

Evaluative Report of the Department (2008-2012)

1. Name of the Department : **DEPARTMENT OF BOTANY**
 2. Year of establishment : **1918**
 3. Is the Department part of a School/Faculty of the university?: **FACULTY OF SCIENCE**
 4. Names of Programmes / Courses offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., etc.) : **UG, PG, Ph.D. -- Botany**

UG -- Industrial Microbiology-Vocational Course
PG & Ph.D.-- Special Courses of Study—
Environmental Science & Applied Microbiology

5. Interdisciplinary courses and departments involved:
Special Courses of Study—M.Sc. in Environmental Science [Departments of Botany, Geography, Geology, Physics, Institute of Environment and Sustainable Development, Faculty of Law], & **Applied Microbiology** [Departments of Botany, Zoology and Biochemistry, School of Biotechnology, Microbiology (Institute of Medical Sciences)], Genetics and Plant Breeding and Mycology and Plant Pathology (Institute of Agricultural Sciences)
Vocational Course B.Sc. Industrial Microbiology (Department of Botany, Zoology)
UG- Ancillary subjects; PG- Minor electives for students of other departments of the Faculty of Science (Zoology, Biochemistry, Biotechnology, Chemistry, Molecular & Human Genetics, etc.)
6. Courses in collaboration with other universities, industries, foreign institutions, etc.: **N.A.**
 7. Details of programmes / courses discontinued, if any, with reasons: **N.A.**
 8. Examination System: Annual/ Semester/Trimester/Choice Based Credit System : **Semester system**
 9. Participation of the department in the courses offered by other departments:

Mahila Mahavidyalaya, BHU

10. Number of teaching posts sanctioned and filled (Professors/Associate Professors/Asst. Professors)

	Sanctioned	Filled	Actual (including CAS & MPS)
Professor	06	15*	15
Associate Professors	12	00	00
Assistant Professors	24	06	06
(*CAS & MPS)			

11. Faculty profile with name, qualification, designation and specialization (D.Sc./D.Litt./ Ph.D./M.Phil., etc.)

Name	Qualification	Designation	Specialization	No. of Years of Experience	No. of Ph.D. students guided for the last 4 years
Dr. A. K. Rai	M.Sc. Ph.D.	Professor	Plant Metabolism	35	05
Dr. L. C. Rai	M.Sc. Ph.D.	Professor	Abiotic Stress Proteomics & Genomics of N ₂ -fixing Cyanobacteria	35	07
Dr. J. P. Gaur	M.Sc. Ph.D.	Professor	Phycology	35	02
Dr. B. K. Roy	M.Sc. Ph.D.	Professor	Cytogenetics of Higher Plant	40	06

Name	Qualification	Designation	Specialization	No. of Years of Experience	No. of Ph.D. students guided for the last 4 years
Dr. M. Agrawal	M.Sc. Ph.D.	Professor	Air Pollution & Global Climate Change	28	07
Dr. R. S. Upadhyay	M.Sc. Ph.D.	Professor	Mycology, Plant Pathology and Microbial Technology	28	06
Dr. N. K. Dubey	M.Sc. Ph.D.	Professor	Herbal Pesticides	28	05
Dr. R. K. Asthana	M.Sc. Ph.D.	Professor	Physiology and Biochemistry of Cyanobacteria	23	04
Dr. S. B. Agrawal	M.Sc. Ph.D.	Professor	Ecology & Environmental Science	27	04
Dr. Surendra Singh	M.Sc. Ph.D.	Professor	Physiology & Biochemistry of Cyanobacteria	32	08
Dr. Nandita Ghoshal	M.Sc. Ph.D.	Professor	Plant Ecology	15	02
Dr. R. P. Sinha	M.Sc. Ph.D.	Professor	Photobiology & Molecular Microbiology	21	04
Dr. A. K. Mishra	M.Sc. Ph.D.	Professor	Microbial Genetics	17	01
Dr. J. Pandey	M.Sc. Ph.D.	Professor	Environmental Science	20	03
Dr. R. N. Kharwar	M.Sc. Ph.D.	Professor	Fungal Endophytes, Bioactive Compounds, Nanotechnology	15	03
Dr. S. K. Dubey	M.Sc. Ph.D.	Assistant Professor	Microbial Ecology	09	02
Dr. K. D. Pandey	M.Sc. Ph.D.	Assistant Professor	Algae & Microbiology	07	01
Dr. R. Sagar	M.Sc. Ph.D.	Assistant Professor	Ecology, Plant diversity	07	02
Dr. Shashi Pandey	M.Sc. Ph.D.	Assistant Professor	Plant Molecular Biology & Tissue Culture	07	02
Dr. Hema Singh	M.Sc. Ph.D.	Assistant Professor	Ecology	06	NIL
Dr. Asha Lata Singh	M.Sc. Ph.D.	Assistant Professor	Environmental Science	05	NIL

12. List of senior Visiting Fellows, faculty, adjunct faculty, emeritus professors

Prof. S. P. Singh	Emeritus Scientist --MNRE, New Delhi
Prof. J. S. Singh	Emeritus Scientist - NASI, Allahabad & Emeritus Professor of BHU
Prof. D.N. Tiwari	Re-engaged Professor
Dr. P. K. Singh	Emeritus Scientist --INSA
Prof. B. D. Tripathi	UGC-BSR Fac. Fellow
Prof. B.R. Chaudhary	Re-engaged Professor

13. Percentage of classes taken by temporary faculty – programme-wise information: NIL

14. Programme-wise Student Teacher Ratio :	UG Botany—	26 : 01
	Industrial Microbiology—	05 : 01
	PG Botany	— 05 : 01
	Environmental Science—	02 : 01
	Applied Microbiology—	02 : 01

15. Number of academic support staff (technical) and administrative staff: sanctioned and filled

Technical		
Post	Sanctioned	Filled
STA	05	01
TA	01	03 (against STA)
Lab Assistant	07	06
Lab Attendant	10	10
Scientific Officer	01	nil
Foreman Gr. II	01	01 (Filled at faculty level)
Mechanic	01	01
Jr. Workshop Asstt.	01	01
Workshop attendant	01	nil
Administrative		
Ministerial	03	03
Secretarial	01	01
Library	01	01

Special Course of Study—M.Sc. Environmental Science & Applied Microbiology—
03 (contractual staff) in both the courses

16. Research thrust areas recognized by funding agencies:

Algology, Ecology, and Mycology & Plant Pathology

17. Number of faculty with ongoing projects from a) national b) international funding agencies and c) Total grants received. Give the names of the funding agencies and grants received project-wise. —
--Rs.7. 03 Crores (approx.) - -Annexure IA

18. Inter-institutional collaborative projects and grants received --Rs.2.86 Crores (approx.)--Annexure IB
a) All India collaboration + (b) International

19. Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, etc.; total grants received.

-- CAS-V Phase Rs. 150.00 lacs
-- DBT-ISLS- Rs. 19.00 lacs
-- DST-PURSE- Rs. 20.00 lacs
-- OBC grant— Rs. 12.00 lacs
Total-- Rs. 201.00 lacs

20. Research facility / centre with — N.A.

- state recognition
- national recognition
- international recognition

21. Special research laboratories sponsored by /created by industry or corporate bodies --N. A.

22. Publications:

- * Number of papers published in peer reviewed journals (national / international) -- **68/430**
- * Monographs -- **01**
- * Chapters in Books -- **59**
- * Edited Books -- **02**
- * Books with ISBN with details of publishers -- **03**
 - Sagar, R. and Verma, P. (2011). N-loading and herbaceous diversity in dry tropical environment. ISBN-10: 3847302647, ISBN-13: 978-3847302643, Lap Lambert Academic publishing, Germany
 - Sagar, R., Suman S. and Kapur, P. (2012). Changes in Functional traits of *Bacopa monnieri* due to water treatment: an analysis. ISBN: 978-3-659-22954-1, Lap Lambert Academic publishing, Germany
 - Kumar Anuj and Kharwar, R.N. (2011). Early Blight Disease of Tomato. Lap Lambert Academic Publishing GmbH & Co. KG Deutschland, Germany. Pp. 1-143. ISBN 978-3-8443-8750, 152 pages
- * Number listed in International Database (For e.g. Web of Science, Scopus, Humanities International Complete, Dare Database - International Social Sciences Directory, EBSCO host, etc.) -- **430**
- * Citation Index -- range / average -- **0-250/45.17**
- * SNIP -- **1.133 (Average)**
- * SJR -- **0.418 (Average)**
- * Impact Factor -- range / average -- **0.39 - 9.79/1.93**
- * h-index -- **11.1 (Average)**

23. Details of patents and income generated: Prof. N.K. Dubey-- One (233/DEL/2011)

One novel essential oil synergistic composition has been patented for its antimicrobial, antiaflatoxic, insecticidal and antioxidant activity. The oil formulation is non-toxic to animals, and is recommended as plant based fumigant for enhancement of shelf life of food commodities by protecting them from fungal and aflatoxic contamination.

No income generated so far.

24. Areas of consultancy and income generated:

N.A.

25. Faculty selected nationally/ internationally to visit other laboratories in India and abroad

-- Annexure II

26. Faculty serving in

- a) National committees b) International committees c) Editorial Boards d) any other (please specify)

-- Annexure III

27. Faculty recharging strategies (UGC, ASC, Refresher/orientation programs, workshops, training programs and similar programs)—**Young colleagues attend refresher and orientation courses. Teachers participate in national and international symposia and seminars to upgrade their knowledge base, besides visiting national and international institutions for collaborative research.**

28. Student projects

- percentage of students who have done in-house projects including inter-departmental projects -- **100% (for M.Sc. Botany and Environmental Science)**
- percentage of students doing projects in collaboration with other universities / industry / institute -- **100%** (*Applicable to only M.Sc. Applied Microbiology*)

29. Awards / recognitions received at the national and international level by -- **Annexure IV**

- Faculty
- Doctoral / post doctoral fellows
- Students

30. Seminars/ Conferences/Workshops organized and the source of funding (national / international) with details of outstanding participants, if any. -- **Annexure V**

31. Code of ethics for research followed by the departments:

There is Research Planning Committee for each Ph.D. student to take care of ethical issues relating to publications and Ph.D. Thesis.

32. Student profile course-wise:

Year	Name of the Course (refer to question no. 4)	Applications received	Selected		Pass percentage Male Female
			Male	Female	
2008	PG-Botany	655	20	22	100%
	PG-Environmental Science	Combined test held for all special courses of study	07	11	100%
	PG-Applied Microbiology	Combined test held for all special courses of study	12	12	100%
2009	PG-Botany	838	15	47	100%
	PG-Environmental Science	424	09	14	100%
	PG-Applied Microbiology	1365	12	12	100%
2010	PG-Botany	1011	31	30	100%
	PG-Environmental Science	518	13	19	100%
	PG-Applied Microbiology	1830	19	14	100%
2011	PG-Botany	1275	27	36	100%
	PG-Environmental Science	645	14	17	100%
	PG-Applied Microbiology	1467	20	16	100%
2012	PG-Botany	1390	26	37	100%
	PG-Environmental Science	696	10	23	100%
	PG-Applied Microbiology	1491	16	19	100%

33. Diversity of students (Average : 2008-2012)

Name of the Course (refer to question no. 4)	% of students from the same university	% of students from other universities within the State	% of students from universities outside the State	% of students from other countries
PG-Botany	51.24	40.79	7.53	2.12
PG-Environmental Science	29.70	44.20	23.91	2.19
PG-Applied Microbiology	09	33.6	57.4	14.2

34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.

About 30% M.Sc. students cleared NET and GATE examinations.

35. Student progression

Student progression	Percentage against enrolled
UG to PG	Botany— 51.24 Env.Sc.— 29.70 App.Mic.— 9.00
PG to M. Phil.	N.A.
PG to Ph.D.	76.74
Ph.D. to Post-Doctoral	03
Employed <ul style="list-style-type: none"> • Campus selection • Other than campus recruitment 	<ul style="list-style-type: none"> • About 25 M.Sc. students have been recruited through campus as well as direct selections. • About 35 Ph.D. students have got job in scientific/ academic/ administrative organizations.
Entrepreneurs	N.A.

36. Diversity of staff

Percentage of faculty who are graduates (M.Sc.)	
of the same university	55
from other universities within the State	41
from universities from other States	04
from universities outside the country	nil

37. Number of faculty who were awarded Ph.D., D.Sc. and D.Litt. during the assessment period –

Ph.D. -- 01

38. Present details of infrastructural facilities with regard to

a) Library

Books:	10034
Theses:	449
Educational films:	16
Periodicals:	680
Reprints:	nil
Dissertations:	485
Microfich collections of Algae:	16000

b) Internet facilities for staff and students -- Available in office chamber of each faculty member; for students, the facility is available in the Central Instrument Lab. and research labs; it is also available in labs of M.Sc. Environmental Science and Applied Microbiology. *The department also has wireless internet connectivity.*

c) Total number of class rooms -- 04.

d) Class rooms with ICT facility -- All have

e) Students' laboratories -- 07

f) Research laboratories -- 20 (Excluding Central Instrument Lab.)

39. List of doctoral, post-doctoral students and Research Associates

a) from the host university-- Doctoral--99 Post-doctoral--01 R.A.--02

b) from other universities-- Doctoral--30 Post-doctoral--01 R.A.--nil

40. Number of post graduate students getting financial assistance from the university:
Nil

41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.

Yes, for revision of syllabi, preparation of proposals for CAS etc., the exercise was done by taking feedback from the students and faculty members of the Department. The methodology included discussion at subject area level followed by rigorous discussion in the Department Council.

42. Does the department obtain feedback from

a. faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilize the feedback?

Yes, feedbacks are being utilized through Departmental Council, Board of Studies and Academic Council.

b. students on staff, curriculum and teaching-learning-evaluation, and how does the department utilize the feedback?

Yes, the feedback is utilized through Department Council, Board of Studies and Academic Council.

- c. alumni and employers on the programmes offered and how does the department utilize the feedback?

Alumni meetings are held yearly at BHU, which provide necessary feedback from time to time.

43. List the distinguished alumni of the department (maximum 10)-- **Annexure VI**
44. Give details of student enrichment programmes (special lectures / workshops / seminar) involving external experts.

Distinguished academicians and researchers of the country and abroad regularly give lectures thereby enriching the students as also the faculty. The Centre of Advance Study program of the Department sponsors national/international symposia/seminars every year. The Centre of Advance Study program of the Dept. also invites experts of repute for teaching/training/interactive discussions for providing benefits to the students.

45. List the teaching methods adopted by the faculty for different programmes.

Teachers use black board and multimedia. Most of the classrooms and labs are equipped with these facilities. The students also conduct field study to study plants in nature. The students are also given projects/assignments, which are assessed regularly.

46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?

The Department ensures by evaluating the students performance during the mid-semester and end semester examinations. Regularity of classes is strictly maintained and monitored.

47. Highlight the participation of students and faculty in extension activities.

- Sanitation in municipal schools. Access, quality, O & M, waste disposal and gender equality
- Socio-environmental issues of the Ganga river in the city of Varanasi
- Socio-environmental issues related to utilization of treated sewage water for irrigation in Dinapur area.

48. Give details of "beyond syllabus scholarly activities" of the department.

- Our research student Mr. Prashant Singh attended the 5th Czech Arctic Research Expedition from 01.08.2012-31.08.2012
- Five students of M.Sc. Environmental Science program underwent advanced training in Germany under a bilateral collaborative FMFE Program.
- Students of other academic institutions carry out their research projects with teachers of the department.
- Participation in INSPIRE programme for school students organized by academic staff college, BHU.
- Short-term affiliation for research activities of international students.
- Organization of refresher course on Botany for teachers.
- Organization of "Anveshan" programme of Association of Indian Universities, New Delhi.

49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.

YES, The department has been graded by the UGC as the Centre of Advanced Study

50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.

The department has contributed significantly to the three thrust areas identified in the CAS program, and also to the non-thrust areas, as evident from publications in journals of international repute. Major research findings are summarized below:

- Diversity and seasonal analyses of viable algal particles in the atmosphere showed prevalence of allergy causing taxa.
- Toth model is the best for isotherm modeling of metal sorption as it shows saturation of metal sorption, presumes heterogenous sites on the biomass, and the modeled sorption maxima is very close to experimental value.
- *Phormidium* dominated biomass is an excellent metal biosorbents (high sorption capacity; no decrease in total metal sorption in binary and ternary systems).
- Demonstration of salt-induced secretion of an alkaline phosphatase /phosphodiesterase, PhoD, from the cells of *Aphanothece halophytica*, a halotolerant cyanobacterium
- Salinity changed the fatty acid composition in *Anabaena cylindrica*; a high level of fatty acid unsaturation occurred due to increase in C12:4, C10:1, C16:1 and C18:2 constituents
- Heat pre-treatment alleviates UV-B toxicity in *Anabaena* through up-regulation of proteins associated with signalling, PPP, Calvin-Benson cycle and also Fe-SOD, NDPK, FBA, PRK and RuBisCo.
- Copper-acclimated *Anabaena* showed anoxygenic photosynthesis, and significant accumulation of PLC, Fe- SOD and Cu-SOD, PRK, TK.
- *Parthenium hysterophorus* demonstrated significant differences in functional traits in response to soil quality. These phenotypically plastic traits contribute to the invasiveness of the species.
- A long-term field study conducted in the Singrauli region showed abundance of alkaline substances in the depositions and hence rainfall in the area was not acidic. Altered pattern of species composition in the area led to community simplification.
- Open top chamber studies showed significant decline in crop yield in response to ambient ozone levels. Resistant cultivars were recommended for cultivation. Quality of seeds has also been found to deteriorate due to air pollution.
- The long-term use of treated or untreated sewage water caused contamination of Cd, Pb and Ni in the edible portions of vegetables causing potential health risk to the people in Varanasi.
- Ethylene diurea (EDU) can be used successfully for biomonitoring of ozone in areas experiencing its high concentrations.
- Better economical utilization of lemongrass after irradiation with low doses of supplemental ultraviolet - B for its commercial exploitation.
- Reduction in yield under continuous no tillage overshadows the benefit of reduced greenhouse gas emissions.
- Molecular community fingerprinting analyses revealed diverse and dynamic picture of methanotrophs in soil.
- Endophytic actinobacteria from Neem have been reported for the first time.
- Antifungal, antiflatoxigenic, antioxidant and insecticidal activities and safety of novel essential oils of *Apluda mutica* L. and *Boswellia carterii* Birdw have been assessed.
- Mycosynthesis of Silver (Ag) and gold (Au) nanoparticles (NPs) was done using endophytic fungi.
- Improved strains of *Trichoderma viride* have been isolated with the objective of biologically controlling several plant diseases.
- Mycotoxin producing fungal strains have been isolated from herbal raw materials.
- Successful micropropagation of several medicinal plants, such as, *Artemesia annua*, *Sapindus trifoliatus*. etc. was carried out in the lab.
- Molecular markers associated with alkaloid yield in *Catharanthus roseus* and with artemisinin content in *A. annua* were developed.
- UV- pretreatment induced artemisinin biosynthetic pathway gene activation and increase in plant biomass and field artemisinin production.
- Chromosome study and DNA quantification was done in several species of palms.

- Hybrids of *Solanum* species were successfully produced.
- Copper caused induction of several cytogenetical changes in *Vicia faba*.
- Wavelength-dependent impacts on nitrogen-fixing enzymes such as nitrogenase, nitrate reductase and glutamine synthetase as well as proteome analysis of a number of cyanobacteria were investigated.
- UV-induced changes in phycobiliproteins of cyanobacteria in general and *cpcA* and *cpcB* genes of α and β subunits of phycocyanin in particular as well as comparative genome analysis of phycobiliproteins was investigated.
- Cost effective methods for the extraction of DNA, RNA and photoprotective compounds such as mycosporine-like amino acids (MAAs) and scytonemin were developed.
- Determination of UV-B radiation-induced DNA damage in terms of formation of thymine dimers and double strand breaks following PCR, immunodot-blot and fluorometric analysis of DNA unwinding (FADU) assays.
- A method for UV-B radiation-induced reactive oxygen species (ROS) production and its detection by non-fluorescent probe DCFH-DA in combination with image analysis was developed.
- Immunochromatographic strip and immuno PCR assays were developed for the detection of BT - insecticidal proteins bearing GM crops.
- Novel mycosporine-like amino acids (MAAs) reported from hot-spring cyanobacteria.
- First report on the involvement of YP_324358 and YP_324357 gene products in the biosynthesis of the common core (deoxygadusol) of all MAAs.
- Ten new *Frankia* strains isolated from the root nodules of *Hippophae salicifolia* D. Don from North Sikkim have been submitted in the culture collection of NBAIM, Mau.
- Gene sequences of 16S rRNA of *Frankia* strains isolated from North Sikkim have been successfully submitted and Accession Numbers obtained from NCBI.
- Molecular phylogeny and diversity of heterocystous cyanobacteria isolated from different parts of India has been studied using the 16S rRNA, *nifH*, *nifD*, *psbA*, *rbcL*, HIP, STRR and ERIC molecular markers has finally led to more than 300 NCBI Accession Numbers.
- Erucic acid has been reported for the first time in *Frankia* strains using FAME analysis.
- Genetic diversity and phylogeny of Arctic cyanobacteria has been studied using 16S rRNA and the nitrogen fixing *nifH* genes alongwith elucidation of evolutionary relatedness of Arctic and Indian Cyanobacteria.
- Salinity induced modifications have been studied in *Frankia* strains.
- Potentiality of *Azolla* as a P-biofertiliser in saline systems has been studied.

51. Future plans of the department.

The Department shall continue to work hard for further enhancing the quality of teaching and research. Insofar as research is concerned, the department intends to take up the following objectives for future research:

- Algal and cyanobacterial biodiversity: Assessment of diversity of cyanobacteria from paddy fields, Arctic and other locations using molecular and bioinformatic approaches.
- Cyanobacterial biotechnology: Environmental bioremediation; production of secondary metabolites, antimicrobial compounds, and pharmaceutical potential of cyanobacteria.
- Stress biology of cyanobacteria: Cloning of N-methyltransferase genes in diazotrophic cyanobacteria; role of photoprotective compounds MAAs and scytonemin in mitigating UV-B stress; Comparative proteomics of *Anabaena* isolates under diverse stresses; structural and functional characterization of stress-induced novel (hypothetical) proteins; Cloning of novel stress-induced genes. UV-B-induced DNA damage and repair in cyanobacteria.
- Ecological and environmental management of various ecosystems.
- Carbon sequestration and footprinting: green house gas emissions and their mitigation through terrestrial sequestration.
- Molecular assessment of abiotic stresses: metabolomic, proteomic and genomic approaches.
- Evolving better strategies for crop improvement under drought, heat and ozone stresses
- Development of DNA based biosensor for the detection of pathogenic microorganism.
- Environment and livelihood strategies for sustainable development.

- Comparative efficacy of the essential oils tested as fumigants with some synthetic fumigants. Toxicological and safety limit evaluation of the essential oil samples.
- Molecular and physiological characterization of potential endophytic fungi for the production of bioactive compounds.
- Use of mycosynthesized nanoparticles in drug delivery.
- Development of effective strains of *Trichoderma* species having a wide range tolerance.
- Molecular characterization of *Trichoderma* species for devising suitable technology for field application.
- Treatment of susceptible varieties of plants with chemical inducers, and study of defence response in these plants.
- *In vitro* micropropagation of some selected medicinal plants, and application of genetic approaches for enhancing secondary metabolite biosynthesis in *Artemisia annua*.
- Assessment of cytotoxicity and genotoxicity in plants under abiotic stress.
- Molecular authentication and assessment of genetic diversity of some herbal medicinal plants.
- ntcA mutant-based molecular studies in *Anabaena* sp. PCC 7120 focusing on the expression and regulation of calcium and iron stress responsive genes.
- Detection of change in signal transduction pathway due to UV-B in formation of nodules in leguminous plants.
- Detection of molecular network provoked by ozone affecting photosynthesis and triggering of antioxidative defense and stress related proteins in wheat and maize plants.

52. Detail any five Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.

(A) Strengths --

- i) It is the second oldest PG Department of Botany in the country, and has consistently maintained high standards of teaching and research.
- ii) The Department has several strong research groups.
- iii) It has adequate infrastructure for teaching and research.
- iv) The Department has a well-organized Central Instruments Lab to cater to the needs of all researchers and M.Sc. students.
- v) The faculty members have earned distinctions in their respective areas of research.

(B) Weaknesses --

- i) A large number of vacant teaching positions.
- ii) Inadequate budget for the repair/maintenance of sophisticated instruments.
- iii) Lack of qualified technical staff to operate and maintain instruments.
- iv) Inadequate man-power for the departmental botanical garden.
- v) Constraints of space, primarily for lab work and departmental library.

(C) Opportunities and challenges --

- i) The Department offers three M.Sc. programmes (Botany, Environmental Science & Applied Microbiology), and B.Sc. Botany and the Vocational Course in Industrial Microbiology.
- ii) Despite < 50% strength of the faculty, the Department has successfully maintained the quality of teaching and research.
- iii) In view of enhanced number of students due to implementation of OBC quota, the Department has to make additional efforts to maintain the quality of teaching.
- iv) There is a need for intensification of collaborative and interdisciplinary research.
- v) The Department shall intensify its efforts in patent generation and consultancy.