



Research article

Additions to lichen flora of Jammu and Kashmir, India

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Abstract: The paper deals with the addition of 44 species to the knowledge of lichen flora of Jammu & Kashmir state, India. The corticolous (25) lichens exhibit their dominance in the area of study followed by saxicolous (16), lignicolous (2) and terricolous (1) forms.

Keywords: Diversity - Hot spot - Doda - Himalayas - Altitude

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INTRODUCTION

State of Jammu and Kashmir lies between 32°17' and 36°58' north latitudes and 73°26' and 80°30' east longitudes and exhibits varied climate associated with wide altitudinal deviations. As such it provides a wide range of substrates for growth and colonisation of lichens. It is often called as 'Hot Spot' for lichen diversity in India (Sheikh *et al.* 2006a). Inspite of this, lichen collection started late here in early thirties of last century (Smith 1931). Comprehensive accounts came later. First of this series was by Sheikh *et al.* (2006a, b). The authors listed a total of 279 lichen species from the state. The collections made by these authors were from diverse areas, which included Achabal, Pahalgam, Kukernag, Verinag, Baltal, Neh Nar Glacier, Mamal village; Kangan, Shankaracharya Hill, Ganderbal, Zaberwan, Sonmarg, Harwan Garden, Prang Garden, Shalimar Garden, Gulmarg, Baba Rishi, Yarikah Pine Forest, Tangmarg, Drang Forest, Khilanmarg, Ferozpur; Awantipura, Pingalgam & Goosu, Yusmarg, Pulwama and Budgam all from Kashmir region; Nandini Hill, Jammu University Campus, Mansar Lake, Nagrota, Vijaypur, Nud, Banihal, Kishtwar, Chinta valley, Ramtund Forest area, Kaplash & Bhaderwah from Jammu region and Hemis National Park from Ladakh region. 30 species from Mansar-Surinsar wildlife Sanctuary of Jammu were added to this list later in 2009. Solan (2010) enumerated 18 species belonging to 15 genera and 10 families from Ramnagar Wildlife Sanctuary, Jammu. Later inclusions were 77 species from Kishtwar, Rajouri and Jammu districts by Sheikh *et al.* (2013), 18 species from Nandini Wildlife Sanctuary by Goni *et al.* (2013), 24 species from Zaskar valley, Ladakh by Kumar *et al.* (2014) and 25 species from Kargil district of Ladakh region by Rahim *et al.* (2014). A checklist of lichen flora of Jammu and Kashmir by Goni *et al.* (2015) revealed the occurrence of 356 species of lichens belonging to 35 families and 91 genera.

These wide collections however do not include several areas of the state. One such area is district Doda of Jammu region lying between 33°08' to 33°24' North latitude and 75°23' to 75°49' East longitude and covering an area of 4,500 km² with an altitude varying from 914 to 4267 meter above mean sea level. This wide district characterized by a wide range of climatic and physiographic conditions, providing thereby different type of habitats. Our survey of this area led us to a collection of about 500 lichen samples. Complete identification of these resulted in the addition of 44 species to the lichen flora of J&K state. This communication depicts these additions.

MATERIALS AND METHODS

During the period 2011–2014, various localities in the Doda district were surveyed for the collection of lichens. The specimens were collected from base to chest height of tree trunk and from all other available substrates.

Identification of the collected specimens was done using relevant keys and literature (Awasthi 1991, 2000, 2007, Nayaka, 2004, Divakar & Upreti, 2005). In the laboratory, the specimens were investigated

morphologically, anatomically and chemically. Chemistry was studied with the help of colour spot tests and thin layer chromatography. The colour tests were performed with the usual chemical reagents which included 5% KOH solution (K-test), aqueous solution of calcium hypochlorite (C-test) and paraphenylene diamine (PD test). Lichen substances were investigated with the thin layer chromatography (TLC) in solvent system A (180 toluene: 60 dioxane: 8 acetic acid) using the technique of Culberson (1972) and Walker and James (1980).

RESULTS AND DISCUSSIONS

The paper deals with a survey of district Doda of J&K state and enumeration of 44 species belonging to 27 genera and 18 families which are new additions to the lichen flora of J&K state (Table 1). Among the various growth forms collected presently crustose forms (29) were the dominant followed by fruticose (7), foliose (6) and squamulose (2) forms. On the basis of substratum type, 25 species have been observed to be corticolous, while 16 species have been recorded as saxicolous forms. Lignicolous and terricolous forms are represented by 2 and 1 species respectively. *Graphidaceae* (7 species) was the dominant family followed by *Parmeliaceae* and *Ramalinaceae* (6 species each), *Teloschistaceae* (4 species); *Lecanoraceae* and *Physciaceae* (3 species each); *Cladoniaceae* (2 species); *Verrucariaceae* and *Lecideaceae* (2 species); *Acarosporaceae*, *Arthoniaceae*, *Coniocybaceae*, *Lichinaceae*, *Megasporaceae*, *Pannariaceae*, *Peltigeraceae*, *Pyrenulaceae* and *Trapeliaceae* (1 species each). *Caloplaca appressa*, *Cladonia didyma*, *Dimelaena oreina*, *Lichinella cribellifera*, *Melanelia tominii*, *Porpidia albocoerulescens*, *Verrucaria laevata*, *Verrucaria margacea* and *Xanthoparmelia antleriformis* are some of the major lichen species collected from the study area (Fig. 1).

Table 1. Lichens of Doda district (J&K State) enumerated with their growth forms and substratum from Doda district of J&K state.

S. No.	Taxa	Growth form	Substrate	Place of collection	Altitude
1	<i>Acarospora tominiana</i> Magnusson	Crustose	Saxicolous	Nalhi	1795 m
2	<i>Arthonia radiata</i> (Pers.) Ach.	Crustose	Corticolous	Sartingal	1700 m
3	<i>Aspicilia dwaliensis</i> Räsänen	Crustose	Saxicolous	Khanpura	1594 m
4	<i>Bacidia alutacea</i> (Kremp.) Zahlbr.	Crustose	Corticolous	Dandi	1603 m
5	<i>Bacidia medialis</i> (Tuck. ex Nyl.) Zahlbr.	Crustose	Corticolous	Dandi	1607 m
6	<i>Bacidia submedialis</i> (Nyl.) Zahlbr.	Crustose	Corticolous	Dandi	1606 m
7	<i>Buellia disjecta</i> Zahlbr. in Hand.ñ Mazz.	Crustose	Saxicolous	Drudoo	1329 m
8	<i>Buellia palmienis</i> S.R. Singh & D.D. Awasthi	Crustose	Saxicolous	Batogra	1905 m
9	<i>Caloplaca appressa</i> Wetmore & Kärnefelt	Crustose	Saxicolous	Phigsoo	1350 m
10	<i>Caloplaca granularis</i> (Müll. Arg.) Zahlbr.	Crustose	Corticolous	Khani	2124 m
11	<i>Caloplaca lithophila</i> H. Magn.	Crustose	Saxicolous	Gath	1198 m
12	<i>Caloplaca ochroplaca</i> Poelt & Hinter.	Crustose	Saxicolous	Chilli	1785 m
13	<i>Cladonia didyma</i> (Fée) Vain.	Fruticose	Lignicolous	Traun	1975 m
14	<i>Cladonia fruticulosa</i> Kremp.	Fruticose	Lignicolous	Traun	1990 m
15	<i>Chaenotheca chrysocephala</i> (Ach.) Th. Fr.	Crustose	Corticolous	Traun	1994 m
16	<i>Dimelaena oreina</i> (Ach.) Norman	Squamulose	Saxicolous	Bhella	1142 m
17	<i>Graphis arecae</i> Vain.	Crustose	Corticolous	Tanta	2100 m
18	<i>Graphis dendrogramma</i> Nyl. in Cromb.	Crustose	Corticolous	Dandi	1675 m
19	<i>Graphis epimelaena</i> Müll. Arg.	Crustose	Corticolous	Khanpura	1594 m
20	<i>Graphis leptocarpa</i> Fee	Crustose	Corticolous	Dandi	1687 m
21	<i>Graphis lineola</i> Ach.	Crustose	Corticolous	Udrana	1580 m
22	<i>Graphis longiramea</i> Müll. Arg.	Crustose	Corticolous	Dandi	1626 m
23	<i>Graphis scripta</i> (L.) Ach.	Crustose	Corticolous	Tanta	2089 m
24	<i>Fuscopannaria subgemmascans</i> Upreti & Divakar	Squamulose	Corticolous	Puneja	1900 m
25	<i>Lichinella cribellifera</i> (Nyl.) P. P. Moreno & Egea	Fruticose	Saxicolous	Shiwa	908 m
26	<i>Lecanora pseudargentata</i> Lumbsch	Crustose	Corticolous	Dareja	1780 m
27	<i>Lecanora sulphurescens</i> Fée	Crustose	Saxicolous	Dareja	1780 m
28	<i>Lecidella elaeochroma</i> (Ach.) M. Choisy	Crustose	Corticolous	Bhalla	1678 m
29	<i>Melanelia tominii</i> (Oksner) Essl.	Foliose	Corticolous	Tanta	1980 m
30	<i>Mycobilimbia hunana</i> (Zahlbr.) D.D. Awasthi	Crustose	Saxicolous	Seri	1271 m
31	<i>Parmelia squarrosa</i> Hale	Foliose	Corticolous	Sartingal	1851 m
32	<i>Parmelenella wallichiana</i> (Taylor) Hale	Foliose	Corticolous	Drudoo	1324 m
33	<i>Parmotrema pseudotinctorum</i> (Abbayes) Hale	Foliose	Corticolous	Seri	1391 m
34	<i>Peltigera collina</i> (Ach.) Schrad.	Foliose	Terricolous	Amira nagar	1723 m
35	<i>Porpidia albocoerulescens</i> (Wulfen) Hertel & Knoph	Crustose	Saxicolous	Khanpura	1595 m

36.	<i>Pyrenula mamillana</i> (Ach.) Trevis	Crustose	Corticolous	Khani	220 m
37.	<i>Ramalina farinacea</i> (L.) Ach.	Fruticose	Corticolous	Traun	2013 m
38.	<i>Ramalina intermedia</i> (Delise ex Nyl.) Nyl.	Fruticose	Corticolous	Puneja	1900 m
39.	<i>Ramalina subfarinacea</i> (Nyl.) Nyl.	Fruticose	Corticolous	Pranoo	1945 m
40.	<i>Trapelia placodioides</i> Coppins & P. James	Crustose	Saxicolous	Sartingal	1987 m
41.	<i>Usnea orientalis</i> Motyka	Fruticose	Corticolous	Traun	2034 m
42.	<i>Verrucaria laevata</i> Ach	Crustose	Saxicolous	Kursari	1857 m
43.	<i>Verrucaria margacea</i> (Wahlenb.) Wahlenb.	Crustose	Saxicolous	Kothi	1657 m
44.	<i>Xanthoparmelia antleriformis</i> (Elix) Elix & J. Johnst.	Foliose	Saxicolous	Shiwa	870 m

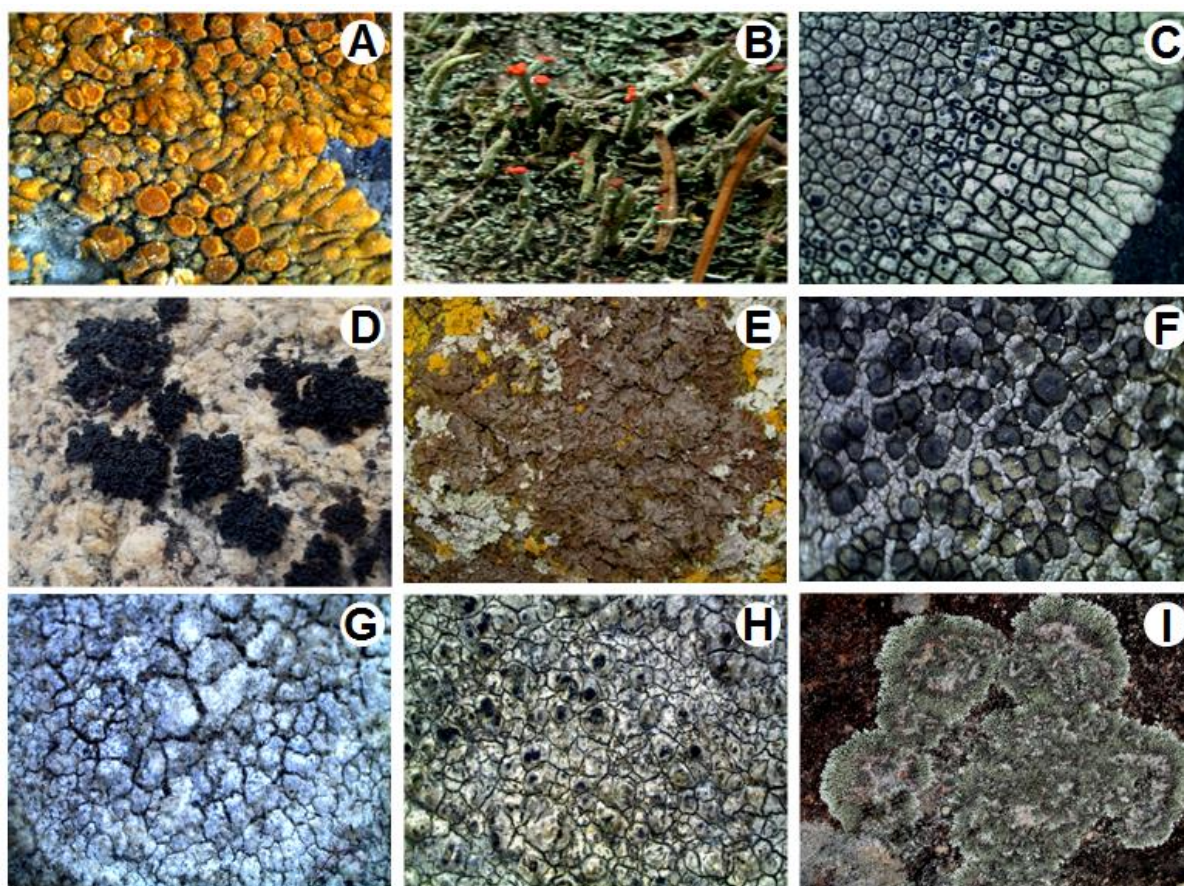


Figure 1. Some major lichens: **A**, *Caloplaca appressa*; **B**, *Cladonia didyma*; **C**, *Dimelaena oreina*; **D**, *Lichinella cribellifera*; **E**, *Melanelia tominii*; **F**, *Porpidia albocoerulescens*; **G**, *Verrucaria laevata*; **H**, *Verrucaria margacea*; **I**, *Xanthoparmelia antleriformis*.

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