1.Name of the Department: Department of Botany

2. History of the Department

2.1. S.S.J.Campus, Almora

The Department of Botany, S.S.J.Campus, Almora, came into existence at graduate level in 1966 and was upgraded to the post- graduation in 1974. Presently the research work is going on in different field like Forest Ecology, Plant Pathology, Microbiology, Taxonomy, Ethnobotany, Genetics, Traditional knowledge, Biotechnogy etc. under the guidance of various teachers having specialization in different fields. The department has well established Pteridophytic herbarium. The various rare endangered and medicinally important plants have also been grown in the Departmental Botanical Garden.

2.2. D.S.B.Campus, Nainital

The department of Botany was established in 1952 as a Govt. postgraduate college and since 1973, it is functioning as a University department. The number of the Ph.D. students varies from year to year between 10-20. The number of faculty members is eleven. The main thrust areas of research work in the department are Ecology, Mycology, Taxonomy, Plant Pathology, macroclonig of medicinal plant (Tissue culture) and Ethnobotany.

The department has a library, computer and Internet facility, Botanical garden of endangered plants, and a tissue culture laboratory, in addition to laboratories for UG, PG and research. A large number of research projects have been completed during the last two decades. Several collaborative research programs have been established involving various national and international agencies, such as DST, National Science Foundation (U.S.A), Ministry of Environment, New Delhi, BCN Washington, and others. Over 450 research papers have been published in more than 50 journals of international repute and about 135 students have been awarded Doctoral degree in past two decades and most of them are employed in various organizations of repute. This department is one of the premier department of the University which has been graced and headed by many internationally known teachers/scientists including Prof. K.S. Bhargava, Prof. A. P. Mehrotra, Prof. S. C. Gupta, Prof. B. S. Mehrotra, Prof. J. S. Singh and Prof. S. P. Singh.

The department is progressing on their foot steps. Two faculty members were awarded FNA and other prestigious awards viz. Shanti Swaroop Bhatnagar prize and Birbal Sahni Medal. The department has also been included under FIST programme of DST, New Delhi, India and actively collaborates with the major institutions like G.B. Pant Institute of Himalayan research, Katarmal, Almora.

3. Brief abstract of courses at U.G. & P.G. level: Both at Almora & Nainital Campuses:

Both the campuses have undergraduate, postgraduate and Ph.D. courses. About 180 students at undergraduate level and 30 at the P.G level at Almora and about 160 students at undergraduate level and 25 at the P.G level are admitted each year at Nainital .

B.Sc. Previous: Theory Papers

Papers	Name
I	Fungi, Lichens, Bacteria & Plant Viruses
II	Algae & Bryophyta
III	Pteridophyta, Gymnosperms & Elementary Palaeobotany

B.Sc. Second Year: Theory Papers

Papers	Name
I	Taxonomy of Angiosperms
II	Anatomy, Embryology & Morphology
III	Ecology & Biostatistics

B.Sc. Final Year: Theory Papers

Papers	Name
I	Cytology, Genetics, Molecular Biology & Plant Breeding
II	Biotechnology & Economic Botany
III	Plant Physiology & Biochemistry

M.Sc. Previous: Theory Papers

Papers	Name
I	Biology and Diversity-I: Microbes, Algae and Fungi Microbes
II	Biology & Diverity-II: Bryophyta, Pteridophyta & Palaeobotany in India

III	Structure, Biology, Diversity and Taxonomy of Seed Plant: Gymnosperms and angiosperms
IV	Cell Biology, Molecular Biology and Biotechnology
V	Plant Ecology

M.Sc. Final: Theory Papers :

Paper	**Name**
I	Cytogenetics, Genetics and Plant Breeding
II	Plant Physiology and Metabolism
III	Plant development and Reproduction anatomy & Embryology
IV	Plant Resource utilization and Conservation
V	Special Papers:

(i) Forest Ecology (Almora & Nainital)
(ii) Plant pathology (Almora & Nainital)
(iii) Taxonomy of Angiosperm (Nainital)
(iv) Ethnobotany Traditional Knowledge & Intellectual Property Right (Nainital)
(v) Bryology (Nainital)

4. Infrastructure including Laboratories and list of sophisticated Instruments

1. P.G. Students have very good reading and library facilities with access to multiple copies of latest editions of standard text and reference books. Multimedia facility is available in the Dept.
2. Xeroxed course material is made available to both teachers and students.
3. Slide Projectors
4. Overhead Projectors
5. LCD Projectors
5. Computer lab with internet facility.
6. Well Equipped Laboratories of undergraduate and Postgraduate classes.
7. Herbarium of higher plants (including Angiosperms, Pteridophytes Bryophytes.
8. Botanical garden of endangered and medicinal plants.
9. Glass House which has a collection of more than 500 plants.

(at Nainital)

Major Equipments and other facilities:

- Pressure chamber (Nainital)

- Porometer AP-4 type (Nainital)
- Portable photosynthetic system (Nainital)
- Auto Analyzer 3 (Nainital)
- Nikon Biological Microscope Optiphot-2 with Photomicrographic Attachment & Accessories (Almora & Nainital)
- LCD Multi Media Projector (Almora & Nainital)
- 10 PCs with Laser and Ink-Jet printer (Almora & Nainital)

- Spectophotometer (Almora)
- Computer and its appliances Audio-Video aids
- Laminar Flow (Almora)
- Microbalance (Almora)
- Cryostate (Almora)
- Microbalance (Almora)
- BOD incubator (Almora)
- Microtomes (Almora)
- Flame Photometer, (Almora)
- Ice Flaking Machine (Almora)
- Gel Electrophoresis (Almora)
- Ultracentrifuge (Almora)

5. **Number of seats with specialization of the courses**
   A maximum of 5 students are admitted in each of the following specialization at PG level:

   (a) Plant Pathology
   (b) Ecology
   (c) Plant tissue culture
   (d) Plant Taxonomy
   (e) Ethnobotany
   (f) Bryology
6. **The faculty: Name & designation of faculty members with photograph of each member.**

NAME	PHOTO	DESIGNATION	PLACE	CONTACT NOS.	EMAIL ID
Dr. P. C. Pande		**Professor & Head**	Almora	05962-237745 (O) 9412375590	
Dr. Hema Joshi		**Professor**	Almora		
Dr. U. Palni		**Professor** **&** **Campus Head**	Nainital	05942-235596 (O) 05942-238963 (R) 9837229479	umapalni@rediffmail.com
Dr. N. Pande		**Professor**	Nainital	05942-237217	atrichum@yahoo.com
Dr. R. C. Gupta		**Professor**	Almora	9411115290	rcgupta_alm@rediffmail.com

Dr. S. S. Gahalain		**Professor**	Almora	9760721656	
Dr. S.C. Sati		**Professor**	Nainital	9412969960	Satisc2000@yahoo.co.in
Dr. Y.S. Rawat		**Associate Professor**	Nainital	05942-238620	Yashwantsinghrawat@ yahoo.com

NAME	PHOTO	DESIGNATION	PLACE	CONTACT NOS.	EMAIL ID
Dr. L. Tewari		**Associate Professor**	**Nainital**	9412362085	l_tewari@rediffma
Dr. K. Bargali		**Assistant Professor**	**Nainital**	05942-231074	kiranbargali@yaho
Dr. S. Tamta		**Assistant Professor**	**Nainital**	9412924956	Sushma_tamta@ya
Dr. Y.P.S. Pangtey		**Professor Emeritus**	**Nainital**	9837852569	Y_pangtey@yahoo

7. Research activities: the main thrust areas of research

7.1 Ecology:

The ecology group has contributed to and directed much of the major study of plant ecology in the Himalaya. This research extends from tropical forests up to the alpine meadows, includes ecosystems as diverse as grasslands, lakes and forests, and includes organisms from aquatic plants to epiphytic cryptogams to forest trees. Their work includes most of the scales considered by ecologists, from physiology at the leaf level, through whole plant responses, to ecosystem processes, and it has contributed to the accuracy of studies at the level of the biosphere. The research has considered most of the environmental factors that affect vegetation development-nutrients, water, animals, geomorphic events and human disturbance- and most of the life-cycle processes of plants, including reproduction, leaf production, growth, nutrient cycling and productivity. The group has worked with situations ranging form the most pristine forests available in the region to areas severely damaged by both human and natural disturbances, and has included the relationships between agriculture and natural vegetation. Consideration of humans, their cultural traits and economic enterprises in research emphasize foresightedness and ability of the group to go beyond the traditional boundaries of plant ecology, and think interdisciplinary. A plan for recovery of the Himalayan forests based

on the analysis of linkages among humans and livestock, crop-fields and forests, effect on nutrient cycling of ecosystem subsequent to changes seeking in the species for forest and combine economic enterprise and biodiversity are some of the major interdisciplinary researches.

Among topics emphasized by the group have been: (I) plant adaptation and ecosystem responses to the characteristic seasonality of the monsoon climate; (ii) consequences of leaf properties for species and ecosystem functioning; (iii) nutrient-cycling and decomposition of organic matter in various forest types (iv) biology of aquatic plants in regionally important lake ecosystems; (v) regeneration strategies of trees; (vi) effect human and livestock on plants, vegetation and regional energy flows and economics. Much of the research has investigated applied topics, including succession and ecological restoration of landslide sites, effect of grazing on high altitude pastures, and functioning of Eucalyptus plantations compared to native forests. Several studies have defined the degree of dependence of local agriculture on products from natural forests.

The research has been published in more than 35 international journals, including the major ecology journals (e.g. Ecology, Ecological Monographs, Journal of Ecology, Journal of Applied Ecology, Journal of Vegetational Sciences and Vegetation), and several major Botanical and Biological journals (e.g. Botanical Review, Annals of Botany, Aquatic Botany, Bio-Sciences and in Nature).

7.2 Mycology:

Main thrust areas of mycological research are aquatic mycology, mycorrhizae, root endophytes and bioactivity testing of botanicals:

- Taxonomy, pathology and ecology of zoosporic fungi in Kumaun Himalaya are the major thrust areas of the study. The major disciplines of aquatic fungi on which the active researches going on are:

i. Aquatic fungi of Kumaun Himalaya- systematic- both watermolds (zoosporic fungi) and Hyphomycetes (conidial fungi).

ii. Aquatic fungi in relation to fish diseases and their control.

iii. Aquatic fungi in relation to the diseases of agricultural and forest plants.

iv. Aquatic fungi- their ecology and decomposition biology.

- The ectomycorrhizae are always an integral components of forest ecosystem showing mutual relationship between fungi and roots of higher plants. Thus research is also going on in this area to assess diversity of ectomycorrhizae in the major forest types of Indian central Himalaya and effect of ectomycorrhizal inoculation on growth an d fitness of plants.
- Research on diversity of fruiting fungi and the fungi causing rust diseases, their identification and disease development, nature of infection, intensity and host diversity is also been carried out.
- Activity of aquatic Hyphomycetes as root entophyte, and their role as biofertilizers as well as pollution indicator is also been carried out.
- Recently the mycology group has also started the bioactive potential testing of medicinally important plants of the region.

- Culture of Yarsha gamboo *(Cordyceps sinensis*) has been successfully carried out in the laboratory.

7.3 Systematics and biodiversity of flowering plants and ferns:

This includes basically exploring the flora of the Kumaun Himalaya both extensively as well as intensively right from the foothills to the alpine zone so as to assess the floristic diversity of the region. This includes the detailed information about each plant species pertaining to their population, habit, habitat, flower color, flowering and fruiting periods together with their regional, national and global distribution along with their economic value and importance.

These informations further provide immense help in assessing the rare, endangered, threatened and endemic taxa of the region and their conservation.

The study also leads to the establishment of the regional herbarium consisting exclusively of Kumaun Himalayan plants, which function as a useful tool both in teaching and research.

Macropropagation (vegetative propagation) of *Texus baccata, Araucaria, Sequoia sempervirens,* Vivipary in a gymnosperm (*Biota orientalis*) etc. have been worked out.

7.4 Plant Tissue Culture:

Plant tissue culture laboratory in the Botany department have been established in 2005. Initially the laboratory has undertaken the tissue culture of some medicinal plants for their propagation. The future research work will focus upon the multiplication of endangered and important plants by rapid clonal propagation using advanced techniques.

7.5 Bryology:

In Bryology laboratory, researches are going on various aspects of bryophytes, namely, identification of bryophytes, diversity, habitat preferences, ecological studies, conservation. Beside these studies, work on antimicrobial potential of these plants is being carried out.

7.6 Ethnobotany and Traditional knowledge Systems:

In ethnobotany, work is in progress on survey and identification of plants used by local people as food, medicine etc. plants used in drug preparation and religious ceremonies are being collected and identified. Ecological aspect and present status of important plant species is being studied and on the basis of these finding, conservation measures would be formulated to save the plants in their native habitat.

7.7 Genetics and Plant Breeding:

In Genetics, the genetetic variability of the local germplasm of various crops like rice, wheat, lentel, bamboo and the genetic transformation of rice has been worked out.

7.8 Phycology

Mass culture of single cell protein Spirulina sp. Was done for the first time at 1651 m altitude in the department, SSJ Campus Almora. Algal flora of polluted water was also worked out.

8. Sponsored Research Projects with title, Principal Investigator and funding agencies for last five years

S.No.	Title of Project	Principal Investigator	Funding agency
1.	Increasing productivity of medicinal and aromatic plants by the application of nurse species of Central Himalaya	Dr. Beena Joshi	CSIR
2.	Fungal diversity and Leaf Litter decomposition in running fresh water bodies of Kaman Himalaya	Dr. S.C.Sati	DST
3.	Propagation and improvement of therapeutically important orchid, *Dactylorhiza hatazirea* using conventional and tissue culture approaches	Dr. S. Tamta	UCOST
4.	Propagation and conservation of Oaks of Central Himalaya through in vitro methods	Dr. S. Tamta	GBPHID
5.	Conservation of community forests of Uttarakhand by capacity building of local communities in Carbon monitoring and trade	Dr. Y.S. Rawat	GBPHID
6.	Antifungal activities of Bryophytes	Dr. N. Pande	UGC
7.	Variation of Orchid species richness and abundance along elevation gradient in Nainital, Kaman Himalaya.	Dr. J. Jalal	DST

8.	Promotion of cultivation of Thysanolaena maxima (BG), a multipurpose species of high fodder value in selected village of district Nainital, Kaman Himalaya	Dr. A. Sah	DST
9.	Diversity of Water Borne Conidial Fungi in running water bodies of Central Himalaya and their association with plant as Root Endophyte	Dr. S.C. Sati	DST
10.	Cultivation and conservation status of some threatened medicinal herbs; An approach towards wasteland/ degraded slope in central Himalaya	Dr. G.Kharkwal	DST
11.	Dynamics of leaf surface microfungi of Ginkgo biloba ans Texus baccata with emphasis on antibiosis	Dr. M. L. Upadhyaya	DST
12.	Diversity of litter decomposing fungi in mycorhhizal fairy ring zone in pine forest of almora hills in kumaun himalaya	Prof. R. C. Gupta	UGC

9. Workshop, Seminars, Symposia organized by the department for last five years-

S.No.	**Training program**	**Date**	**Funding agency**
1.	Tissue Culture Training for PG students	07-16 June, 2007	UCOST, Dehradun
2.	Tissue Culture Training for PG students	07-14 Dec, 2009	State Biotechnology Program, Govt. of Uttarakhand, Biotech Bhawan, Haldi, US Nagar

10. **Number of research publication from the department during last five years.**
    a. **Number of papers published –** 154 (Nainital), 26 (Almora)
    b. **Number of papers presented in conference, Seminar etc. –** 59 (Nainital)
    c. **Number of books published**- 6 (Nainital), 06 (Almora)

11. Contacts of faculty members, office, residence, mobile and e-mail: given against no. 6

12. Number of students awarded Ph.D. in last fiveyears– 28 (Nainital), 08 (Almora)

13. Proposed activities in future:

- To initiate M.Sc. (Microbiology) course. (Nainital)
- Certificate/ Diploma course in Plant Tissue Culture. (Nainital)
- Creation of Central facility for various equipments used for different experiments. (Nainital)
- Addition of endangered plants in the Botanical Garden. (Nainital)
- Development of Moss Garden. (Nainital)
- Establishment of Biotechnology Lab. And Polyhouse (Almora)
- Development of Fern and Orchid house (Almora)