

Group Name: Lichenology

Group Works On:

Lichens are the unique group of organisms made of symbiotic association between a photosynthetic partner (alga or cyanobacteria) and a heterotrophic fungus. Lichens are the most widely distributed group of organism and in the world about 20,000 species are known so far. India is represented by 2368 species belonging to 305 genera and 67 families.

About the Lichenology group

Lichenology group at CSIR-NBRI was established in the year 1961 by Dr. Ajay Singh during the directorial regime of Prof. K.N. Kaul. Today Lichenology laboratory of CSIR-NBRI is a leading group for lichenological studies in India and Asia. The laboratory is well equipped with state of art infrastructure for carrying out research in various aspects of Lichenology. The group deals with taxonomy (floristic and monographic studies) and allied aspects of Indian lichens, i.e. lichen bioprospection, air pollution monitoring and biodeterioration studies.

Objectives

- Revision of taxonomically complicated or less understood lichen taxa as per modern concept and preparation of monographs
- Survey and documentation of lichen diversity in different phytogeographical regions of India, with special reference to protected areas and ecologically interesting habitats
- Documenting lichen diversity and their physiological adaptation in East Antarctic
- Utilizing lichens for air pollution and climate change monitoring studies in different localities of India
- Understanding the physiological role of lichens in draught and desiccation tolerance
- Documenting the growth of lichens on monuments and historical building of India and studying their role in biodeterioration
- Bioprospection of lichens for various biological activities (antimicrobial, antioxidant, anticancer and hepatoprotective) and dye extraction

- *In vitro* culture of mycobiont of economically important lichens for mass production of biomass and desired metabolites
- Documenting lichens utilization in various ethnic groups of India

Facilities

- Advanced microscopes (stereozoom, compound and fluorescent) with photographic facilities
- Rich lichen herbarium (LWG) with 1,47,000 specimens from all phytogeographic regions of India, representing 1,600 species, 55 families and 190 genera. The herbarium also includes about 200 type specimens, 2000 exsiccates, 2500 specimens from Antarctica. The herbarium has the rich collection of parmelioid, pyrenocarpous, graphidaceous and cyanolichens
- Rich collection of lichen literature in the form of books and reprints
- Axenic culture room, incubators, growth chambers and other culture facilities
- Field kit with lichen collection articles and GPS

Major achievements

Up to 11th Five year Plan:

- Discovered about 100 new species
- Reported more than 200 new distributional records of lichens for India
- New combinations proposed for 20 taxa
- Participated in 3 Indian Scientific Expeditions to Antarctica
- Successfully completed or participated in 27 research projects
- Established collaboration with 22 universities and academic organization of India
- Produced 25 Ph.D. thesis
- Imparted short term training in various aspects of Lichenology to more than 50 students

In 12th Five year Plan:

NBRI in house projects

- Morphotaxonomic studies on some Graphidaceous lichen genera of India (Completed)
- Morphotaxonomic studies on microlichen genera of India (Completed)
- Floristic survey assessment and documentation of biodiversity and higher plants (Completed)
- Lichen diversity of North-East Himalayas (Completed)
- Assessing the lichen flora in the Upper Gangetic Plains (ongoing)
- Studies on Antarctic Lichens (on going)

Outside agencies like DBT / DST / MOEF etc.:

Completed projects

- Enumeration of lichens from Uttar Pradesh - UP State Biodiversity Board, Lucknow
- Screening of potential dye yielding Indian lichens and their mycobiont culture - Department of Science and Technology, New Delhi
- Status of lichen diversity of Uttaranchal and Jammu and Kashmir (AICOPTAX) - Ministry of Environment & Forests, New Delhi
- Status of lichen diversity in Himachal Pradesh (AICOPTAX) - Ministry of Environment & Forests, New Delhi
- Lichen diversity of Rewa and adjacent areas of Vindyanchal in relation to biomonitoring studies. Sponsored by Madhya Pradesh State Biodiversity Board - MP Biodiversity Board, Bhopal
- Studies on biological resource and documentation of traditional knowledge of Amarkantak Biosphere Reserve, Madhya Pradesh and Chattisgarh - Ministry of Environment & Forests, New Delhi
- Biodiversity assessment, prospection and conservation of plant resources of India - CSIR, New Delhi (Supra institutional, 11th Five Year Plan Project)
- Enhancing water utilization efficiency in crop plants: Prospecting plant diversity for genes and systems biology for drought tolerance - CSIR, New Delhi (Supra institutional, 11th Five Year Plan Project)
- Taxonomic studies and development of Herbarium for Bhimbetka forest - Archeological Society of India, Madhya Pradesh
- Pollution monitoring & mitigation devices and systems. Pollution monitoring with the help of lichens in some major cities of India - CSIR, New Delhi (Task Force project)

- Plant based screening technologies for monitoring of metal and metalloid pollution - CSIR, New Delhi (Network Project)
- Epiphytic lichen flora of *Pinus* and *Quercus* trees of Kumaon - Department of Science and Technology, New Delhi
- Lichen flora of Jim Corbett National Park - UP Council of Science and Technology, Lucknow
- A digitalized inventory of plant resources other economically important species, Part 2 - Department of Science and Technology, New Delhi
- Lichen flora of Great Himalayan National Park, Kullu - Wildlife Institute of India, Dehra Dun
- Study and comparison of lichen taxonomy and biodiversity of certain regions of Russian Arctic and high mountains areas (Himalayas) of India - Department of Science and Technology, New Delhi
- Ecological studies on the lichen flora of Katarniaghat Wildlife Sanctuary - UP Council of Science and Technology, Lucknow

Ongoing projects

- DBT Network Project: Bioprospection of potential lichens for treatment of liver disorders and their safety and toxicity - Department of Biotechnology, New Delhi
- Bioprospection of plant resources and other natural products - CSIR, New Delhi (12th Five Year Plan Project)
- Biodiversity assessment and bioprospection of lichens in Rayalaseema forests of Andhra Pradesh, India - CSIR, New Delhi (Sponsored scheme), in collaboration with Yogi Vemana University, Andhra Pradesh
- Assessing the lichen diversity in mangrove forests of Gujarat - Ministry of Environment and Forests, New Delhi
- Exploring suitable biomarker in some Indian lichens to serve as an early bioindicator system against changing environment - Department of Science and Technology, New Delhi

Foreign collaboration

- India is a center of high level of lichen diversity in the world. A detailed account of vulnerable lichens from this area was provided to the International Association of

Lichenology Committee for conservation of lichens (IALCC), Sweden, in developing a "Global Red List of Lichens"

- Contributor to worldwide database on Parmelioid lichens under 'Encyclopedia of Life (EOL)' programme

Areas open for collaboration

- Taxonomic revision and molecular analysis of interesting lichen taxa
- Lichen floristic survey in different phytogeographic regions of India
- Biomonitoring, biodeterioration, bioprospection studies on Indian lichens

Publications

- Research articles published about – 350
- Popular articles – 15
- Abstracts - 200
- Books published,
 - Singh, A. 1965. Lichens of India. *Bull. Natl. Bot. Gard. [Lucknow]* 93: 1-356.
 - Singh, A. 1980. *Lichenology in Indian Subcontinent 1966-77*. National Botanical Research Institute, Lucknow.
 - Upreti, D.K. & Nayak, S. 2004. *A field guide to the common lichens of Corbett Tiger Reserve*. Bishen Singh Mahendra Pal Singh, Dehra Dun.
 - Divakar, P.K. & Upreti, D.K. 2005. *Parmelioid lichens in India (A revisionary study)*. Bishen Singh Mahendra Pal Singh, Dehradun.
 - Nayaka, S. & Upreti, D.K. 2013. *Lichens of Uttar Pradesh*. U.P. State Biodiversity Board, Lucknow.
- Books edited,
 - Mukerji, K.G., Chamola, B.P., **Upreti, D.K.** & Upadhyay, R.K. (eds). 1999. *Biology of Lichens*. Aravali Books International, New Delhi.

Lichen taxa revised

Parmelioid lichens	Genus <i>Aspicilia</i>
Pyrenocarpus lichens	Genus <i>Diploschistes</i>
Graphidaceous lichens	Genus <i>Lecanora</i>
Lichinaceous lichens	Genus <i>Lecidea</i>
Pannaraceous lichens	Genus <i>Phyllospora</i>
Sterile crustose lichens	Genus <i>Porpidia</i>
Family Teloschistaceae	Genus <i>Stereocaulon</i>
Family Cladoniaceae	Genus <i>Tephromela</i>

Awards and recognitions

- Dr. D.K. Upreti – **Prof. B.A. Razi Medal Award (2006)**, Association for plant Taxonomy
- Dr. D.K. Upreti – **J.B.S. Haldane Memorial Scroll(1997)**, for contribution towards "Theoretical Studies on Environment", by Forum of Scientist for Peace and Development (FSPD) and Rais Ahmed Memorial Trust, New Delhi.
- Dr. D.K. Upreti – **Award of Excellence (2013)**, by the organizing committee of UGC Sponsored National Conference on Resource Management and its Sustainable Use, Rishikesh.
- Dr. D.K. Upreti – **Environment Conservation Award (2013)**, by the organizing committee of National Seminar on Environmental Issues and Challenges in the 21st Century (EICC-2013), Bareilly.

Protected area/ecologically interesting sites surveyed in India

- Nanda Devi Biosphere, Uttarakhand
- Amarkantak Achanakmar Biosphere Reserve, Madhya Pradesh & Chattisgarh
- Nilgiri Biosphere Reserve, Tamil Nadu
- Jim Corbett National Park, Uttarakhand
- Hemis National Park, Leh, J&K
- Great Himalayan National Park, Himachal Pradesh
- Kaziranga National Park, Assam

- Chail Wildlife Sanctuary, Himachal Pradesh
- Shilly Wildlife Sanctuary, Himachal Pradesh
- Lahul Spiti Cold Desert, Jammu & Kashmir
- Askote Sandev Botanical Hotspot, Uttarkhand
- Bondla Wildlife Sanctuary, Goa
- Bhagwan Mahavir Wildlife Sanctuary, Goa
- Cotigao Wildlife Sanctary, Goa
- Meghamalai Wildlife Sanctuary, Tamil Nadu
- Ratapani Wildlife Sanctuary, Madhya Pradesh
- Govind Wildlife Sanctuary, Uttarkashi, Uttarkhand
- Katarniya Ghat Wildlife Sanctuary, Uttar Pradesh

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