



## Floristic Diversity Of Auli–Gorson Bugyal, District Chamoli, Uttarakhand

Varsha Dimri<sup>1</sup>, Vishamber Joshi<sup>2</sup>, S.P. Joshi<sup>3</sup>, Santosh Kumar Karn<sup>4\*</sup>

<sup>1</sup>Research Scholar, S.B.S. University, Balawala, Dehradun-248001.

<sup>2</sup>Asst. Professor, B.L.J. Govt. (P.G.) College, Purola (Uttarkashi) .

<sup>3</sup>Professor, Department of Botany, D.A.V. (P.G.) College, Dehradun.

<sup>4\*</sup>Assoc. Professor, S.B.S. University, Balawala, Dehradun .

\*Corresponding Author: Santosh Kumar Karn

\*Email: varshadimri@gmail.com;shambhujoshi77@gmail.com;santoshkarn.sbsu@gmail.com

**Abstract:** The present study carried out in 2022-2023 in Auli Gorson Bugyal of Chamoli district recorded 293 species of vascular plants. Angiosperms are represented by 289 species under 169 genera and 53 families. Dicots contributed 226 species in 42 families. Asteraceae is the dominant species of the area with 28 species in 19 genera followed by Rosaceae with 20 species. Among monocots, Orchidaceae emerged as largest family with 17 species under 14 genera closely followed by Poaceae and Cyperaceae. On the basis of growth forms herb dominate the area with 88.8%. Forbs made contribution of 80% followed by shrubs with 8.8% Climbers made least (0.6%) contribution.

**Key words:** Bugyal, Gorson, Gujjar, Alpine, Diversity.

### Introduction

Uttarakhand, Himalayas is the home to some of the world's most sacred religious places. A botanist working in high altitude vegetation of Himalayas region is always delighted as these areas are bestowed with varied landscape that provide shelter to diverse plants and animals communities (Gaur, 1999).

Alpine meadows, also known as bugyals, are a valuable part of the Himalayan ecosystem. These meadows appear at the height of 3000 meters above sea level, where the tree line ends. They continue till about 5000 meters (Kala, 2005).

The bugyals attract thousands of tourists every year and are of three types. First, the dry alpine meadows in cold desert. The second type of bugyals are located in the Western Himalayas including the states like Uttarakhand, Himachal Pradesh and Jammu and Kashmir. Such kind of bugyals have enough rain and snowfall with lush and diverse vegetation. The third type of bugyals are found in the eastern Himalayan region, like in Sikkim and Arunachal Pradesh. Vats *et al.* (2008) worked on diversity of timberline forest extensions, within alpine meadows of Dayara.

The Himalayas mountain chain stretches over a distance of about 2500 km from west to east.

It averages width range from 100-400 km. The Himalayas are superlatives, as it holds deepest gorges, highest mountain peaks, vast stretches of alpine grasslands, world's most towering peaks and longest rivers. Ghildyal (1957) explored the valley of flowers through a botanical trip.

Vegetation in Himalaya is defined on the basis of altitudinal zones. A harsh climatic condition exists in the high altitudes of Himalayan region and this makes difficult for both plants and animals to survive in these regions.

Himalayas are recognized as the major biodiversity centre in the world as it supports a great diversity of plants live due to its wide altitudinal range. They are followed by 'Gujjars' and 'Shepherds'. This migration is due to lack of fodder availability in lower altitudes of Himalayas as summers are strong and fodder dries out. Joshi and Srivastava (1988) recorded the effect of grazing on species composition, diversity and productivity in a high altitude pasture in Garhwal Himalaya. This movement of heavy footed animals have a deep effect in the soil and vegetation of alpine grasslands. Among the impacts are trampling, soil compaction, damage to plants and soils, covering of vegetation with soil and dung are prominent. Locals migrate to their nearby alpine grasslands due to availability of plenty of fodder in six months of growing season. These areas are rich in medicinal plants which lead to their overexploitation. This leads to conservation threat to economically important species (Bhatt *et al.*, 2020).

The present study is focused on the floristic diversity of the Auli-Gorson alpine meadow. The Himalayas are one of the youngest mountain chain and ecologically most fragile. Therefore, due to various human activities, the rate of degradation is high. The Himalayan vegetation is highly diverse (Bisht and Bhatt, 2011).

### Study Area

**Location :** Auli-Gorson Bugyal is a Himalayan alpine meadow in Joshimath, Chamoli district of Uttarakhand at an elevation of 3519 m and is around 19 km from Joshimath. It is a large alpine meadow with expanse of grass land covering several hundred acres of land area. It is a stunning circuit for trekking and has a well maintained trek route. The trek to this bugyal passes through lush vegetation of apple orchards, oak and deodar forests.

The area fall within the central Himalayan zone and formed by Tethyan sediments. The central crystalline in the area comprises of low grade metamorphic belonging to green schist facies with grade upward up to almandine-amphibolites facies. These rocks are represented by chloride schist, quartzite, quartz mica schist and migmatites. In the Himalayan

region, the soil formation is comparatively rapid process. The damp evergreen forest play an important role in the formation and conservation of the soil cap. The treeless southern slopes are generally devoid of soil. The texture of the soil in the most of sites was loamy and silty as well as loamy at the end of forest. However the silver fir forests are dominated by loamy soil.

The climate of the area is diverse in nature because of variation in altitude, aspects and terrain. Lower valley of the area is represented by sub-tropical climate. Whereas the higher altitudes are covered with snow met throughout the year.

The Bugyal is covered with green grass met during the spring season and is considered the best time for trekking and camping. During the winter season, the whole meadow is covered with snow. This area has views of Nanda Devi and Nanda Ghunti, Chattarkund, located just 1 km away from Gorson Bugyal. Rau, M.A.(1981) recorded the impact of vegetation and phytogeography of Himalaya.

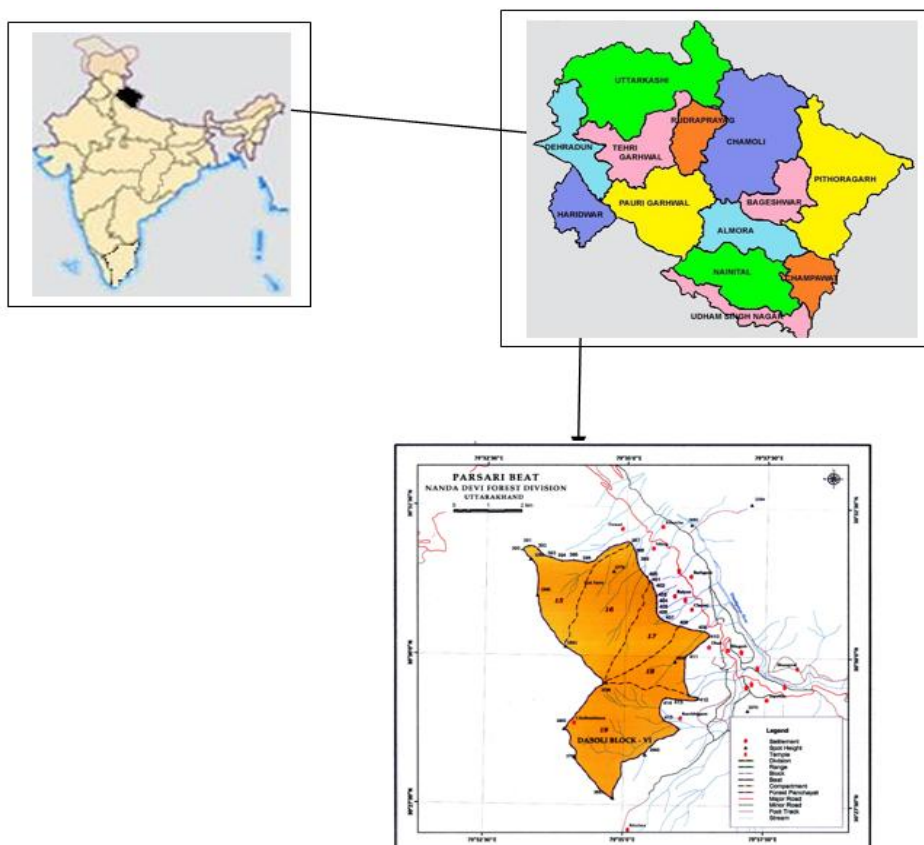


Fig. 1 : Location Map of the Study Area

### Results and Discussion

The study site is a well known tourist spot and a famous grazing land for nearby villagers of Joshimath Tehsil in Chamoli district (Fig. 1). The present study was conducted in 2022-2023 recorded 293 plant species of vascular plants. Among these Angiosperms included 289 species. The dicots were in all 226 species under 128 genera and 42 families whereas monocots included 63 species included in 41 genera and 11 families (Fig. 2).

The growth forms of the floristics of the study site revealed forbs, shrubs, grasses, sedges, trees and climbers as 80%, 8.8%, 4.8%, 4.0%, 1.36% and 0.6% respectively (Fig. 3). The floristics of the area is reported in Table 1 with each species flowering time with the colours of the flower. The growth season is restricted to six months only (May-Oct). Due to harsh winters the study area does not show any growth during winters.

The area is dominated by herbaceous vegetation with Asteraceae (19 genera and 28 species) as the most dominant family, Ranunculaceae (11 genera and 19 species). Among monocots Orchidaceae with 17 species is the dominant family closely followed by Poaceae (11 genera and 14 species) and Cyperaceae (4 genera and 12 species) (Table 2).

The area is frequently visited by tourists visiting the holy shrines of Badrinath and Hemkund Shahib. The vegetation is trampled by humans. The grazing in the area is intense and heavy foot animals have not only degraded soil of the area but have made openings for the opportunist plants that are unpalatable.

Table 1 : Floristic Diversity of Auli Gorson Bugyal.

Botanical Name	English Name	Habit	Colour of Flowers	Flowering time
<b>Ranunculaceae</b>				
<i>Actaea spicata</i> Linn.		Herb	white	June
<i>Aconitum falconeri</i> Holmes ex. Stapf.		Herb	blue	Jul-Aug

<i>Aconitum heterophyllum</i> Wall. Ex Royle.		Herb	blue	Jul-Sept
<i>Eriocapitella rupicola</i> (Buch-Ham ex DC.) Christenh&Byng.		Herb	white	June-July
<i>Anemonastrum tetrasepalum</i> (Royle) Holub.		Herb	white	June-July
<i>Anemonastrum obtusilobum</i> (D.Don.) Mosyakin.	Anemony Wind flower	Herb	white & blue	June-Aug
<i>Aquilegia pubiflora</i> Wall. ex Royle.	Columbine	Herb	purple	July-Aug
<i>Caltha palustris</i> Linn.	Marshmari gold	Herb	yellow	May-July
<i>Clematis barbellata</i> Edgew.		Climber	pale	May-Aug
<i>Delphinium uncinatum</i> Hook. f.& Thomson	Larkspurs	Herb	blue	June-July
<i>Isopyrum anemonoides</i> Kar. & Kir.		Herb	white	July
<i>Ranunculus hirtellus</i> Royle.	Buttercup	Herb	yellow	June-Aug
<i>Ranunculus sceleratus</i> Linn.		Herb	pale yellow	Mar-Sept
<i>Thalictrum alpinum</i> Linn		Herb	purple	May-June
<i>Thalictrum chelidonii</i> DC.	Meadow	Herb	lilac/purple	June
<i>Thalictrum elegans</i> Wall. ex Royle.		Herb	greenish	July-Aug
<i>Thalictrum foliolosum</i> DC		Herb	white	Aug
<i>Thalictrum minus</i> Linn.		Herb	purple	June-Aug
<i>Thalictrum reniforme</i> Wall.		Herb	green	Aug-Sept
<b>Berberidaceae</b>				
<i>Berberis glaucocarpa</i> Stapf.		Shrub	black	Apr-June
<i>Berberis kumaonensis</i> C.K. Schneid.		Shrub		May-Sept
<b>Podophyllaceae</b>				
<i>Podophyllum hexandrum</i> Royle.	May-apple	Herb	white	Apr-June
<b>Papaveraceae</b>				
<i>Meconopsis aculeata</i> Royle.	Blue-poppy	Herb	blue	July-Sept
<b>Fumariaceae</b>				
<i>Corydalis cashmeriana</i> Royle.	Fumatory	Herb	blue	June-July
<i>Corydalis cornuta</i> Royle.		Herb	yellow	July-Aug
<i>Corydalis meifolia</i> Wall.		Herb	yellowish	July-Aug
<b>Brassicaceae</b>				
<i>Arabis bijuga</i> G. Watt.	Cress rock cress	Herb	white	June-July
<i>Capsella bursa pastoris</i> (L.) Medik.		Herb	white	May-July
<i>Cardamine impatiens</i> Linn.		Herb	white	May-July
<i>Draba gracillima</i> Hook.f. & Thomson.		Herb	White	May-July
<i>Erysimum repandum</i> Linn.	Alpine Wall flower	Herb		May-June
<b>Violaceae</b>				
<i>Viola biflora</i> Linn.	Violet pancy	Herb	yellow	June-July
<i>Viola hispida</i> Lam.		Herb		May-July
<b>Caryophyllaceae</b>				
<i>Arenria montana</i> Linn.		Herb	white	May-June
<i>Dichodon cerastioides</i> (L.) Rchb.		Herb	white	June-Aug
<i>Cerastium holosteoides</i> Fr.		Herb	white	
<i>Acanthophyllum cerastioides</i> (D.Don) Madhani & Zarre.	Chalk plant	Herb	lilac	July-Aug
<i>Sabulina kashmirica</i> (Edgew.) Dillenb. & Kadereit.		Herb	white	July-Aug
<i>Sagina saginoides</i> (L.) H. Karst.		Herb	white	May-Aug
<i>Silene edgeworthii</i> Bocquet.	Cathfly	Herb	white	July-Aug
<i>Silene indica</i> Roxb. ex Otth.		Herb	purplish green	Aug-Oct
<i>Silene persica</i> Boiss.		Herb	white	Jul-Aug
<i>Silene monosperma</i> Linn.		Herb	white	Aug-Oct
<b>Hypericaceae</b>				
<i>Hypericum hookerianum</i> Wight & Arn.	Herb	yellow	July-Aug	
<b>Geraniaceae</b>				

<i>Geranium collinum</i> Stephan ex Willd.	Crane's bill	Herb	pink	July-Aug
<i>Geranium himalayense</i> Klotzsch.		Herb	purple	Aug-Sept
<i>Geranium nepalense</i> Sweet.		Herb	pink	June-Sept
<i>Geranium sanguineum</i> Linn.		Herb	pink	May-Oct
<i>Geranium wallichianum</i> D.Don ex Sweet.		Herb	purple	July-Aug
<b>Balsaminaceae</b>				
<i>Impatiens amplexicaulis</i> Edgew.	Balsam	Herb	purple	Aug-Sept
<i>Impatiens insignis</i> DC.		Herb	yellow	Aug-Oct
<i>Impatiens sulcata</i> Wall.		Herb	purple	July-Aug
<b>Rutaceae</b>				
<i>Skimmia anquetilia</i> N.P. Taylor & Airy Shaw	Skimmia	Shrub	yellow	May-June
<b>Aceraceae</b>				
<i>Acer acuminatum</i> Wall. ex D. Don.	Maple	Shrub	green	Apr-Nov
<i>Acer caesium</i> Wall. ex Brandis.		Tree	yellowish green	Mar-May
<i>Acer caudatum</i> Wall.		Tree	green	Mar-May
<b>Papilionaceae</b>				
<i>Astragalus himalayanus</i> Klotzsch.		Herb		Aug-Sept
<i>Astragalus candolleanus</i> Royle ex Benth.	Milk vetch	Shrub	yellow	June-Aug
<i>Parochaetus communis</i> Buch.-Ham. ex D. Don.		Herb	blue	May-June
<i>Piptanthus nepalensis</i> Sweet.		Shrub	yellow	May-June
<i>Toxicopueraria peduncularis</i> (Benth.) A. N. Egan & B. Pan.		Twiner	red	June-July
<i>Thermopsis barbata</i> Benth.		Herb	purplish	July-Aug
<i>Trigonella corniculata</i> L.		Herb	yellow	June-July
<i>Trigonella emodi</i> Benth.		Herb	yellow	June-Aug
<b>Rosaceae</b>				
<i>Geum elatum</i> Wall. ex G. Don.		Herb	yellow	Aug-Sept
<i>Geum urbanum</i> Linn.	Meadow sweet	Herb	white	July
<i>Cotoneaster acuminatus</i> Lindl.		Shrub.	white	
<i>Cotoneaster microphyllus</i> Wall. ex Lindl.		Shrub	white pink	Apr-May
<i>Cotoneaster rotundifolius</i> Wall. ex Lindl.	Quince leaved Medlar	Shrub	white	June-July
<i>Fragaria nubicola</i> (Lindl. Ex Hoof.f.) Lacaita.		Under-Shrub	white	May-Sept
<i>Filipendula vestita</i> (Wall. ex G.Don) Maxim.		Herb	yellow	June-July
<i>Potentilla argrophylla</i> Wall. ex Lehm.	Cinquefoil	Herb	June-July	
<i>Potentilla atosanguinea</i> G. Lodd.		Herb	orange-red	July-Aug
<i>Potentilla eriocarpa</i> Wall.		Herb	yellow	July-Aug
<i>Potentilla fruticosa</i> Gray.		Shrub	yellow	Aug-Sept
<i>Potentilla fulgens</i> Wall. ex Sims.		Herb	yellow	July-Oct
<i>Sibbaldia cuneata</i> Edgew.		Herb	yellow	Aug-Sept
<i>Sibbaldia parviflora</i> Willd.		Herb	yellow	May-Oct
<i>Sibbaldia ursina</i> Linn.		Shrub	pink	May-Oct
<i>Prunus cornuta</i> (Wall. ex Royle) Steud.	Bird cherry	tree	white	May-June
<i>Rosa macrophylla</i> Lindl.	Wild rose	Shrub	red	June
<i>Rosa sericea</i> Lindl.		Shrub	white	June
<i>Rubus foliosus</i> Hayek		Shrub	white	June-Oct
<i>Spiraea bella</i> Sims.		Shrub	pink	May-June
<b>Saxifragaceae</b>				
<i>Bergenia stracheyi</i>		Herb	pink	June-July
<i>Saxifraga asarifolia</i>		Herb	white	Aug
<i>Saxifraga brachypoda</i>		Herb	yellow	Aug-Sept
<i>Saxifraga brunonis</i>	Rockfoil	Herb	yellow	July-Aug
<b>Parnassiaceae</b>				
<i>Parnassia nubigena</i> Linn.	Grass of pamassus	Herb	white	July-Aug

<b>Grossulariaceae</b>				
<i>Ribes glaciale</i> Wall.	Red current	Shrub	brownish green	June
<b>Crassulaceae</b>				
<i>Rhodiola wallichiana</i> (Hook.) S.H.Fu.		Herb	red	June-Sept
<i>Rhodiola crenulata</i> (Hook.f. & Thomson) H. Ohba.	Stone crop	Succ Herb	red	July-Aug
<i>Rhodiola imbricata</i> Edgew.		Herb	greenish yellow	July-Aug
<i>Rhodiola sinuata</i> (Royle ex Edgew.) S.H. Fu.		Herb	white	July-Aug
<i>Rhodiola tibetica</i> (Hook.f. & Thomson) S. H. Fu.		Herb	white	July-Aug
<i>Sedum glaucophyllum</i> R.T. Clausen		Herb		June-Aug
<b>Onagraceae</b>				
<i>Circaea alpina</i> Linn.		Herb	white	July-Oct
<i>Epilobium latifolium</i> Linn.	Willow herb	Herb	purple	Aug-Sept
<i>Epilobium roseum</i> Kit. ex Hausskn.		Herb	pink-rose	Aug-Sept
<b>Apiaceae</b>				
<i>Acronematenerum</i> (DC.) Edgew.		Herb	white	Aug-Sept
<i>Angelica archangelica</i> Linn.		Herb	white	Aug-Oct
<i>Angelica glauca</i> Edgew.		Herb	purplish-white	Aug-Oct
<i>Bupleurum candollei</i> Wall. ex DC.		Herb	yellow	July-Aug
<i>Bupleurum falcatum</i> Linn.		Herb	yellow	Aug-Oct
<i>Bupleurum himalayense</i> Klotzsch.	Hare's ear	Herb	brown	July-Aug
<i>Chaerophyllum acuminatum</i> Lindl.		Herb	white-greenish	June-Aug
<i>Chaerophyllum reflexum</i> Lindl.		Herb	white	July-Aug
<i>Chaerophyllum villosum</i> Wall. ex DC.		Herb	white-yellow	July
<i>Kedarnatha garhwalia</i> (H. Wolff) Pimenov & Kljuykov.		Herb	yellowish-white	Aug-Oct
<i>Trachydium roylei</i> Lindl.		Herb	brown	July-Aug
<i>Vicatia coniifolia</i> DC.		Herb	purple	May-Aug
<b>Caprifoliaceae</b>				
<i>Lonicera obovata</i> Royle ex Hook.f. & Thomson.		Shrub	yellow	July-Aug
<i>Viburnum cotinifolium</i> D. Don.		Shrub	pinkish white	May-June
<i>Viburnum grandiflorum</i> Wall. ex DC.		Shrub	white pink tinged	July-Aug
<b>Rubiaceae</b>				
<i>Galium acutum</i> Edgew.	Woodruff	Cr. Herb	white	Aug-Sept
<i>Galium aparine</i> Linn.		Cr. Herb	white	Aug-Sept
<i>Galium asperuloides</i> Edgew.		Herb	white	June-July
<i>Galium odoratum</i> (L.) Scop.		Cr. Herb	white	July-Aug
<b>Valerianaceae</b>				
<i>Valeriana hardwickei</i> Wall.		Herb	pink	July-Aug
<b>Morinaceae</b>				
<i>Morina longifolia</i> Wall. ex DC.		Herb	white pink	July-Sept
<i>Morina persica</i> Linn.		Herb	pink white	June-July
<b>Asteraceae</b>				
<i>Ainsliaea aptera</i> DC.		Herb	greenish white	May-Sept
<i>Anaphalis busua</i> (Buch.-Ham.) DC.	everlasting	Herb	white	Aug-Sept
<i>Anaphalis cuneifolia</i> (DC.) Hook.f.		Herb	yellow	Sept
<i>Anaphalis nepalensis</i> (Spreng.) Hand.-Mazz.		Herb	white	Aug
<i>Anaphalis triplinervis</i> (Sims) C.B. Clarke.		Herb	pale yellow	Aug
<i>Artemisia absinthium</i> Linn.		Herb	brown yellow	June-July
<i>Artemisia roxburghiana</i> Besser.		Herb	brown	Aug
<i>Aster albescens</i> (DC.) Wall. ex Hand.-Mazz.		Herb	white	Aug
<i>Aster diplostephioides</i> (DC.) Benth. ex C.B. Clarke.		Herb	purple	Aug-Oct

<i>Aster falconeri</i> (C.B. Clarke) Hutch.		Herb	pink	July-Aug
<i>Carpesium nepalense</i> Less.		Herb	yellow	Aug
<i>Melanoseris cyanea</i> (D. Don) Edgew.		Herb	purple	Sept-Oct
<i>Melanoseris macrorhiza</i> (Royle) N. Kilian.		Herb	purple	Aug-Oct
<i>Cirsium spinosissimum</i> (L.) Scop.		Herb	Off-white	
<i>Cirsium wallichii</i> DC.		Herb	pink	July-Aug
<i>Cremanthodium arnicoides</i> (DC. ex Royle) R.D. Good.		Herb	yellow	Aug-Sept
<i>Dubyaea hispida</i> DC.		Herb	blue	Aug
<i>Erigeron multiradiatus</i> (Lindl. Ex DC.) Benth. Hook.f.		Herb	blue	July-Aug
<i>Leibnitzia nepalsensis</i> (Kunze) Kitam.	Transvall Daisy	Herb	white-pink	Aug-Sept
<i>Inula grandiflora</i> Willd.		Herb	yellow	Aug
<i>Leontopodium himalayanum</i> DC.	Edleweiss	Herb	white	July-Aug
<i>Leontopodium leontopodioides</i> (Willd.) Beauverd.		Herb	white	Aug-Sept
<i>Myriactis nepalensis</i> Less.		Herb	yellow	Aug-Oct
<i>Jurinea albescens</i> (DC.) N. Garcia, Herrando & Sussana.	Saw wort	Herb	purple	Aug-Sept
<i>Saussurea auriculata</i> Hemsl.		Herb	purple	Aug
<i>Senecio alpicornis</i> Hook. & Arn.	Ragwort	Herb	yellow	July-Aug
<i>Taraxacum officinale</i> F.H. Wigg.	Dendron	Herb	yellow	June-July
<i>Tragopogon gracilis</i> D. Don.		Herb	white	May-June
<b>Campanulaceae</b>				
<i>Campanula argyrotricha</i> Wall. ex A. DC.		Herb	blue	Aug
<i>Campanula latifolia</i> Linn.		Herb	purple	Aug
<i>Codonopsis rotundifolia</i> Benth.	Bellwort	Herb	purple	Aug
<i>Cyananthus integer</i> Wall. ex Benth.		Herb	blue	Aug
<i>Cyananthus lobatus</i> Wall. ex Benth.		Herb	blue	Aug
<i>Cyananthus microphyllus</i> Edgew.		Herb	blue	July-Aug
<b>Ericaceae</b>				
<i>Gaultheria trichophylla</i> Royle.	Creeping winter green	Herb	pink	June
<i>Rhododendron campanulatum</i> D. Don.		Shrub	lilac	June-July
<i>Rhododendron anthopogon</i> D. Don.		Shrub	yellow	June
<i>Rhododendron lepidotum</i> Wall. ex G. Don.		Shrub	pink	June-July
<b>Primulaceae</b>				
<i>Androsace chamaejasme</i> M. Bieb.	Rock jasmine	Herb	purple	July-Aug
<i>Androsace rotundifolia</i> Hardw.		Herb	pink	May-Oct
<i>Androsace umbellata</i> (Lour.) Merr.		Herb	pink	June
<i>Androsace sarmentosa</i> Wall.		Herb	purple	July
<i>Primula elliptica</i> Royle.		Herb	purple	Apr-June
<i>Primula auriculata</i> Lam.		Herb	dark purple	June-July
<b>Gentianaceae</b>				
<i>Gentiana aprica</i> Decne.	Gentian	Herb	blue	Apr
<i>Gentiana argentea</i> Royle. ex D. Don.		Herb	blue	Apr-June
<i>Gentiana capitata</i> Buch.-Ham ex. D. Don.		Herb	blue	Apr-June
<i>Gentiana stipitata</i> Edgew.		Herb	blue	Aug
<i>Gentiana tubiflora</i> (G. Don) Griseb.		Herb	purple	Aug-Sept
<i>Halenia elliptica</i> D. Don.		Herb	whitish	Aug-Oct
<i>Swertia alata</i> Hayata.		Herb	yellowish green	Aug-Sept
<i>Swertia alternifolia</i> Royle.	Marsh felwort	Herb	bluish yellow	Aug
<i>Swertia angustifolia</i> Buch.-Ham. ex D. Don.		Herb	yellow	June-Aug
<b>Polemoniaceae</b>				
<i>Polemonium caeruleum</i> Linn.	Jacob's ladder	Herb	blue	Aug
<b>Boraginaceae</b>				

<i>Cynoglossum wallichii</i> G. Don.		Herb	blue	July-Aug
<i>Erytrichum canum</i> Linn.		Herb	blue	Aug-Sept
<i>Hackelia uncinata</i> (Royle ex Benth.)C.E.C Fisch.		Herb	blue	June-Sept
<i>Myosotis caespitosa</i> DC.	Forget me not	Herb	blue	Aug-Sept
<i>Myosotis sylvatica</i> Ehrh.exHoffm.		Herb	blue	July
<b>Scrophulariaceae</b>				
<i>Scrophularia officinalis</i> Linn.		Herb	yellowish-white	June-Oct
<i>Scrophularia edgeworthii</i> Benth.		Herb	yellow	June-July
<i>Pedicularis bicornuta</i> Klotzsch.		Herb	yellow	July
<i>Pedicularis bifida</i> (Buch.-Ham. ex D. Don) Pennell.		Herb	red	Aug
<i>Pedicularis gracilis</i> Wall.ex Benth.		Herb	pink	Aug-Sept
<i>Pedicularis hoffmeisteri</i> Klotzsch.		Herb	yellow	Aug-Oct
<i>Pedicularis pectinata</i> Wall.ex Benth.		Herb	red	Aug
<i>Pedicularis roylei</i> Maxim.		Herb	pinkish	Aug
<i>Pedicularis siphonantha</i> D. Don.		Herb	red	Aug
<i>Verbascum Thapsus</i> Linn.	Aaron's rod	Herb	yellow	July-Aug
<i>Verbascum deltigera</i> Linn.	Speedwell	Herb	blue	July-Aug
<b>Orobanchaceae</b>				
<i>Orobanche crenata</i> Forssk.	Root parasite	red brown	July-Aug	
<i>Boschniakia himalaica</i> Edgew.		Herb	purplish white	Sept-Oct
<b>Acanthaceae</b>				
<i>Strobilanthes atropurpurea</i> Nees.		Herb	purple dark	July-Oct
<b>Lamiaceae</b>				
<i>Clinopodium umbrosum</i> (M.Bieb.) K.Koch		Herb	bluish	Sept
<i>Clinopodium vulgare</i> Linn.		Herb	blue	Aug
<i>Elsholtzia eriostachya</i> (Benth.) Benth.		Herb	yellow	Aug
<i>Elsholtzia strobilifera</i> (Benth.) Benth.		Herb	yellow	July-Aug
<i>Nepeta govaniana</i> (Wall.ex Benth.) Benth.		Herb	yellow	Aug-Oct
<i>Nepeta laevigata</i> (D. Don) Hand.- Mazz.		Herb	purplish	Mar-Oct
<i>Origanum vulgare</i> Linn.	Sweet Marjoram	Herb	pink	Aug
<i>Phlomis bracteosa</i> (Royle.ex Benth)	Jerusalem sage	Herb	purple	July
<i>Prunella vulgaris</i> Linn.		Herb	purple	Aug
<i>Salvia nubicola</i> Wall.ex Sweet.		Herb	purple	Aug-Oct
<i>Scutellaria prostrata</i> Jacquem.ex Benth.	Helmet flower	Herb	purplish yellow	Aug
<i>Stachys splendens</i> Wall.ex Benth.		Herb	pink	Oct
<i>Thymus linearis</i> Benth.	Thyme	Herb	pink	Aug
<b>Plantaginaceae</b>				
<i>Plantago erosa</i> (Wall.) Z. Yu Li.		Herb	green	May-Aug
<b>Chenopodiaceae</b>				
<i>Dysphania botrys</i> (L.) Mosyakin& Clements.		Herb	green	Aug
<b>Polygonaceae</b>				
<i>Bistorta amplexicaulis</i> (D.Don) Greene.		Herb	pink/red	Sept
<i>Bistorta affinis</i> (D.Don) Greene.	Knotweed	Herb	cream	Sept
<i>Bistorta vacciniifolia</i> (Wall.exMeisn.) Greene.		Herb	pink	Aug
<i>Bistorta vivipara</i> (L.) Delarbre.		Herb	pink	Aug
<i>Bistorta officinalis</i> Delarbre		Herb		June-Sept
<i>Fagopyrum esculentum</i> Moench.		Herb	pink	July
<i>Oxyria digyna</i> (L.) Hill.		Herb	pink green	July
<i>Persicaria chinensis</i> (L.) H. Gross.		Herb	white/pink	May-Nov
<i>Persicaria convolvulus</i> Linn.		Herb	green	July-Sept
<i>Persicaria nepalense</i> (Meisn.) H. Gross.		Herb	violet	July-Aug
<i>Persicaria rumicifolium</i> Pall.ex Spreng.		Herb	green yellow	Aug
<i>Rumex acetosa</i> Linn.		Herb	pink	June

<i>Rumex nepalensis</i> Spreng.		Herb	green	Apr-May
<b>Balanophoraceae</b>				
<i>Balanophora involucrata</i> Hook.f. & Thomson.		Par Herb	red yellow	Aug
<b>Euphorbiaceae</b>				
<i>Euphorbia stracheyi</i> Boiss.		Herb	yellow	Aug-Sept
<b>Salicaceae</b>				
<i>Salix denticulata</i> Andersson.	Willow	Shrub	white	May-July
<b>Pinacaceae</b>				
<i>Abies pindrow</i> (Royle.ex D.Don) Royle.	Silver Fir	Tree	purple	May
<b>Cupressaceae</b>				
<i>Juniperus communis</i> Linn.		Shrub	blue red cones	Apr
<i>Juniperus squamata</i> D.Don.		Shrub	black	Aug-Oct
<b>Taxaceae</b>				
<i>Taxus wallichiana</i> Zucc.	Yew	Tree	bright red cones	Apr
<b>Orchidaceae</b>				
<i>Cephalanthera longifolia</i> (L.) Fritsch.		Herb	white	July
<i>Cypripedium cordigerum</i> D.Don.		Herb	purple brown	Mar-Sept
<i>Cypripedium elegans</i> Rehb.f.		Herb	greenish purple	June
<i>Dactylorhiza hatagirea</i> (D.Don.) Soo.	Salampanja	Herb	purple	June
<i>Tipularia josephi f. cunninghamii</i> (King & Prain) Suetsugu.		Herb	amber	Aug-Sept
<i>Epipactis helleborine</i> (L.) Crantz.		Herb	green	June-Sept
<i>Eulophiadabia</i> (D.Don) Hochr.		Herb	pink	July-Aug
<i>Goodyera fusca</i> (Lindl.) Hook.f.		Herb	greenish white	Sept-Oct
<i>Gymnadenia orchidis</i> Lindl.		Herb	pink	July-Aug
<i>Habenaria intermedia</i> D.Don.		Herb		July-Aug
<i>Habenaria monorchis</i> D.Don.		Herb	green	July-Sept
<i>Neottia longicaulis</i> (King & Prantl) Szlach.		Herb	green	Aug-Sept
<i>Malaxis muscifera</i> (Lindl.) Kuntze.		Herb	green	June-Oct
<i>Oreorchis indica</i> (Lindl.) Hook.f.		Herb	purplish	Sept
<i>Oreorchis micrantha</i> Lindl.		Herb	yellow	June-July
<i>Hemipilia chusua</i> (D.Don.) Y. Tang & H. Peng.		Herb	purple	Aug
<i>Spiranthes sinensis</i> (Pers.) Ames.		Herb	pink	Aug-Sept
<b>Zingiberaceae</b>				
<i>Roscoea alpine</i> Royle.		Herb	purple	June
<b>Haemodoraceae</b>				
<i>Aletris pauciflora</i> (Klotzsch) Hand.-Mazz.		Herb	white	July
<b>Iridaceae</b>				
<i>Iris kumaonensis</i> D. Don.		Herb	purple blue	June-July
<b>Amaryllidaceae</b>				
<i>Allium consanguineum</i> Kunth.		Herb	white	July-Sept
<i>Allium wallichii</i> Kunth		Herb	red	Aug
<b>Liliaceae</b>				
<i>Clintonia udensis</i> Trautv. & C.A. Mey.		Herb	white	June
<i>Gagea lutea</i> (L.) Ker Gawl.	Yellow star of Bethlehem	Herb	yellow	June
<i>Polygonatum hookeri</i> Baker.		Herb	purple	July-Aug
<i>Polygonatum cirrhifolium</i> (Wall.) Royle.		Herb	purple	July
<i>Polygonatum multiflorum</i> (L.) All.		Herb	white yellow	June-Sept
<i>Polygonatum verticillatum</i> (L.) All.		Herb	white yellow	July-Aug
<i>Trillidium govanianum</i> Wall.ex D. Don.	Wood lily	Herb	dark purple	June-Aug
<b>Commelinaceae</b>				
<i>Aneilema scaberrima</i> Linn.		Herb	purple blue	June-July
<b>Juncaceae</b>				
<i>Juncus elegans</i> Royle ex Sam.		Herb	purple brown	July-Aug
<i>Luzula multiflora</i> D. Don.		Herb	purple brown	June-Aug



<b>Araceae</b>				
<i>Arisaema flavum</i> (Forssk.) Schott.	Arum	Herb	yellow green	June-July
<i>Arisaema intermedium</i> Blume.		Herb	yellow green	June-July
<i>Arisaema jacquemontii</i> Blume		Herb	spathe white	June-July
<i>Arisaema propinquum</i> Schott.		Herb	purple brown	June-Aug
<i>Arisaema tortuosum</i> (Wall.) Schott.		Herb	pale yellow	June-July
<b>Cyperaceae</b>				
<i>Carex cruciata</i> Wahlenb.		Herb		Aug-Sept
<i>Carex infuscata</i> Nees		Herb		June-Oct
<i>Carex nubigena</i> D.Don		Herb		Aug-Sept
<i>Carex obscura</i> Nees		Herb		June-Oct
<i>Carex setosa</i> var. <i>setosa</i>		Herb		May-June
<i>Carex deasyi</i> (C.B. Clarke) O.Yano & S.R. Zhang		Herb		Aug-Sept
<i>Cyperus metzii</i> (Hochst. ex Steud.) Mattf. & Kük.		Herb		Aug
<i>Cyperus niveus</i> Retz		Herb		May-June
<i>Cyperus sanguinolentus</i> Vahl		Herb		Aug
<i>Cyperus squarrosus</i> Linn.		Herb		Aug-Oct
<i>Eleocharis palustris</i> (L.) Roem. and Schult.		Herb		July
<i>Kobresia reticularis</i> Boeckeler ex Benth.		Herb		Aug
<b>Poaceae</b>				
<i>Danthonia cachemyriana</i> Jaub. & Spach		Grass		Aug-Sept
<i>Poa persica</i> Trin.		Grass		July
<i>Poa bulbosa</i> Linn.		Grass		June-July
<i>Poa supina</i> Schrad.		Grass		Aug-Sept
<i>Festuca gigantean</i> Krock.		Grass		July-Sept
<i>Phleum alpinum</i> Linn.		Grass		Aug
<i>Sporobolus piliferus</i> (Trin.) Kunth.		Grass		Aug-Sept
<i>Himalayacalamus falconeri</i> (Hook.f.ex Munro)Keng f.		Grass		
<i>Thamnocalamus spathiflorus</i> (Trin.) Munro.		Grass		
<i>Agropyron thomsoni</i> Hook.f.		Grass		Mar.-Apr.
<i>Agrostis munroana</i> Aitch. &Hemsl.		Grass		July
<i>Agrostis pilosa</i> Schleich. ex Gaudin		Grass		June
<i>Bromus ramosus</i> L.		Grass		July
<i>Dactylis glomerata</i>		Grass		June

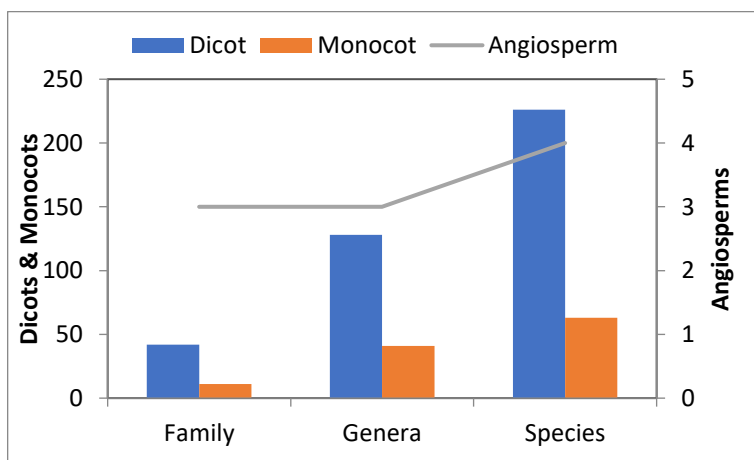


Fig. 2 : Percentage contribution of various ranks of taxa from the study site

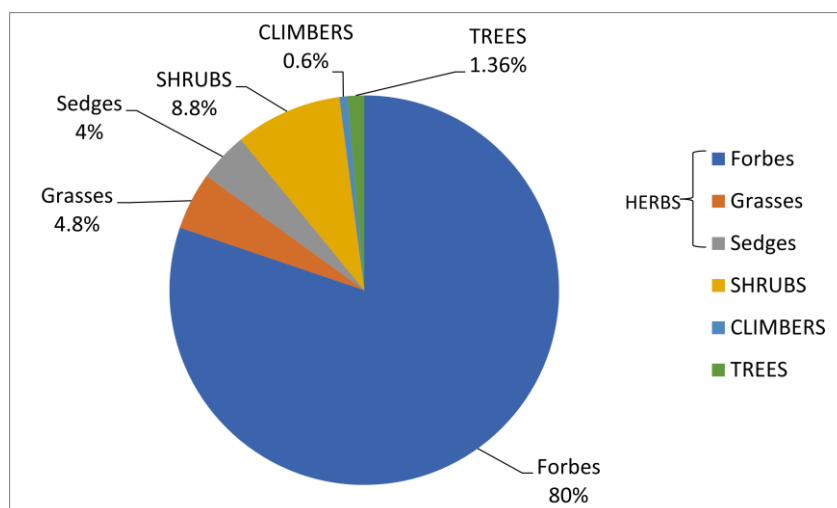


Fig. 3 : Contribution of various growth forms from the Study Area

Table 2 : Dominant Families of Study Area

Group	Family	Genera	Species
Dicotyledons	Asteraceae	19	28
	Rosaceae	10	20
	Ranunculaceae	11	19
	Polygonaceae	04	13
	Lamiaceae	10	13
	Caryophyllaceae	07	10
	Apiaceae	07	12
	Papilionaceae	06	09
	Scrophulariaceae	03	11
	Brassicaceae	05	05
	Gentianaceae	03	09
Monocotyledons	Orchidaceae	14	17
	Poaceae	11	14
	Cyperaceae	04	12
	Liliaceae	04	07

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