Lichen Flora Of Niti Area From Garhwal Himalaya, Uttarakhand

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Abstract: The paper deals first time with the lichen flora of way of Gamsali to Niti area of Chamoli district, Uttarakhand. A total 43 species belonging to 32 genera and 13 families from the area have been reported. Among the different growth forms of lichen, foliose lichens exhibit their dominance with 21 species followed by 14 species of crustose and 8 species fruticose form respectively. Most of the lichen growing sequence of corticolous < terricolous < saxicolous lichen species followed by 22, 18 and 9 respectively. Total 13 species of lichens are medicinally important. The available information regarding lichen diversity provides baseline data which will be useful in conducting future biomonitoring studies and developing conservation strategies in the valley.
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1. Introduction

Recently Indian lichens were achieved that revealed the occurrence of more than 2300 species from India (Singh & Sinha 2010). The Niti valley area is situated in higher temperate and alpine region of Chamoli district in the Himalayas. Being situated at higher altitudes of 2800-3600m, the Niti valley area exhibit luxuriant growth of many lichens particularly the lichen genera growing on soil (terricolous) and exposed rock (saxicolous). First time lichen flora has recorded from Niti area. The Gamsali, Bampa and bank of river Dhauli Ganga are the major temperate localities within Niti Valley comprised of dense coniferous forest of *Taxus baccata, Cedrus deodara, Pinus wallichiana* and bears luxuriant growth of lichen.

The long stretches of grasslands interspersed with snow streams in higher altitudes of Niti area the characteristic features of alpine meadows. The area bears good growth of many terricolous lichens together with herbaceous plants. Within the alpine regions of Niti the dry arid areas show xerophytic type of vegetation represented by scanty growth of *Juniperus, Jruinea, Artemisia* shrubs together with *Ephedra* and *Hippophae* in riverine and rocky situation. The dry and exposed habitats exhibit growth of some exclusive lichen species on rocks and soil.

2. Materials and Methods

In August-September 2007 more than 450 specimens of lichens were collected from the different available substrates Niti and Gamsali area. The specimens were identified in respect of their morphology, anatomy and chemistry. The chemistry of all the specimens were performed by both colour spot tests (K, C, Pd) followed by thin layer chromatographic (TLC) methods as described by Walker & James (1980).The chromatograms were developed in solvent A (Toluene: 1-4 dioxane: acetic acid 180: 60: 8 ml). The collected specimens were identified with the help of recent literature of Awasthi (1988, 1991, 2000, 2007); Divakar and Upreti (2005); Nayaka, (2004); Joshi, Y., (2008). The specimens are deposited in the herbarium of National Botanical Research Institute (CSIR) Lucknow (LWG).

3. Result

In (Table No.1) 143 species belonging to 32 genera and 13 families of lichens from Niti area. Among the different substrates, the trees host the maximum diversity of lichens represented by 22 species followed by 18 saxicolous and 11 terricolous (soil inhabiting) lichens. The area shows good growth of medicinal lichens, represented by 13 species. In Niti area, *Pinus wallichiana, Taxus baccata* are the common host tree for the lichens.

Niti area dominance of Parmelioid lichens represented by 19 species. The probable resion for scarce or poor growth of lichens on various coniferous trees may be attributed to the factors such as rocky dry area, having thinned out, open forest and stunted growth of trees. The area show good growth of saxicolous lichens as 18 species the common species are *Xanthoparmelia stenophylla* (Ach.) Ahti & D. Hawksw., *Rhizoplaca peltata* (Ramond) Leuck. & Poelt., *Xanthoparmelia conspersa* (Ehrh. ex Ach.) Hale, *Diploschistes scruposus* (Schreb.) Norman, on soil or on soil over rocks recorded from the area.

	Table 1: Total lichen taxa of Niti and Gamsali areas in Chamoli district, Uttarakhand, India						
	Lichen species	**Families**	**Habitat**	**Habit**	**Gamsali**	**Niti**	**Amt**
1	*Amandinea punctata* (Hoffm.) Coppins & Scheid.	**Caliciaceae**	Saxicolous,	Crustose	+	-	-
2	*Chrysothrix candelaris* (L.) J. R. Laundon	**Chrysothricaceae**	Corticolous, Saxicolous	Crustose	-	+	-
3	*Cladonia fimbriata* (L.) Fr.	**Cladoniaceae**	Corticolous	Fruticose	+	-	+
4	*Cladonia furcata* (Huds.) Schrad.	**Cladoniaceae**	Saxicolous, Terricolous	Fruticose	-	+	+
5	*Cladonia pyxidata* (L.) Hoffm.	**Cladoniaceae**	Terricolous	Fruticose	+	-	+
6	*Leptogium burnetii* Dodge	**Collemataceae**	Corticolous, Terricolous	Foliose	+	-	-
7	*Lecanora frustulosa* (Dickson) Ach.	**Lecanoraceae**	Corticolous	Crustose	-	+	-
8	*Lecanora muralis* (Schreb.) Rabenh.	**Lecanoraceae**	Saxicolous,	Crustose	-	+	+
9	*Lobothallia alphoplaca* (Wahlenb.) Hafellner	**Megasporaceae**	Saxicolous,	Crustose	-	+	
10	*Allocetraria nygricascens* (Nyl.) Karnefelt & Thell	**Parmeliaceae**	Terricolous	Foliose	-	+	-
11	*Dolichousnea longissima* (Ach.) Articus	**Parmeliaceae**	Corticolous	Fruticose	-	-	+
12	*Evernia mesomorpha* Nyl.	**Parmeliaceae**	Corticolous	Fruticose	+	+	-
13	*Everniastrum cirrhatum* (Fr.) Hale ex Sipaman	**Parmeliaceae**	Corticolous	Foliose	-	+	+
14	*Flavoparmelia caperata* (L.) Hale	**Parmeliaceae**	Corticolous, Saxicolous	Foliose	+	-	+
15	*Flavopunctelia flaventior* (Stirton) Hale	**Parmeliaceae**	Corticolous	Foliose	+	-	-
16	*Flavopunctelia soredica* (Nyl.) Hale	**Parmeliaceae**	Corticolous	Foliose	+	-	-
17	*Hypogymnia tubulosa* (Schaer.) Hav.	**Parmeliaceae**	Corticolous	Foliose	+	-	-
18	*Melanelia tominii* (Oxner) Essl.	**Parmeliaceae**	Saxicolous	Foliose	-	+	-
19	*Melanelixia fuliginosa* (Fr.ex Duby) O. Blanco Crespo, Divakar, Essl. D. Hawksw.	**Parmeliaceae**	Saxicolous,	Foliose	-	+	-
20	*Melanelixia vilosella*(Essl.) O. Blanco Crespo, Divakar, Essl. D. Hawksw..	**Parmeliaceae**	Corticolous	Foliose	+	+	-
21	*Parmelia sulcata* Taylor	**Parmeliaceae**	Corticolous	Foliose	+	-	+
22	*Parmotrema rampoddense* (Nyl.) Hale	**Parmeliaceae**	Corticolous	Foliose		+	
23	*Rhizoplaca peltata* (Ramond) Leuck. & Poelt.	**Parmeliaceae**	Saxicolous,	Foliose	-	+	-
24	*Xanthoparmelia bellatula* (Kurok. & Filson) Elix & Johnston	**Parmeliaceae**	Terricolous	Foliose	-	+	-
25	*Xanthoparmelia conspersa* (Ehrh. ex Ach.) Hale	**Parmeliaceae**	Saxicolous,	Foliose	-	+	+
26	*Xanthoparmelia stenophylla* (Ach.) Ahti & D. Hawksw.	**Parmeliaceae**	Saxicolous,	Foliose	-	+	-
27	*Usnea perplexans* Stirton	**Parmeliaceae**	Corticolous	Fruticose	+	-	-
28	*Usnea subfloridana* Stirton	**Parmeliaceae**	Corticolous	Fruticose	+	-	-
29	*Vulpicida pinastri* (Scop.) Mattsson	**Parmeliaceae**	Corticolous	Foliose	+	-	-
30	*Peltigera didactyla* (With) J. R. Laundon	**Peltigeraceae**	Terricolous	Foliose	+	-	-
31	*Peltigera praetextata* (Flörke ex Sommerf.) Vain.	**Peltigeraceae**	Corticolous , Terricolous	Foliose	+	-	+
32	*Peltigera rufescens* (Weiss) Humb.	**Peltigeraceae**	Terricolous	Foliose	+	-	+
33	*Anaptychia kaspica* Gyeln.	**Physciaceae**	Corticolous	Foliose	-	+	-
34	*Dimelaena oreina* (Ach.) Norman	**Physciaceae**	Saxicolous,	Crustose	-	+	-
35	*Physcia gomukensis* D. D. Awasthi & S. R. Singh	**Physciaceae**	Saxicolous,	Foliose	-	+	-
36	*Physcia stellaris* (L.) Nyl.	**Physciaceae**	Corticolous	Foliose	-	+	-
37	*Physconia detersa* (Nyl.) Nyl.	**Physciaceae**	Corticolous, Saxicolous	Foliose	+	-	-
38	*Porpidia macrocarpa* (DC.) Hertel & A. J. Schwab	**Porpidiaceae**	Saxicolous,	Crustose	-	+	-
39	*Ramalina sinensis* Jatta	**Ramaliaceae**	Corticolous	Fruticose	+	-	+
40	*Rhizocarpon geographicum* (L.) DC.	**Rhizocarpaceae**	Saxicolous,	Crustose	-	+	-
41	*Caloplaca saxicola* (Hoffm.) Nordin	**Teloschistaceae**	Saxicolous,	Crustose	+	+	-
42	*Xanthoria sorediata* (Vain.) S. Kondratyuk & Karuefelt	**Teloschistaceae**	Saxicolous,	Foliose	+	-	-
43	*Diploschistes scruposus* (Schreb.) Norman	**Thelotremataceae**	Terricolous	Crustose	+	-	+

The sites chosen have subalpine climatic characteristics and lichen vegetation which plays a significant part in the evolution of the soils that it colonizes (Asta 2001). The most common lichen species of the area *Evernia mesomorpha, Peltigera praetextata* (Flörke ex Sommerf.) Vain., *Peltigera didactyla* (With) J. R. *Peltigera rufescens* (Weiss) Humb., and *Xanthoparmelia bellatula* (Kurok. & Filson) Elix & Johnston are terricolous species grow on moist vertical slopes along with mosses indicates the moist and humid condition of forest. The Niti area situated on the top of mountain has frequent landslides due to melting of glaciers. The landslides not only destroy the tree vegetation but also remove the top soil and thus resulted into loss of both terricolous and corticolous lichens. Niti and Gamsali areas total 13 species of lichens having medicinal properties. *Cladonia fimbriata* (L.) Fr., *Allocetraria nygricascens* (Nyl.) Karnefelt & Thell, *Flavoparmelia caperata* (L.) Hale and *Flavopunctelia flaventior* (Stirton) Hale are the commen medicinal lichen species from the area.

The available enumeration of the lichen from Niti area will be helpful in documentation of lichens from the Nanda Devi Biosphere Reserve will also provide status of the diversity of medicinally important lichens of the area. The present number of species, their distribution on different substrate will act as baseline data to carry out biomonitorying studies in the area in future.

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