

## PTERIDOLOGY

### Group worked on

The Pteridophytes, consisting of ferns and fern allies, constitute a vast group of vascular cryptogams, the majority of them being restricted to sheltered, shaded humid habitat. Among these, the group of ferns is the most predominant all over the world. The Indian sub-continent is one of the richest in its Pteridophytic flora as regards the variety and abundance with over 1200 species. The taxonomy and nomenclature had undergone such radical changes that it was considered necessary to study the taxonomy and nomenclature of Indian filicineae, as also their reproductive biology, distribution, ecology, palynology and some aspects of experimental studies including ornamental horticulture. The investigations, covering over 75 genera and 350 species mainly of Homosporous Ferns, were objective of studying the occurrence and distribution of ferns in the country. The group has initiated the work on genetic diversity and biosystematics (which also includes molecular characterization) of arsenic and mercury hyper accumulating fern and fern ally i.e. *Pteris vittata* and *Equisetum*, respectively.



*Pteris cretica* L. var. *albolineata*



*Bolbitis heteroclita* (Pr.) Ching



*Doryopteris ludens* (Wall ex Hook) J. Sm.



*Psilotum nudum* (L.) P. Beauv.

### Achievements

- A review on "Gemotophytes of homosporous ferns" has been prepared based on spore germination and gametophyte growth and differentiation patterns.
- Survey and assessment of ferns and fern-allies in Corbett National Park (Uttaranchal) has been completed and total 34 species of ferns and ferns allies were collected, identified and voucher specimens were made. Out of 34 species 11 taxa are not recorded earlier from this area hence are new records of occurrence for the first time from the National Park.
- Extensive collections of ferns and fern allies of Kumaon Himalayas have been made. Out of 750 taxa collected, 58 species have been categorized as threatened, out of which 5 taxa are endangered. Among them a threatened plant, *Colysis pothifolia* (D.Don) Presl. has been identified as a new record of occurrence from Didihat, Pithoragarh. Observations on the reproductive behavior and sexuality of 14 taxa cytological investigation of 28 taxa also have been made.
- Pteridophytic flora of Uttar Pradesh (including Uttaranchal) has been prepared which includes, Salient

features/Key characters of 429 species (392 ferns and 37 fern-allies) under 61 genera and 30 families.

- Economic potentials of 80 species have been identified in Kumaon Himalayas. This study of ethnobotany may let to find new information on natural resources.
- On the basis of the detailed morphological studies made on various genera and groups of ferns, evolutionary tendencies among the species and genera and groups have been traced. The morphological data contributed a good deal towards a better understanding of the relationship and evolution among these ferns.
- The vascular organization of the rhizome in the most of the groups of homosporous ferns has been studied and the importance of this characters in the taxonomy of various genera and groups has been suggested and of much significance in taxonomic and phyletic studies. The standard evolved for the morphological study of the stelar system in ferns, have added a new dimension to the application of morphology of fern taxonomy and phylogeny.
- On the basis of the study of spore morphology, a phylogenetic evolution of ferns in relation to spore morphology and evolutionary trends among the spore types has been suggested and a new concept of the morphology and interpretation of the perispore has been proposed. Significance of the natural association of fungal and fern spores in evolutionary environmental and ecological problems has also been pointed out.
- On the basis of the studies on reproductive biology, the mode of sexuality and colonizing ability of 35 taxa has been analyzed.
- Cytology, spore morphology, gametophyte differentiation, reproductive biology of triploid, tetraploid and pentaploid cytotypes of *Pteris vittata* L. have been studied. Determination and analysis of genetic diversity amongst the species complex is being undertaken and RADP analysis of 23 accessions of different ploidy of *P. vittata* has been studied for the first time in India.
- More than fifty five species of economic and threatened ferns and fern allies have been successfully introduced and grown in the fern house of the Institute. Exchange of ferns and fern allies conserved are also one of the important goal.
- A simple technique has been evolved for the acclimatization of juvenile sporophytes raised *in vitro*, and a score of plants of different species have been introduced in the fernery.

#### **Ongoing Projects**

- Biodiversity and biosystematics study of heavy metal accumulating *Equisetum* (Hoesetail) species in India. (Sponsored)
- Studies on genetic diversity and conservation of some threatened and economically important ferns. (In House)
- Pollution Monitoring, Mitigation systems and Devices

#### **Publications**

Research Papers published - More than 400

Ph.D. degree awarded - 05

Books published - 06

Popular articles in Hindi - 05

Review articles - 10

Ph.D. students enrolled - 02

#### **Project Completed**

- Morphological and taxonomical studies of ferns.
- Diversity of Pteridophytic flora of Corbett National Park.
- Diversity and Conservation of Pteridophytic flora of Kumaon and Sikkim Himalayas with special reference to threatened taxa.
- Determination and analysis of genetic diversity of an economically important fern, *Pteris vittata* L. complex.