



## **Inventorization of Existing Flora of Govind Wildlife Sanctuary in the Uttarakhand, India**

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### **Abstract**

Govind wildlife sanctuary a pride of Uttarkashi district of Uttarakhand and the house of a wide varieties of flora. In addition, it forms the upper catchment of the Tons River, which is the most important tributary of the Yamuna river. Thus, the Govind wild life sanctuary is a major water shed for the river Yamuna, an important river for the Indo-Gangetic plains. The rich biodiversity, rolling large meadows, criss-cross dancing rivers and streams, high altitude lakes, snow clad peaks and unique social and cultural style of the area altogether represent unique scenic beauty which is unparalleled in the entire Himalayas and as such the area has a great tourism potential.

**Keywords:** Govind Wildlife Sanctuary, Flora, Forest, Tree species, Uttarakhand.

### **Introduction**

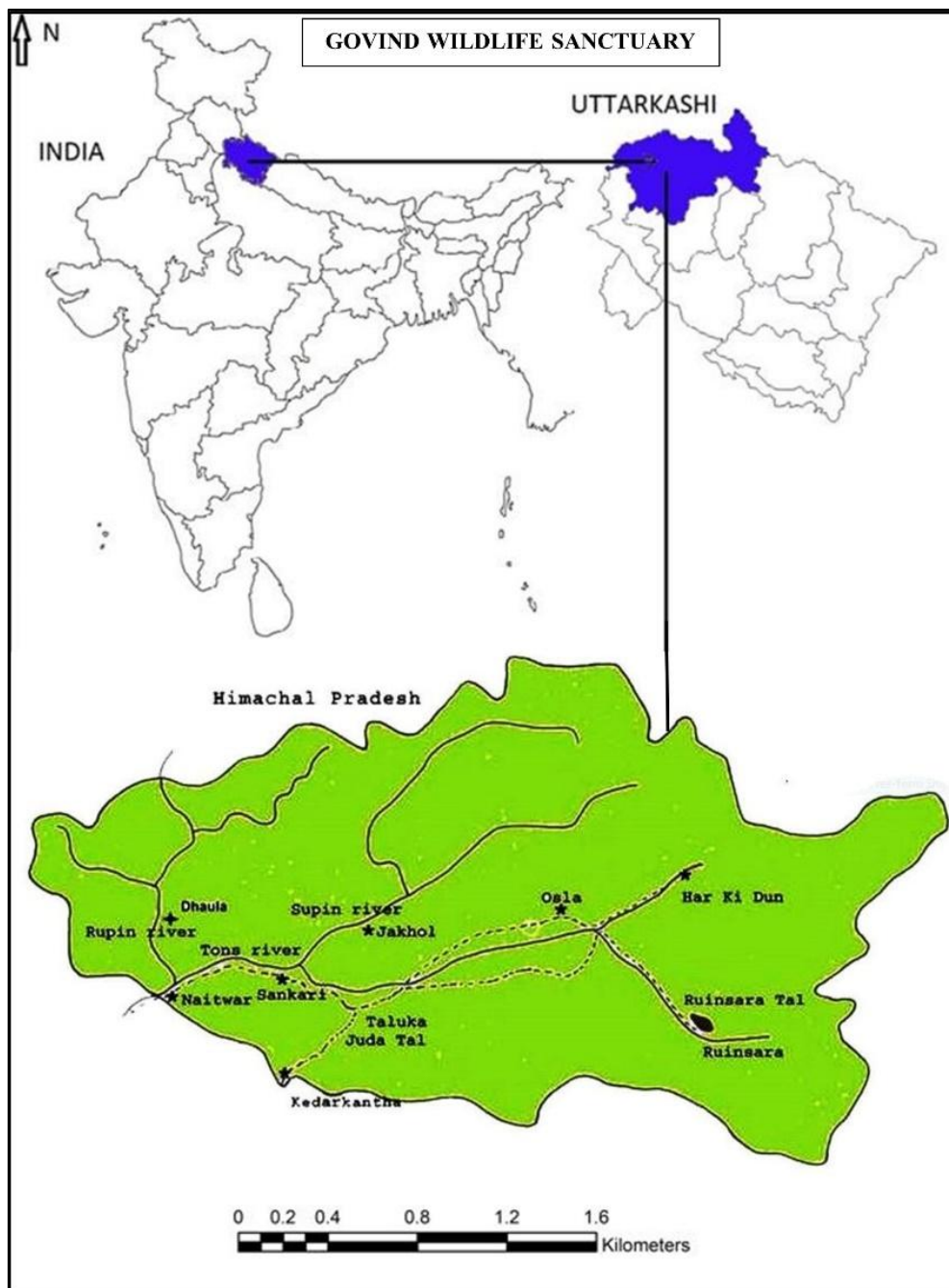
The Himalayan Eco-system is well represented by the Govind wildlife sanctuary of Uttarakhand. It is one of the state's oldest Protected Areas (PA). The region boasts varied climatic zones – sub-tropical, temperate and alpine – those results in diverse flora. It represents a variety of indigenous flora and fauna. It marks the most eastern edge of western Tragopan. The Govind PA was a part of the former Tons Forest Division until 1987. After that, it was managed till then in accordance with the Tons Forest Division's Working Plan. Establishment of the Uttar Pradesh organisation for the protection of wildlife in 1988. The PA was placed under the direction of the Chief Wildlife Warden Uttarakhand with the formation of the new state of Uttarakhand in 2000. This sanctuary is spread over an area of 957.969 sq. kms with a varying altitude of 1,300 m to 6,323 m. River Tons enriches the entire area with its sediments and helps the vegetation in the sanctuary to grow uninhibit-

ed. The study area, located in the Western Himalaya is one of the largest centers of endemism in India and among the 34 biodiversity hot spots of the world (Synge, 2005; Manikandan, *et al.*, 2014).

### **Material and Methods**

#### **Study Area**

Govind Wildlife Sanctuary constitutes of Rupin and supin ranges of erstwhile of Tons Forest Division, and was notified under G.O. No 720/14-725/1953 dated March 22, 1955. Named after the Bharat Ratna Govind Ballab Pant. It is situated in Uttar Kashi District of Uttarakhand and spreads over an area of 957.97 sq. km. The entire area lies in the middle - greater Himalayas between 1300 m to 6323 m considering the biological and geomorphological importance of the area, Govind National Park covering an area of 957.97 sq km.



**Figure 1.** Location Map of Govind Wildlife Sanctuary

### Topography

The entire P.A. lies within four ridges namely Changsil, Kedarkantha, Banderpunch and an unknown peak 20,600ft. high (on the north boundary). The whole terrain is broken by numerous streams and nalas and presents a rugged picture. The elevation varies from 1300 m. to 6323m. All aspects and gradients are present in the area. There are very few gentle slopes, the greater part being steep to precipitous.

### Geology Removes

### Climate

Owing to large variation in altitudes, greatly varying conditions of climate are met inside the P.A. The lower valleys of Rupin - Supin Rivers gave a sub-tropical climate while the highest parts remain perpetually under snow, but generally the climate of the tract is temperate. The spring season (mid-March to mid-June) is characterised by occasional showers of rain sometimes accompanied with thunder storms and hail. Snowfall may occur up to May in the highest parts. The lower

Rupin and Supin valleys are uncomfortably hot during June before rain occurs. The summer (mid-June to mid-September) is the best season. The bulk of precipitation occurs during this period. The monsoon which generally begins by middle of June is set in properly by July and lasts till second week of September. The greatest rainfall occurs during July - August. The autumn (mid-September to mid-December) is generally pleasant with a clear weather. Snowfall may occur in the upper reaches as early as September but generally, it takes place after mid-December. The winter (mid-December to mid-March) is very cold and there is heavy snowfall in higher altitudes (above 2000m). Snow may descend to lower part of the P.A. but does not last below 2000 m. except in cool nallas and protected places. The rainfall during winter is more in spring and less in summer. Strong winds are not usual in the P.A. However, high

and exposed ridges do experience strong winds at times.

Regular seasonal temperature records are not available. However, past records show that during summer temperature goes up to 39°C in lower parts of Rupin and Supin valleys.

A great variation in altitude and floral aspect inside the Govind wild life sanctuary which resulted in diversity of vegetation. According to Champion and Seth, a wide range of forest types are found inside the PA. It has been classified broadly as follows: 1. Sub-tropical Pine forests, 2. Himalayan moist temperate forests, 3. Himalayan dry-temperate forests, 4. Sub-alpine forests, 5. moist alpine scrubs (Champion and Seth, 1968).

The details of flora of the present study area comprising of tree, herbs, shrubs climbers, creepers and grasses are given as:

**Table 1.** Tree species present in the Govind Wildlife Sanctuary

S. No.	Common Name	Scientific name	Family	Uses
1	Akharot	<i>Juglans nigra</i>	Juglandaceae	Commonly consumed as a nut
2	Angir/Bedu/Pendu	<i>Ficus palmata</i>	Moraceae	Used as laxative, poultice, demulcent, emollient, and are also used for food
3	Anar/Darim	<i>Punica granatum</i>	Lythraceae	Used as fruit and treat various disease risk factors including high blood pressure, high cholesterol, and oxidative stress.
4	Amaltara/Titari	<i>Rhus punjabensis</i>	Anacardiaceae	Used in the treatment of persistent cough with blood, chronic diarrhoea, spontaneous sweating, night sweats, bloody stool and urorrhoea.
5	Amis/Chuk	<i>Manilkara zapota</i>	Sapotaceae	Rich natural source of multivitamins.
6	Ayar	<i>Lyonia ovalifolia</i>	Ericaceae	Used externally as an infusion to treat skin diseases and external parasites.
7	Arkhol/Arkhoi	<i>Rhus wallichii</i>	Anacardiaceae	Used as a brown dye
8	Aadu	<i>Prunus persica</i>	Rosaceae	Tree bark is used to improve blood flow and eliminate blood stagnation caused by dysmenorrhea, amenorrhea,

				and for postpartum abdominal pain
9	Aalu bukhara	<i>Prunus communis</i>	Rosaceae	Used as laxative to treat constipation, as well as immune stimulant
10	Anwala	<i>Emblica officinalis Gaertn</i>	Phyllanthus emblica Linn	Used as antioxidant, anti-inflammatory, anticancer, adaptogenic, anti-diabetic, nootropic, antimicrobial and immunomodulatory potential
11	Utis	<i>Alnus nepalensis</i>	Betulaceae	Used in land reclamation, as firewood and for making charcoal
12	Angru	<i>Euonymus fimbriatus</i>	Celastraceae	Used for carving
13	Ash tree, Angu	<i>Fraxinus micrantha</i>	Oleaceae	Used as anticancer, anti-inflammatory, neuroprotective, and antioxidant.
14	Kanderu/Kandela	<i>Ilex dipyrrena</i>	Aquifoliaceae	Used for the treatment of various ailments including pain, swelling, burns, and fever
15	Kath mauwa/Kathmalu	<i>Glochidion velutinum</i>	Euphorbiaceae	Used in the treatment of diabetes, inflammation, cancer, healing of wounds and diarrhea.
16	Kathbhoj/Kathbhuj/Saur	<i>Betula alnoides</i>	Betulaceae	The plant has been used as an antidote in the treatment of snake bites
17	Kandali/Kushki/Bichchhi	<i>Urtica parviflora</i>	Urticaceae	Used as soup, curry, fiber and a medicinal plant.
18	Kasmoyi/Kingora/Kilmora	<i>Berberis asiatica</i> <i>Berberis aristate</i>	Berberidaceae	Used as an antibacterial, antiperiodic, antidiarrheal and anticancer and it is also used in the treatment of ophthalmic infections
19	Kajaswa/Kaiswa/Jhiran	<i>Asparagus racemosus</i>	Asparagaceae	Used as drugs in Ayurveda

**Table 2.** Shrubs and herbs occurred in Govind Wildlife Sanctuary

S. No.	Common Name	Scientific name	Family	Uses
1	Anchhayi	<i>Rubus biflorus</i>	Rosaceae	Used as blue dye
2	Ajwayin, Ban Ajwayin	<i>Thymus lineare</i>	Lamiaceae	Used to treat eye disease, postnatal complications, liver complaints and skin diseases
3	Atis	<i>Aconitum heterophyllum</i>	Ranunculaceae	Used as reproductive disorders
4	Apamarg/Chirchita	<i>Achyranthes aspera</i>	Amaranthaceae	Used in the treatment of boils, asthma, in facilitating delivery, bleeding, bronchitis, and debility.

5	Amilda/Bhilmora	<i>Rumex hastatus</i>	Polygonaceae	Used in skin diseases, piles, bilious complaints and lungs bleeding.
6	Amela	<i>Embllica officinalis Gaertn</i>	Phyllanthaceae	Used to treat fever, whooping cough, chest diseases and wounds
7	Archa	<i>Rheum webbianum</i>	Polygonaceae	Used in hyperlipidemia, cancer and improves the memory in senile patients
8	Karwi	<i>Picrasma quassioides</i>	Simaronbaceae	Used in fever, gastric discomfort, and pediculosis.

**Table 3.** Climbers and creepers present in Govind Wildlife Sanctuary

S.No.	Common Name	Scientific name	Family	Uses
1	Agali/Banayi	<i>Schisandra grandiflora</i>	Schisandraceae	Used as fruit
2	Asoli/Panibela	<i>Ampelocissus latifolia</i>	Vitaceae	Used in bone fractures, dysentery, leucorrhoea, dental problems, and stomach pain.
3	Indrariyan/Iladu	<i>Trichosanthes tricuspidata</i>	Cucurbitaceae	Used as antioxidant, anticancer, antibacterial, and antifungal.
4	Kathtarur/Gaithi	<i>Dioscorea deltoidea</i>	Dioscoreaceae	Used in gastrointestinal, urogenital disorders, diarrhea, irritability, abdominal pain, and wounds.
5	Kathula	<i>Rubus paniculatus</i>	Rosaceae	Used in dysentery, malaria, stomachache and worms
6	Kandar/ Panlukowal	<i>Parthenocissus semicordata</i>	Vitaceae	Used for jellies or sauces
7	Kingari/Ari	<i>Caesalpinia decapetala</i>	Fabaceae	Used as laxative, tonic, anti-pyretic and carminative
8	Kukurdara/Kukurdan	<i>Smilax parvifolia</i>	Smilacaceae	Used for its various medicinal values.
9	Kunj/Kunja	<i>Rosa brunonii</i>	Rosaceae	Used as "blood purifier, to stimulate wound healing, to treat infectious diseases
10	Keniya/Kauniya	<i>Clematis montana</i>	Ranunculaceae	Used orally to treat syphilis, gout, rheumatism, bone disorders, and chronic skin conditions and as a diuretic

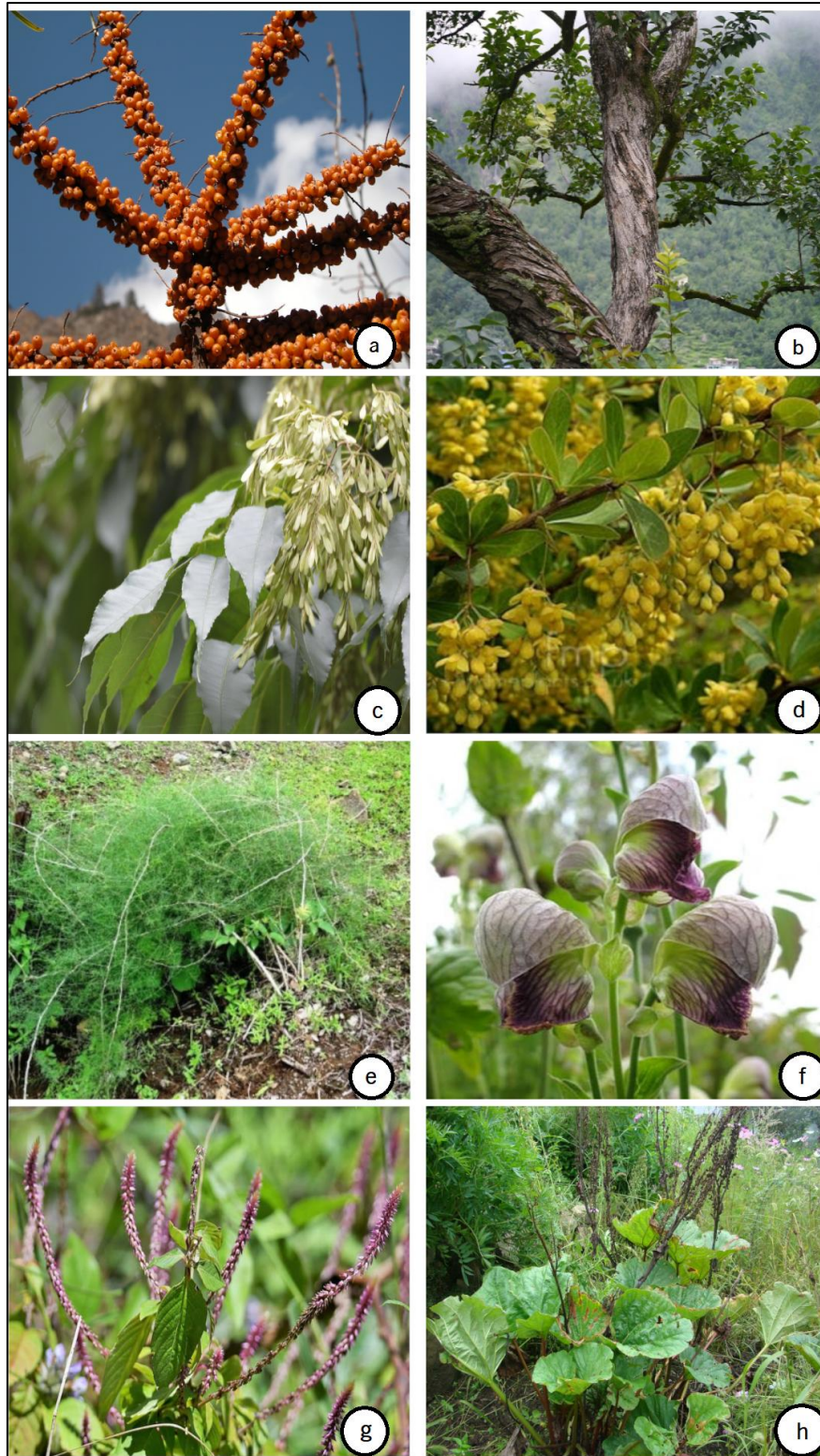
**Table 4.** Species of grasses present in Govind Wildlife Sanctuary

S. No.	Common Name	Scientific name	Family	Uses
1	Auchayi ghas	<i>Dactylic glomerata</i>	Poaceae	Used as a dairy pasture
2	Ula kumeriya	<i>Themeda arundinacea</i>	Poaceae	Use as a source of fibre and thatching material
3	Kanjugola	<i>Setaria kajungola</i>	Poaceae	Used for its various medicinal values

4	Kans	<i>Saccharum spontaneum</i>	Poaceae	Used in the treatment of burning sensation, dysuria, dyscrasia and kidney
5	Kumariya/Kumra	<i>Heteropogon contortus</i>	Poaceae	Used as fodder
6	Gini	<i>Penicum maximum</i>	Poaceae	Used to make good quality hay
7	Golda/Goriya	<i>Chysopogon serrulatus</i>	Gramineae	Uses as anti-inflammatory and cookies
8	Joint star	<i>Cynodon plectrostrabius</i>	Poaceae	Its root decoction given to cattle suffering from respiratory diseases. Its roots are kept in stores to keep away insects from wsopogonheat grains.
9	Tachla/Tachhola/Chhari	<i>Apluda mutica</i>	Poaceae	Glutene-rice grass

**Table 5.** Asthetic flora of the Govind Wildlife Sanctuary

S. No.	Common Name	Scientific name	Family	Uses
1	Ailenthus	<i>Ailanthus excelsa Roxb</i>	Simaronbaceae	Used for gastrointestinal, respiratory, and cardiovascular.
2	Gulmohar	<i>Delonix regia</i>	Fabaceae	Used for constipation, inflammation, rheumatoid arthritis and diabetes
3	Jakranda	<i>Jacaranda mimosaeifolia</i>	Bignoniaceae	Used for cure neuralgia, varicose veins, and other infections
4	Poplar	<i>Populus ciliata</i>	Salicaceae	Used for making boxes for packing purposes
5	Bottle brush	<i>Callistemon pachyphyllus Cheel</i>	Myrtaceae	Used as antibacterial, antifungal, and antioxidant activities
6	Eucalyptus/gum	<i>Eucalyptus globules</i>	Myrtaceae	Used as cough and cold products
7	Robinia	<i>Robinia pseudacacia</i>	Fabaceae	Used in treatment of hyperacidity
8	Wattle	<i>Acacia mollissima A. decurans/dealbata</i>	Fabaceae	Used as an emulsifier and stabilizing agent,
9	Silver oak	<i>Gravellia robusta</i>	Proteaceae	Used for manufacture of furniture, cabinetry, and fences.



**FIG 2:** Plate-1a) *Hippophae salicifolia* b) *Lyonia ovalifolia* c) *Fraxinus micrantha* d) *Berberis asiatica* e) *Asparagus racemosus* f) *Aconitum heterophyllum* g) *Achyranthes aspera* h) *Rheum webbianum*

### Discussion

Uttarakhand is a stunning state with lush green foliage located at the base of the snow-covered Himalayas. India's Uttarakhand region is home to a wide variety of plants and

animals. The state's vegetation is primarily made up of alpine trees Dixit (1984) and tropical rainforests. In Uttarakhand, wildlife thrives in these massive forests.

Floral diversity varies at different altitude and climate: *Grewia* spp (Bimal) *Acer* spp (Maple). *Alnus nepalensis* (Alder), *Pinus roxburghii* (Chir), *Mallotus philippensis* (Kukum or kamla tree), *Toona ciliate* (Red cedar), and *Celtis australis* (European nettle tree) are dominant trees and timber found in the subtropical zone. However, *Rhododendron arboretum* (Gurans), *Cedrus deodara* (Devdar), *Quercus leucotrichophora* (Oak) *Q. floribunda*, *Juglans regia* (English walnut), *Corylus jacquemontii* (Hazel tree), *Picea smithiana* (Spruce), in the temperate zone. *Quercus semecarpifolia* (Kharsu), *Rhododendron campanulatum* (Burans), *Ulmus wallichiana* (American elm), *Taxus wallichiana* (English yew), *Pinus wallichiana* (Blue pine) and *C. deodara* (Devdar) are most common in the sub-alpine zone and medicinal plants, *Picrorhiza kurrooa* (Kutki), *Nardostachys grandiflora* (Jatamasi), *Acontium heterophyllum* (Atis or Ativisha), *Gentiana* sp. (bitterwort), flowering plants, *Androsace globifera* (rock jasmine), *Cyananthus* sp (trailing bell flower) and *Potentilla* sp (creeping cinquefoil). *Danthonia cachemyriana* (wire grass) dominate the alpine zone of the Govind wildlife sanctuary (Negi *et al.*, 2010; Manikandan, & Srivastava, 2015).

Due to Uttarakhand's diverse flora and fauna, numerous national parks have been established around the nation Khullar (1994, 2000). These parks not only act as a natural habitat for the state's flora and fauna, but also as a wealth of knowledge for visitors. In terms of floristics, Uttarakhand is made up of 13 districts that cover a total area of 51,082 square kilometres (Rana and Rao 2003). It belongs to the west Himalayan Biogeography zone and is renowned for having a similar level of floral diversity to other Himalayan regions in the nation, with an estimated 4,000 species of flowering plants that are highly valued for their medicinal, aromatic, and artistic properties Chandra 2000, Chandra *et al.*, 2008). The abundance of indigenous plants in Uttarakhand is noteworthy because it eventually belongs to the nation's cultural heritage. Over 116 species (Plate-1) are native

to the Himalayas in Uttarakhand. *Arenaria ferruginea*; examples include *Microschoenus duthiei*, *Trachycarpus takil*, *Poa rhadina*, *Gentian tetrasepala*, *G. saginoides*, *Meeboldia solenoids*, and others.

In addition, numerous plant species from various regions of Uttarakhand have been added to the scientific database. These species include *Arenaria curvifolia*, *Saussurea sudhanshui*, *Carex nandadvienensis*, *Euphorbia sharmae*, and *Androsace garhwalicum*, among others. *Arceuthobium minutissimum*, one of the smallest flowering plants, parasitizes over *Pinus gerardiana* (Chilgoza) and *Pinus roxburghii*, the tallest plant in Asia, and dominant in Uttarkashi district, which is more intriguing to remark. Other local oddities include the sacred *Morus serrata*, which is thought to have been planted by Adi Shankaracharya at Joshimath, the tree fern *Cyathea spinulosa*, the enormous *Aesculus indica* on the way to Panwali, and the tall *Shorea robusta* (Raja Sal) at Byasi. There will be gaps in the account of Uttaranchal's plant wealth. But recently, decreasing populations of medicinal plants in the wild due to illegal exploitation have led to discussions among conservationists, ecologists and scientists (Maikhuri *et al.*, 1998a; Singh 2002; Manikandan *et al.*, 2020). Several medicinal plants have been listed as endangered, vulnerable and threatened due to over-exploitation, reckless harvesting from the forest and alpine meadows (Maikhuri *et al.*, 1998a; Uniyal *et al.*, 2000; Uniyal *et al.*, 2006). With the realisation that some wild species are being over-exploited, several agencies are recommending that wild species be brought into cultivation (Lambert *et al.*, 1997). Cultivation of medicinal plants is widely viewed not only as an option for meeting current and future demands for large-volume production of plant-based drugs and herbal remedies but also as a strategy for relieving harvest pressure on wild populations (FAO 1995; Lambert *et al.*, 1997). Therefore, cultivation and conservation of medicinal plants is a prerequisite to sustain biodiversity in the region and economic opportunities also has the advantage of

preserving rapidly eroding indigenous plants (Maikhuri *et al.*, 2003, Myers *et al.*, 2000) This present study is an attempt to listing of existing flora document which will help in developing management and conservation strategies in order to save biodiversity of Govind Wildlife sanctuary.

### Conclusion

The goal of present study is manage and preserve biodiversity in the Govind Wildlife Sanctuary. In a current situation, it is a high time to understand how diversity is impacted by diverse management policies. If we have a reliable information about the status and trends of forest resources it will helps in decision-making, policies and programs. The prospective conservation of such unmatched scenic beauty of the floristic composition as well as herbal wealth of the present study area is essential and also it is a home for a lot of endemic plants and endangered species. Among the threats to the indigenous flora of the Govind wild life sanctuary, the most important anthropogenic, deforestation, cattle grazing, timber and fuel wood cutting, soil erosion, construction schemes, plantation, plant collection, fire, and the invasive species, result in degradation of forests of the P.A. The preliminary study of floral diversity in the Govind Wildlife will help as a important environmental tool that will empower other researcher and managers of the sanctuary to further take up ecological studies to quantify floral diversity and vegetation structure. The strict measures from government and private agencies should be taken up, to solve conservation related problems in the hilly terrain. We have also pay attention on public awareness about such plants and its ecosystem amongst the local people. To promote this type of activity in remote area we should organise exhibitions, training camps and workshops at the village level and involving botanists, geologist, agriculturists, hydrogeologist and foresters.

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