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Floristic study in region of Basukedar, Rudraprayag (Uttarakhand)

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ABSTRACT

Total of 348 plant species, 278 genera in 109 families of the vascular plants were recorded from Khombherav zone of Garhwal Himalaya. In dicot, Asteraceae was found the dominant family with 25 species, whereas in monocot, Orchidaceae was ascribed as a dominant family with 20 species. *Ficus* was found dominant genus with eight species. Total 38 species of Pteridophytes were also recorded from the area, while Gymnosperms were represented 5 species and 4 genera. The high level of similarity was found between (site 2) and (site 3) with 20% and 33% through Jaccard and Sorenson, respectively. Among various growth habit of vegetation, herbs were found with the highest value (199/56.9%), followed by trees (57/16.3%), shrubs (41/11.7%), climbers (29/8.3%), medium sized trees (16/4.6%), and small trees (6/1.7%).

Keywords: Temperate zone, khombherav, vascular plants, Asteraceae, growth habit

INTRODUCTION

The Indian Himalayan region occupies a special place in the mountain ecosystem of the world. It harbours about 50% of the total Indian flora with 30% of the total flora endemic to the region (Rao, 1996). Himalayan forests are major source of industrial material and also provide number of products to local communities. The forest vegetation in the Himalayan region ranges from tropical dry deciduous in the foothills to alpine meadows above tree line zone (Champion and Seth 1968). Floristic diversity is one of the major components of a community that determines the functioning of an ecosystem. The component can vary in quality and quantity in a given time and space and impart a structure to the community. The plant communities play a pivotal role in sustainable management by maintaining biodiversity and conserving the environment (Gaur *et al*. 1993), (Aswal, 1996), (Dhar, 1996), (Farooque and Saxena 1996). Biodiversity is essential for human survival and economic wellbeing, ecosystem function and stability (Singh, 2002) but due to overexploitation and habitat degradation, many of the species have

decreased to a great extent, approximately 121 species of vascular plants of India have been recorded in the Red Data Book (Nayar and Sastry 1987, 1988, 1990). The knowledge of the floristic composition of a plant community is a prerequisite to understand the overall structure and function of any ecosystem. The various regions of Garhwal in the Western Himalaya have been surveyed time to time by numbers of workers such as (Rau, 1963), (Semwal and Gaur 1981), (Kala and Gaur 1982), (Naithani 1984), and (Gaur, 1999). The present status of Basukedar forest region as a reserve forest emphasizes the need of floristic study in order to generate the baseline information on this important eco-sensitive zone. The data on plant diversity in different forest communities in this particular zone of Rudraprayag forest division required for conservation and management. Present study was carried out to recognize the forest communities and to identify and compare the plant species diversity along the elevational gradient.

MATERIALS AND METHODS

Study area

The study area is extended from lower basin of Mandakini river to upper forest of Khom Bherav Nath (30°25'50.60" N Lat. 79°04'00.49" E Lon.) and (30°27'22.68" N - 78°59' 15.94" E). The forest covers an elevational range from 879 to 2553 m. The study area consists of montane mixed oak-lauraceous forest, mixed-Oak forests, mixed *Alnus* forest, the cultivated field edges, mixed *Rhus* forest, road sides, forest fringes, pine stand, grassy land, moist shady areas, disturbed land, near water stream.

Data collection, tabulation and identification

Regular field visits were conducted from 2015 to 2018 and plant specimens were collected from various habitats of the study area. The collected samples were identified with the help of standard regional flora (Naithani 1984 and 1985; Babu, 1977; Gaur, 1999). Nomenclature were validated through www.theplantlist.org and confirmed through Herbaria of Garhwal University Srinagar (GUH) and Botanical Survey of India, Dehradun (BSD).

RESULTS

In the present study (2015-18), total 348 species were recorded in 278 genera and 109 families of Angiosperms, Gymnosperms and Pteridophytes (Table 1). Dicot includes 259 species in 213 genera followed by monocot with 46 species in 39 genera and 7 families, pteridophyte with 38 species, 22 genera and 10 families whereas Gymnosperms are represented by 5 species in 4 genera and 3 families (Figure 2).

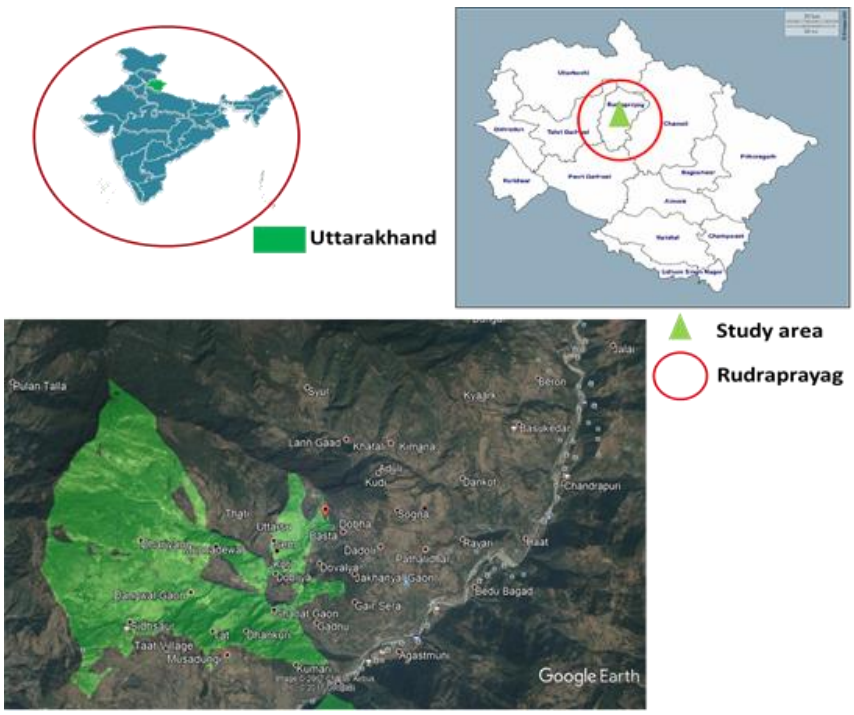

Fig. 1: Map showing the area of study in Basukedar region

Table 1: Diversity of plants from lower catchment of Mandakini to upper temperate sacred forest of Khombherav Nath

Groups	Families		Genera		Species	
	Number	Percentage	Number	Percentage	Number	Percentage
Pteridophytes	10	9.2	22	7.9	38	10.9
Gymnosperms	3	2.8	4	1.4	5	1.4
Dicot	89	81.7	213	76.6	259	74.4
Monocot	7	6.4	39	14.0	46	13.2
Total	**109**		**278**		**348**	

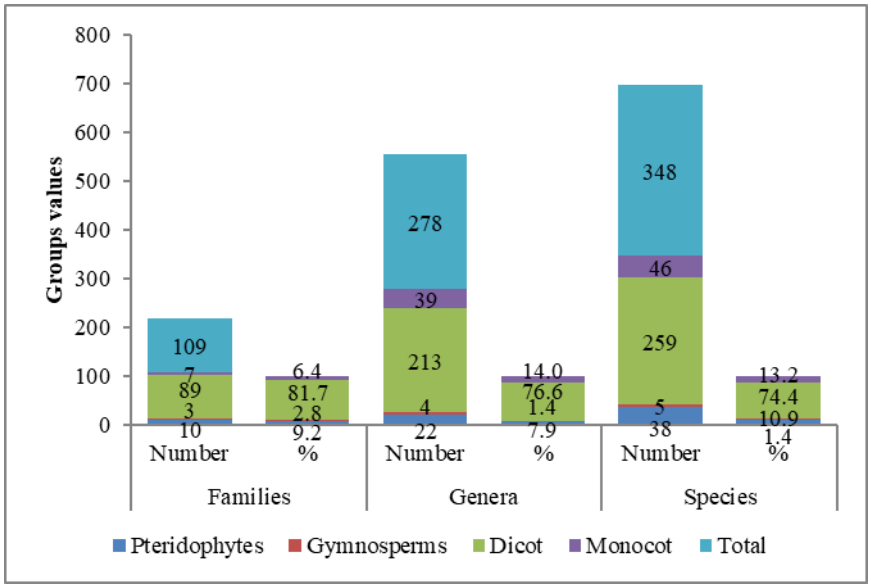

Fig. 2: Number and percentage value of different groups of vascular plants in the study area

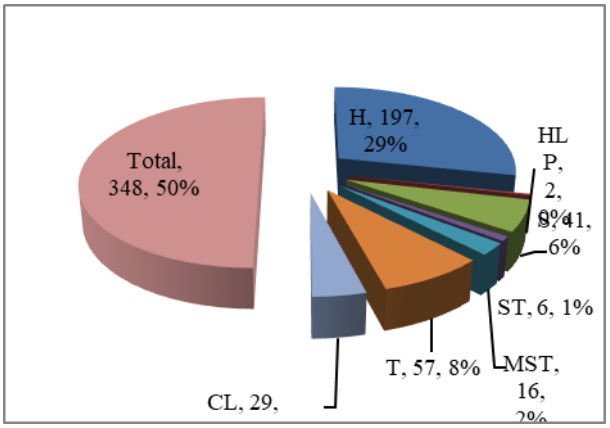

Fig. 3: Different Life forms of vascular plants in study area

Diversity of habits

Various life forms of plants were recorded in the study area as herbs, shrubs, small tree, medium sized tree and climbers. Among these growths habit, herbs were found with the maximum value percentage (199/56.9%), followed by Trees (57/16.3%), Shrubs (41/11.7%), Climbers (29/8.3%), Medium sized tree (16/4.6%) and small trees (6/1.7%), (Figure 3).

Similarity measures (JC/SC)

Among various floristic groups, the maximum similarity coefficient was recorded between (Location-2) and (Location-3) with the values (%) of 0.20/20% and 0.33/33% for both Jaccard and Sorenson coefficient, respectively followed by 0.20/20% and 0.33/33% for the sites L1 and L2 and 0.19/19% and 0.31/31% between L4 and L5 and in the sites (L3:L4)

and (L1:L4) with their corresponding figures as 0.08/8% and 0.06/6%, respectively. Whereas the minimum values of the similarity coefficient was found 0.02/2% and 0.04/4% between (L1:L5) and (L2:L4), (L2:L5) (Table 2, 3; Figure 4, 5).

Vegetation pattern in the study area

In the study area Asteraceae (dominant family) were found to have maximum number species (25) followed by Orchidaceae (20 species), Rosaceae (17 species), Poaceae (15 species), Lamiaceae (13 species), Urticaceae, Moraceae (each with 9 species), Lauraceae, Leguminosae (8 species each), (Figure 6), Solanaceae, Euphorbiaceae (6 species each), Polygonaceae, Asparagaceae, Acanthaceae, Rubiaceae, Malvaceae, Araceae (5 species each), Phyllanthaceae, Ranunculaceae, Amaranthaceae, Fagaceae, Berberidaceae, Ericaceae, Anacardiaceae, Sapindaceae (4 species each) Rutaceae, Menispermaceae, Pinaceae, Betulaceae, Vitaceae, Oleaceae (3 species each) and Oxalidaceae, Zingiberaceae, Boraginaceae, Apiaceae, Plantaginaceae, Cucurbitaceae, Meliaceae, Nyctaginaceae, Caryophyllaceae, Violaceae, Juglandaceae, Rhamnaceae, Schisandraceae, Smilacaceae, Cornaceae, Araliaceae, Gentianaceae, Apocynaceae, Hydrangeaceae, Gesneriaceae (2 species each), (Table 4).

Table 2 Jaccard similarity coefficient between different locations of study area

JC	L1	L2	L3	L4	L5
L1	**100**	20%	7%	3%	2%
L2	-	**100**	20%	2%	2%
L3	-	-	**100**	8%	8%
L4	-	-	-	**100**	19%
L5	-	-	-	-	**100**

Table 3 Sorenson index of coefficient between various locations

SC	L1	L2	L3	L4	L5
L1	**100**	33%	13%	6%	4%
L2	-	**100**	33%	4%	4%
L3	-	-	**100**	15%	14%
L4	-	-	-	**100**	31%
L5	-	-	-	-	**100**

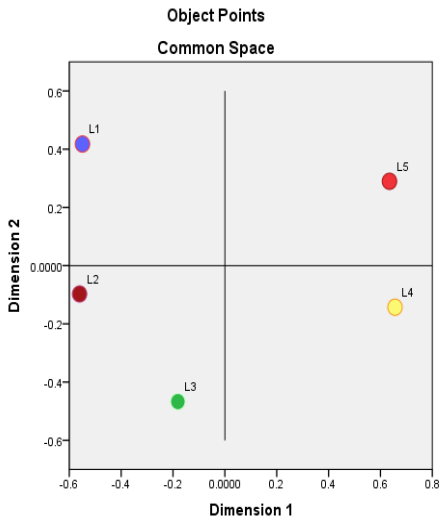

Fig. 4

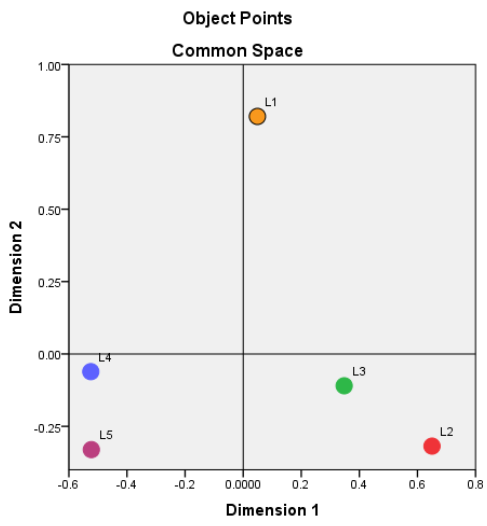

Fig. 5

Fig. 4 Jaccard similarity co-efficient between various locations of study site
Fig. 5 Sorenson similarity coefficient between various locations of study site

Table 4 Percentage of Genera and species occurences in the study area

S.NO.	Family	Genera (G)	G%	Species (S)	S%	G:S
1.	Acanthaceae	4	1.4	5	1.4	0.8:1
2.	Acoraceae	1	0.4	1	0.3	1:1
3.	Adiantaceae	1	0.4	4	1.1	0.25:1
4.	Amaranthaceae	3	1.1	4	1.1	0.75:1
5.	Anacardiaceae	4	1.4	4	1.1	1:1
6.	Apiaceae	2	0.7	2	0.6	1:1
7.	Apocynaceae	2	0.7	2	0.6	1:1
8.	Aquifoliaceae	1	0.4	1	0.3	1:1
9.	Araceae	2	0.7	5	1.4	0.4:1
10.	Araliaceae	2	0.7	2	0.6	1:1
11.	Arecaceae	1	0.4	1	0.3	1:1
12.	Asparagaceae	4	1.4	5	1.4	0.8:1
13.	Aspleniaceae	1	0.4	4	1.1	0.25:1
14.	Asteraceae	25	9.0	25	7.2	1:1
15.	Athyriaceae	1	0.4	2	0.6	0.5:1
16.	Balsaminaceae	1	0.4	1	0.3	1:1
17.	Begoniaceae	1	0.4	1	0.3	1:1
18.	Berberidaceae	1	0.4	4	1.1	0.25:1
19.	Betulaceae	3	1.1	3	0.9	1:1
20.	Bombaceae	1	0.4	1	0.3	1:1
21.	Boraginaceae	2	0.7	2	0.6	1:1
22.	Brassicaceae	1	0.4	1	0.3	1:1
23.	Buxaceae	1	0.4	1	0.3	1:1
24.	Caesalpinaceae	2	0.7	5	1.4	0.4:1
25.	Campanulaceae	1	0.4	1	0.3	1:1
26.	Cannabaceae	1	0.4	1	0.3	1:1
27.	Caprifoliaceae	1	0.4	1	0.3	1:1
28.	Caryophyllaceae	2	0.7	2	0.6	1:1
29.	Celastraceae	1	0.4	1	0.3	1:1
30.	Commelinaceae	1	0.4	1	0.3	1:1
31.	Convolvulaceae	1	0.4	1	0.3	1:1
32.	Cornaceae	1	0.4	2	0.6	0.5:1
33.	Cucurbitaceae	2	0.7	2	0.6	1:1
34.	Cupressaceae	1	0.4	1	0.3	1:1
35.	Cuscutaceae	1	0.4	1	0.3	1:1
36.	Daphniphyllaceae	1	0.4	1	0.3	1:1
37.	Dennstaedtiaceae	1	0.4	1	0.3	1:1
38.	Dioscoreaceae	1	0.4	2	0.6	0.5:1
39.	Dryopteridaceae	2	0.7	4	1.1	0.5:1
40.	Equisetaceae	1	0.4	1	0.3	1:1
41.	Ericaceae	4	1.4	4	1.1	1:1
42.	Euphorbiaceae	4	1.4	6	1.7	0.67:1
43.	Fagaceae	1	0.4	4	1.1	0.25:1
44.	Gentianaceae	1	0.4	2	0.6	0.5:1

Table 4 : Continued...

S.NO.	Family	Genera (G)	G%	Species (S)	S%	G:S
45.	Geraniaceae	1	0.4	1	0.3	1:1
46.	Gesneriaceae	2	0.7	2	0.6	1:1
47.	Gleicheniaceae	1	0.4	1	0.3	1:1
48.	Hydrangeaceae	2	0.7	2	0.6	1:1
49.	Juglandaceae	2	0.7	2	0.6	1:1
50.	Lamiaceae	13	4.7	14	4.0	0.93:1
51.	Lardizabalaceae	1	0.4	1	0.3	1:1
52.	Lauraceae	6	2.2	8	2.3	0.75:1
53.	Leguminosae	7	2.5	8	2.3	0.88:1
54.	Linaceae	1	0.4	1	0.3	1:1
55.	Loranthaceae	1	0.4	1	0.3	1:1
56.	Lythraceae	1	0.4	1	0.3	1:1
57.	Malvaceae	4	1.4	5	1.4	0.8:1
58.	Melastomataceae	1	0.4	1	0.3	1:1
59.	Meliaceae	2	0.7	2	0.6	1:1
60.	Menispermaceae	3	1.1	3	0.9	1:1
61.	Mimosaceae	1	0.4	1	0.3	1:1
62.	Moraceae	2	0.7	9	2.6	0.22:1
63.	Myrtaceae	1	0.4	1	0.3	1:1
64.	Nyctaginaceae	2	0.7	2	0.6	1:1
65.	Oleaceae	3	1.1	3	0.9	1:1
66.	Oleandraceae	1	0.4	1	0.3	1:1
67.	Orchidaceae	17	6.1	19	5.5	0.89:1
68.	Oxalidaceae	1	0.4	2	0.6	0.5:1
69.	Paeoniaceae	1	0.4	1	0.3	1:1
70.	Papaveraceae	1	0.4	1	0.3	1:1
71.	Pentaphylacaceae	1	0.4	1	0.3	1:1
72.	Phrymaceae	1	0.4	1	0.3	1:1
73.	Phyllanthaceae	2	0.7	4	1.1	0.5:1
74.	Phytolaccaceae	1	0.4	1	0.3	1:1
75.	Pinaceae	2	0.7	3	0.9	0.67:1
76.	Piperaceae	1	0.4	1	0.3	1:1
77.	Plantaginaceae	2	0.7	2	0.6	1:1
78.	Poaceae	15	5.4	15	4.3	1:1
79.	Polygonaceae	4	1.4	5	1.4	0.8:1
80.	Polypodiaceae	7	2.5	10	2.9	0.7:1
81.	Portulacaceae	1	0.4	1	0.3	1:1
82.	Primulaceae	1	0.4	1	0.3	1:1
83.	Pteridaceae	6	2.2	10	2.9	0.6:1
84.	Ranunculaceae	4	1.4	4	1.1	1:1
85.	Rhamnaceae	1	0.4	2	0.6	0.5:1
86.	Rosaceae	11	4.0	17	4.9	0.65:1
87.	Rubiaceae	4	1.4	5	1.4	0.8:1
88.	Rutaceae	2	0.7	3	0.9	0.67:1

Table 4 : Continued…

S.NO.	Family	Genera (G)	G%	Species (S)	S%	G:S
89.	Sabiaceae	1	0.4	1	0.3	1:1
90.	Salicaceae	2	0.7	2	0.6	1:1
91.	Santalaceae	1	0.4	1	0.3	1:1
92.	Sapindaceae	3	1.1	3	0.9	1:1
93.	Saururaceae	1	0.4	1	0.3	1:1
94.	Saxifragaceae	1	0.4	1	0.3	1:1
95.	Schisandraceae	1	0.4	2	0.6	0.5:1
96.	Scrophulariaceae	1	0.4	1	0.3	1:1
97.	Smilacaceae	1	0.4	2	0.6	0.5:1
98.	Solanaceae	3	1.1	6	1.7	0.5:1
99.	Symplocaceae	1	0.4	1	0.3	1:1
100.	Taxaceae	1	0.4	1	0.3	1:1
101.	Thymelaeaceae	1	0.4	1	0.3	1:1
102.	Trilliaceae	1	0.4	1	0.3	1:1
103.	Ulmaceae	1	0.4	1	0.3	1:1
104.	Urticaceae	9	3.2	9	2.6	1:1
105.	Valerianaceae	1	0.4	1	0.3	1:1
106.	Verbenaceae	1	0.4	1	0.3	1:1
107.	Violaceae	1	0.4	2	0.6	0.5:1
108.	Vitaceae	4	1.4	4	1.1	1:1
109.	Zingiberaceae	2	0.7	2	0.6	1:1
Total		**278**		**348**		

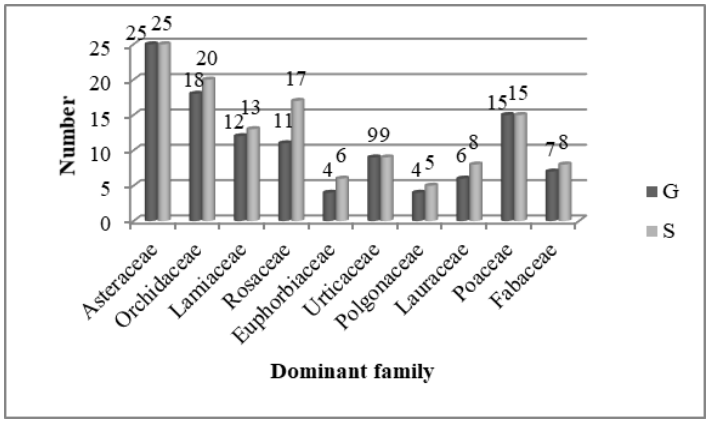

Fig. 6 Dominant families with their respective genera and species count from the study area.

Other representative families found in the study area were Saxifragaceae, Acoraceae, Brassicaceae, Caprifoliaceae, Cannabaceae, Convolvulaceae, Symplocaceae, Cactaceae, Arecaceae, Piperaceae, Taxaceae, Scrophulariaceae, Ulmaceae, Linaceae, Valerianaceae, Phytolaccaceae, Saururaceae, Lardizabalaceae, Sabiaceae, Daphniphyllaceae, Thymelaeaceae, Paeoniaceae, Pentaphylacaceae, Tiliaceae, Buxaceae, Loranthaceae, Celastraceae, Geraniaceae, Balsaminaceae, Verbenaceae, Cuscutaceae, Trilliaceae, Bombaceae, Begoniaceae, Lythraceae, Myrtaceae, Papaveraceae, Salicaceae, Primulaceae, Melastomaceae, Santalaceae, Commelinaceae, Phrymaceae, Aquifoliaceae and Campanulaceae, each with one species.

Dominant families

Among the genera *Ficus* was found dominant with 8 species followed by *Rubus*, *Quercus*, *Berberis*, *Arisaema* (4 species each), *Phyllanthus*, *Solanum*, *Euphorbia*, *Cassia* (3 species each), *Rumex*, *Dendrobium*, *Oberonia*, *Zanthoxylum*, *Leucas*, *Oxalis*, *Potentilla*, *Rosa*, *Cotoneaster*, *Cyathula*, *Pinus*, *Litsea*, *Nicotina*, *Bauhinia*, *Desmodium*, *Viola*, *Rhamnus*, *Schisandra*, *Smilax*, *Cornus*, *Sapindus*, *Gentiana*, *Justicia*, *Galium* and *Sida* (2 species each).

Other reported genera with only sole taxon from the surveying sites were *Acer*, *Achyranthes*, *Acorus*, *Aerides*, *Aeschynanthus*, *Aesculus*, *Agave*, *Ageratum*, *Agrimonia*, *Ainsliaea*, *Ajuga*, *Albizia*, *Amaranthus*, *Ampelocissus*, *Anaphalis*, *Anemone*, *Anisomales*, *Artemisia*, *Asparagus*, *Begonia*, *Berginia*, *Bidens*, *Boehmeria*, *Boenninghausenia*, *Boerhavia*, *Bombax*, *Bulbophyllum*, *Buxus*, *Calanthe*, *Callicarpa*, *Campanula*, *Cardamine*, *Carpesium*, *Carrisa*, *Casearia*, *Celtis*, *Centella*, *Cephalanthera*, *Chamaerops*, *Cicerbita*, *Cichorium*, *Cinnamomum*, *Cirsium*, *Cissampelos*, *Clematis*, *Clinopodium*, *Coelogyne*, *Colebrookea*, *Colocasia*, *Commelina*, *Cotinus*, *Crepidium*, *Crotalaria*, *Cryptolepis*, *Cucumis*, *Cuscuta*, *Cymbidium*, *Dalbergia*, *Daphne*, *Daphniphyllum*, *Datura*, *Debregeasia*, *Dendrophthoe*, *Deutzia*, *Dicliptera*, *Dipsacus*, *Drymaria*, *Duchesnea*, *Eclipta*, *Emilia*, *Engelhardia*, *Erigeron*, *Euonymus*, *Eupatorium*, *Eurya*, *Fagopyrum*, *Falconeri*, *Flemingia*, *Fragaria*, *Fraxinus*, *Fumaria*, *Galinsoga*, *Gastrochilus*, *Gaultheria*, *Geradiana*, *Geranium*, *Gerbera*, *Gonostegia*, *Goodyrea*, *Grewia*, *Hedera*, *Hedychium*, *Henckelia*, *Himalrandia*, *Holboellia*, *Houttuynia*, *Hydrangea*, *Hydrocotyle*, *Ilex*, *Impatiens*, *Indigofera*, *Inula*, *Jasminum*, *Juglans*, *Kingidium*, *Lantana*, *Lecanthus*, *Leptodermis*, *Leptopus*, *Lindenbergia*, *Lindera*, *Litsea*, *Lyonia*, *Machilus*, *Mallotus*, *Mazus*, *Melia*, *Meliosma*, *Micromeria*, *Mirabilis*, *Morus*, *Myrica*, *Nervilia*, *Ocotea*, *Ophiopogon*, *Origanum*, *Osbeckia*, *Osmanthus*, *Paeonia*, *Parietaria*, *Paris*, *Parochetus*, *Parthenium*, *Parthenocissus*, *Peperomia*, *Perilla*, *Persicaria*, *Pholiodata*, *Phytolacca*, *Pilea*, *Pimpinella*, *Pistacia*, *Plantago*, *Pogostemon*, *Polygonum*, *Portulaca*, *Pouzolzia*, *Primula*, *Prinsepia*, *Prunus*, *Pseudognaphalium*, *Pyrecantha*, *Pyrus*, *Ranunculus*, *Reinwarditia*, *Rhododendron*, *Rhus*, *Rhynchostylis*, *Roscoea*, *Rubia*, *Salvia*, *Satyrium*, *Senecio*, *Shuteria*, *Sigesbeckia*, *Sonchus*, *Stellaria*, *Stephania*, *Strobilanthes*, *Symplocos*, *Synotis*, *Syzygium*, *Taraxacum*, *Tetrastigma*, *Thalictrum*, *Tinospora*, *Toona*, *Tricosanthes*, *Tridax*, *Triumfetta*, *Ulmus*, *Urnea*, *Valeriana*, *Vanda*, *Verbascum*, *Viscum*, *Vitex*, *Woodfordia*, *Xanthium*, *Zeuxine*.

Diversity of Pteridophytes

Total 38 species of Pteridophytes belonging to 10 families were recorded from the study area. Polypodiaceae and Pteridaceae were the dominant families with 10 species each followed by Adiantaceae, Aspleniaceae, Dryopteridaceae (4 species each), Athyriaceae (2 species) and Equisetaceae, Oleandraceae, Gleicheniaceae, Dennstaedtiaceae (1 species each).

Adiantum and *Asplenium* were the dominant genera having a maximum number of species (4) followed by *Drynaria* and *Pteris* (3 species each), *Diplazium*, *Lepisorus*, *Phymatosorus*, *Cheilanthes*, *Onychium*, *Polystichum* and *Dryopteris* (2 species each) and *Equisetum*, *Microsorum*, *Polypodioides*, *Phlebodium*, *Athyrium*, *Vittaria*, *Coniogramme*, *Oleandra*, *Dicranopteris* and *Hypolepis* (1 species each).

Total 12 habitats or niches as Lauraceous mixed forest, Mixed oak forest, *Alnus* mixed forest, *Rhus* forest, moist shady places, Grassy land, Pine stand, Forest edges, Field edges, road sides, disturbed land and near water bodies were identified. The maximum species count were recorded in Lauraceous mixed forest (93 species) followed by 51 taxa in mixed oak forest, *Alnus* forest (35 species), cultivated field edges (34 species), *Rhus* forest (32 species), road sides (26 species), Pine stand, forest edges (20 species each), grassy land (17 species), moist areas (15 species), disturbed land (3 species) and near water bodies (2 species). Species richness with respect to their habitats was plotted in 2D graph **(Figure 7).**

From the study area, the proportion of a family to genus was enumerated as 1:2.55, family to species (1:3.19) and a genus to species was 1:1.25.

The reported figure of floristic study was compared to the other flora of the region **(Table 5)**.

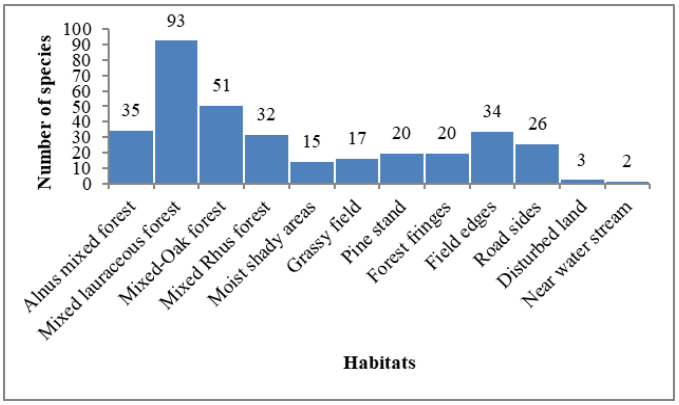

Fig. 7 Species count in different habitats of study area

Table 5 Comparison of the present floristic or flora with other floras.

Flora	Source	Family (F)	Genera (G)	Species (S)	F:G	G:S
Lower catchments of Mandakini-upper Khom shrine, Garhwal, UK.	Present study	109	278	348	1:2.55	1:1.25
Mandal Chopta, Garhwal, UK.	Gairola et al., 2009b	93	249	338	1:2.68	1:1.36
Chaurangikhal, Garhwal, UK.	Sarvesh Suyal et al.	69	159	231	1:2.30	1:1.45
Chamoli, Garhwal, UK.	Naithani, 1984-85	163	892	1934	1:5.47	1:2.17
Garhwal Himalaya, UK.	Gaur, 1999	189	978	2035	1:5.17	1:2.08
British India	Hooker, 1872-1897	174	2346	14384	1:13.48	1:6.13
Mussorie, UK.	Raizada & Saxena 1978	131	649	1219	1:4.95	1:1.88

DISCUSSION

Tropical-temperate/montane forests of Himalaya are characterised by graded topographical attributes and manifest as variation in elevation, precipitation, humidity soil type, slope, aspect and light period or radiation. Species dispersion relies on the features that determine their reproduction and survival (Young et al., 2002). Inventory and monitoring of biodiversity of an area is prerequisite for conservation and management planning (Samant and Joshi, 2003). The present study area was found rich and healthy in respect to species diversity. Occurences of 57 species of trees, 6 small trees, 2 herb like plants, 198 herbs and 29 species of climbers indicate good climatic conditions in this area of study that provides a congenial environment for vegetation growth.

In the present study, 10 dominant families as Asteraceae, Orchidaceae, Lamiaceae, Rosaceae, Euphorbiaceae, Urticaceae, Polygonaceae, Lauraceae, Poaceae and Fabaceae recorded as dominant families in the study area. All the dominant families, except Lauraceae, were found widely distributed across the elevational gradient. These families revealed 70% similarities with the dominant families of India. *Ficus*, *Rubus*, *Quercus*, *Phyllanthus*, *Solanum*, *Arisaema*, *Dendrobium*, *Pinus*, *Viola*, *Cornus* and *Sida* have been noted as the dominant genera of the study site. *Mallotus philippensis*, *Quercus leucotrichophora* and *Lyonia ovalifolia* were recorded a dominant species at a lower elevation (879-1556) and *Litsea* was recorded a predominant sp. at the upper elevation (1757-2349). High species diversity with graded elevation from the lower tropical to the upper temperate region indicated that more favourable conditions and less biotic interferences prevailed. *Taxus wallichiana* and *Paris polyphylla* were recorded as rare in the study area and due to over collection for medicinal purposes. *Kingidium taenialis*, an orchid species recorded thinly scattered probably due to less availability of preferred host plants and the high rate of disturbances. The members of these families are highly tolerant, and have adaptive ability and high regeneration and dispersal abilities.

Unplanned activities and habitat degradation are reasons of species banishment. Degradation in the Himalayan region has reached in alarming state (Gupta, 1960; Gaur, 1982, 1999). The construction of roads, hydroelectric power project, overgrazing, and forest fire have lead the reduction of species richness. Furthermore, lopping for fodder, fuel wood collection, removal of duff and litter from the forest floor may leave a severe impact on plant diversity of the area.

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CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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