Desmodium laxiflorum</i>
			
<i>Desmodium velutinum</i>	<i>Erythrina arborescens</i>	<i>Erythrina suberosa</i>	<i>Flemingia procumbens</i>
			
<i>Flemingia semialata</i>	<i>Indigofera astragalina</i>	<i>Indigofera dosua</i>	<i>Milletia extensa</i>
			
<i>Ougeinia oojeinensis</i>	<i>Pueraria tuberosa</i>	<i>Tephrosia candida</i>	<i>Vigna vexillata</i>



## CONCLUSION

The present study compiles 127 species (65 herbs, 33 shrubs, 18 trees and 11 climbers) belonging to 55 genera. Legumes are the important source of protein. Documentation of these legumes may provide basic information for conservation and sustainable development of the Himalayan region.

## Conflicts of Interest

Authors declare that there is no conflict of interests regarding the publication of this paper.

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