

# **SUBJECT REVIEW REPORT**

**DEPARTMENT OF PLANT SCIENCE**



**FACULTY OF SCIENCE  
UNIVERSITY OF COLOMBO**

26<sup>th</sup> to 28<sup>th</sup> September 2006

**Review Team :**

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## 1. SUBJECT REVIEW PROCESS

The exercise of a subject review evaluates not only the quality of the student learning experience/education at the subject level, but also all the programs offered by an academic department. It is in this context, the review team evaluated the quality of both undergraduate and postgraduate programs in Plant Sciences at the University of Colombo. The Department has laid down the principles, set the aims and expected learning outcomes in the teaching of the subject of Plant Sciences in its Self Evaluation Report (SER) and the present review is primarily based upon the information provided in this report supported by evidence gathered during the review visit.

The following aspects of education/provision were evaluated during the present review:

1. Curriculum design, content and review
2. Teaching, learning and assessment methods
3. Quality of students, including student progress and achievements
4. Extent and use of student feedback
5. Postgraduate studies
6. Peer observation
7. Skills development
8. Academic guidance and counseling

The reviewers followed the guidelines set by the Quality Assurance and Accreditation Council of the U.G.C., for subject evaluation.

The review team consisted of Prof. S.A. Kulasooriya (Senior Professor of Botany, University of Peradeniya), Prof. Morley De Silva (Professor of Botany, University of Ruhuna) and Professor S. Mohandas (Professor of Agricultural Chemistry and former Vice-Chancellor, University of Jaffna). Prof. Kulasooriya served as the review chair.

The review team visited the Department of Plant Sciences (DoPS) of the University of Colombo during the period 26<sup>th</sup> to 28<sup>th</sup> September, 2006, and initiated the peer review process. The purpose of the visit was to search for evidences and make observations on the aims and learning outcomes and the eight aspects under review as stated in the self evaluation report of the department and evaluate them according to the set guidelines.

On 26<sup>th</sup> morning the review team had a meeting with the Dean of the Faculty, Prof. R. L. Wijesundera at the Dean's office along with the Head of the Department Prof. (Mrs.) K. Hirimburegama. Prof Colin Peiris, Quality Assurance Specialist and Dr. Jayantha Ratnasekera, Consultant to the Quality Assurance project, introduced the members of the team and briefly explained the objectives and purpose of the review.

The Dean of the Faculty briefed the members on the history of the faculty, its present status and future development plans. The history of the University vis-à-vis the establishment of the department of Plant Sciences was briefly discussed as the information in the SER was incomplete.

Next the Head of the Department made a presentation to the review team, in the presence of the academic staff and special degree students. Having introduced the departmental academic staff members she summarized the information that had been compiled in the self evaluation report covering information pertaining to the structural and organizational aspects and facilities of the department, organization of teaching programs, curricula

development and revisions, evaluation procedures, teaching and learning processes, course contents, student performances and achievements, field activities, research programs, community service activities, post graduate programs etc.

The review team then met with other members of the academic staff and had the opportunity to discuss different aspects of the quality assurance program. Data were gathered additionally by meeting with two groups of undergraduate students (31 special & general degree and 21 special degree 3<sup>rd</sup> & 4<sup>th</sup> year), 5 postgraduate students and a group of temporary staff, technical staff and supporting staff of the department. The team also observed teaching classes for 3<sup>rd</sup> & 4<sup>th</sup> year special degree and 1<sup>st</sup> year general degree students and laboratory classes of 1<sup>st</sup> year and 2<sup>nd</sup> year general degree students, and a students' seminar. The review team went through a large collection of documents and inspected the facilities available in the department and the Faculty of Science. In between these activities, the review team constantly discussed among themselves the outcomes of their observations. Each reviewer took the lead responsibility for different aspects of provision while all contributed to the writing of the report and making judgments on the eight aspects.

Members of the review team wish to thank the Dean of the Faculty, the Head and members of the academic staff of the Department of Plant Sciences for the excellent arrangements made and the cooperation and hospitality extended to them throughout the review process. The reviewers also thank all members of the technical and other non academic staff and students who helped them in numerous ways to successfully carry out the quality assurance program during these three days.

## **2. THE UNIVERSITY AND THE DEPARTMENT**

The University of Colombo has its origin from the University College, Colombo established in 1910 affiliated to the University of London. In 1942 it gained the status of an independent university as University of Ceylon and the Department of Botany was perhaps a founder department of that institution. Although the University of Ceylon commenced a program of relocation to Peradeniya in 1952, it was never completed and Colombo and Peradeniya continued to function as two campuses of the University of Ceylon. In 1978 the University of Colombo was declared an independent university distinct from the University of Peradeniya.

The faculty of Science consists of the Departments of Chemistry, Mathematics, Nuclear Science, Physics, Plant Sciences, Statistics and Zoology. It offers undergraduate courses leading to BSc. General Degrees (03 years) and Special Degrees (04 years). The department of Plant Sciences contributes to the teaching programs of all these degrees including those of the special intake for the degree of Biochemistry and enhancement courses on Life Sciences and Introduction to Biotechnology for students following 1<sup>st</sup> courses in the Physical Sciences. The department of Botany was renamed as the Department of Plant Sciences (DoPS) in 2003 primarily on the basis of the expansion of its activities and the diversity of its special degree programs in Plant Sciences and Plant Biotechnology. Since last year another special degree program entitled Bioinformatics has been introduced. In addition to its academic commitments the department is engaged in community based activities primarily through its Community Service Center at Weligatte.

Details of the undergraduate programs offered by the Department of Plant Sciences are given in Table 1. The Department curriculum for undergraduate programs had always been for three and four year degree programs. Over the years these had been continuously modified to meet the national and international demand. The major revisions were in 2000 and in 2003.

**Table1. Undergraduate programs under review**

Programs	Duration (years)	No of Students
Biological Sciences	03	240
Plant Science	04	12
Plant Biotechnology	04	12
Bioinformatics	04	12

The DoPS has been offering three M.Sc. taught courses namely: i) M. Sc. in Plant Cell and Tissue culture, ii) M. Sc. in Weed Science and iii) M. Sc. in Plant Pathology. Of these only the M Sc in Plant Cell & Tissue Culture which started in 1995, is on going at present. The other two courses are currently not offered. Three students are following postgraduate research degree programs: One for a Ph.D degree and the other two for M.Phil. degrees.

### 3. AIMS AND LEARNING OUTCOMES

#### 3.1. Aims

The Department of Plant Sciences as one of the seven departments in the Faculty of Science, has been progressively improving on its contribution towards academic excellence and community services and thereby to national development. The department has set about its study programs alongside with institutional activities to enable it to achieve its long term goals. The relevance of the study programs of the DoPS to the university's broad objectives is primarily manifested through its vision and mission.

Vision: *“To produce able graduates, with deep and analytical knowledge in the field of Plant Sciences and related fields, not only in dissemination of knowledge but also in the application and technology transfer towards national development of the country”*

Mission: *“The Department offers a wide variety of courses in basic and applied Plant Sciences and in related fields thereby allowing the students to specialize in the direction of their interest at individual, national and global level. It is also anticipated that the postgraduate programs facilitate applicative research and harness the best possible solutions to the issues of national interest”.*

In this context the department aims to provide:

- Degree programs to offer a multidisciplinary knowledge and understanding in plant sciences and related areas on the basic, applied, analytical and novel fields in plant sciences.
- Opportunities for undergraduates to interact with each other, staff and community enabling them to integrate better into the society and to develop leadership skills.

- Exposure for better employment opportunities in government and private sector at national and international level.
- Stimulate to promote and facilitate research activities in plant sciences.
- Department organization for effective teaching, learning, assessment, review and quality assurance.

The Department of Plant Sciences has the academic and physical strengths as given in the SER, and provides opportunities to achieve its objectives and become a leading department in the Faculty. The main objectives of the undergraduate programs are:

- To produce science graduates with excellent knowledge, correct attitudes, and competent in soft skills that will lead to greater prospects of employability.
- Strengthen links with local industry/corporate sector and community thereby to be more sensitive and competent to handle national needs in a professional manner.

### **3.2. Learning Outcomes**

On successful completion of the undergraduate study programs the students should have:

- Gained a thorough knowledge and an understanding of the core concepts in plant sciences & related disciplines.
- Been trained in the relevant technical, analytical and laboratory skills in general plant based studies.
- Developed result-oriented skills in different fields of Plant Sciences.
- Improved in self confidence, competency, positive working attitudes and professional attitudes need in the career.
- Developed self-learning capabilities and intellectual ability to acquire new knowledge in emerging fields related to Plant Sciences.
- Enhanced writing and reading skills and a variety of soft skills (communication, critical thinking, independent thinking, ICT skills, time management) and accountability to meet the job market's requirements.
- Improved positive attitudes and to be outcome oriented in the subsequent careers of the students.
- Gained social responsibility skills: ability to appreciate the value of cooperating with peers, democracy, equal opportunity, work ethics and team work.

Apart from the above, the Plant Science/ Biotechnology/Bioinformatics four year degree undergraduate programs, the students should also acquire the following:

- Have mastered the under mentioned skills, enabling them to develop careers within the respective fields and to function effectively as professionals.
  - Field and Laboratory Research Skills: Ability to design and execute experiments, systematically collect and analyze data, interpret results and present them and reach logical conclusions.
  - Critical Thinking Skills
  - Problem-Solving Skills: Ability to assess the elements of a problem and develop and test a solution, based on logic and the best possible information.

- Information-Seeking Skills: ability to seek for correct information, communication with persons.

The M Sc programs will lead to the following outcomes as well:

- Contribute to the direct national development through educational and R & D process.

#### **4. FINDINGS OF THE REVIEW TEAM**

These will be presented under the eight aspects as indicated in the introduction. Each aspect will provide the evidences gathered, highlight strengths and weaknesses and make suggestions and recommendations where necessary.

##### **4.1. Curriculum Design, Content and Review**

The Department of Plant Sciences offers courses for three year and four year degree programs. Apart from the general degree, there are 03 special degree programs each of 4 years duration, viz. in Plant Science, Plant Biotechnology and Bioinformatics. The program in Bioinformatics has commenced only in 2005.

As indicated in the appendices 1A, 1B and 1C in the Self Evaluation Report, 46 different course units (core and non-core/optional) are offered for students of all 04 years. The practice in the Department until 2003 had been that all students admitted to Biological Sciences follow all the courses offered by the Department during the first two years. However, with the introduction of the semester based course unit system in 2003 a separate degree program in Biochemistry has been introduced by the Faculty and students had been allowed to select Biochemistry as a subject. As a result of this revision about 90% of the students enrolled for Biological Sciences now follow the courses offered by the Department. At present, 240 students, (1<sup>st</sup> year-90, 2<sup>nd</sup> year-90 and 3<sup>rd</sup> year-60) in the general degree program follow courses offered by the Department. In addition there are 35 students in the 3<sup>rd</sup> and 4<sup>th</sup> years following the 3 special degree programs of the Department. The reviewers were informed that there is provision for the students to transfer from a four year degree program to the three year program. *The diversity of courses offered for the Special degree and the flexibility to move from special to general degrees can be considered as a good practice.*

The Department has commenced its curricular reforms in 1999. It was intended to introduce two special degree programs (Special degree in Plant Science and Plant Biotechnology) in place of the single special degree in Botany, to revise the ongoing courses and also introduce new courses of high demand with current applications. As a result there had been major curriculum revisions in the years 2002 and 2003. Curricular revisions are discussed regularly at the Departmental meetings under academic programs. Such revisions are then evaluated by the Faculty *Curriculum Development and Evaluation Committee* and scrutinized at the Faculty meetings prior to submission to the Senate for approval. The present curriculum has been operative from 2003.

While the current review process appears to be satisfactory, it could be improved by introducing an annual review meeting to which stake holders from relevant outside organizations/professional institutes and from industry are invited. Such participation will

strengthen the department's prime objective of preparing graduates to cater to industry and national development as stated in its vision and mission statements.

The review team, having gone through the present curriculum, noted that the curriculum is well designed in keeping with the mission of the Department to give the students a wide variety of courses in both basic and applied plant sciences and related fields. The 1<sup>st</sup> year courses are so designed to make the transition from Biology to Botany easy for the new entrants. It was also evident that the Department has strived hard to introduce a number of new courses to enhance employment prospects of its students. Overall, the Department offers a diverse range of course units that encompass many different areas of Plant Sciences. The introduction of new courses that emphasize applied aspects of Plant Sciences such as Industrial Biotechnology, Bioinformatics, Post-harvest Technology, Food Technology and Floriculture & Horticulture can be cited as *positive developments in curriculum reforms*.

From the documents submitted for scrutiny, the reviewers noted the contents of each course unit and are satisfied that each unit provides an in-depth subject knowledge. At the commencement of each unit, the students are encouraged to do extra reading and a list of reference material has been provided. Supplementary material is usually provided in all courses and these include laboratory schedules and manuals. Reviewers observed a gradual movement from basics to more advanced knowledge within the curriculum. For instance, the 1<sup>st</sup> year study program introduces the students to the fundamentals of Botany through courses such as Plant Structure, Variety of Plant Life, Cell Biology and Genetics. During the second year, the curriculum contains further basic courses such as Biostatistics, Experimental design, Principles of Microbiology and then goes on to build up their knowledge by exposing the students to more complex areas in the field of Plant Sciences. Multi-disciplinary subjects such as Molecular Biology and Recombinant DNA Technology, Plant Tissue Culture Technology, Horticulture, Plant Pathology etc., are then taught widening the depth and breadth of student knowledge and application. The reviewers are convinced that under the current curriculum, the students are provided with a better and broader subject combination and are given the opportunity to study different inter-related disciplines.

However the review team would like to make the following suggestions that could further improve the curriculum.

- Some knowledge in Plant Taxonomy be given perhaps through an introductory course during the first two years before the students are selected to their special degree programs. This will not only provide them knowledge in a core area of study in Plant Sciences, but also make it easy for them to follow the advanced course of Plant Systematics offered by the DoPS.
- There is no Plant Ecology component in the General Degree curriculum. Apparently the reason for this is that Ecology is taught under the programs of the Department of Zoology during the second year. Considering the importance of ecosystem protection and the employment prospects for Biology students available in Forestry and Wild Life sectors, it is necessary to include Ecology to the General degree curriculum. Perhaps a combined course unit on Ecology, Forestry and Conservation Biology could be offered jointly by the departments of Plant Sciences and Zoology.
- The Department offers core and non-core courses in the five subject combinations available to the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> year general degree students. On the other hand,

the 4<sup>th</sup> year special degree programs do not have any flexibility of choice among the taught course units in their third and fourth years, other than some flexibility of choice in the Assignments and the Research Projects. It is desirable to explore the possibility of providing some flexibility.

- Soil Science (BT 4018) is taught only during the 4<sup>th</sup> year of the special degree. It is suggested that some knowledge on plant-soil interactions including soil microbiology and fertility and soil conservation be introduced to all students (General and Special) following the degree programs offered by the department.

The Department's curricula also include some courses offered to students outside the DoPS such as those of the new Biochemistry stream and the Enhancement Courses offered for Physical science students.

Six enhancement courses are offered every year on interdisciplinary subjects including sports as indicated in the Appendix 3C. This is a positive step towards broadening the general knowledge and aptitude of students.

For the newly introduced Special degree program in Bioinformatics, 50% of the courses are conducted in collaboration with the departments of Zoology and Statistics and the School of Computing. ***This concept of inter departmental and inter institutional collaboration in offering teaching programs is a commendable positive development.***

The curricula of the special degree programs are well designed and exhaustive. Owing to their relevance in offering modern specialized knowledge and orientation towards lucrative employment, there is a high competition for enrollment. However, only six students are admitted each year for each program owing to constraints in facilities. It is a pity that such well formulated courses are limited to a few students and the department has every right to request enhancement of its facilities to enable the accommodation of more students.

The review team met a group of 31 students that included students from all levels of study in the general and special degree programs and also 21 students from the 3<sup>rd</sup> and 4<sup>th</sup> year special degree programs. Having explained the mission objectives of a subject review, students were given the opportunity to express their views. Some expressed that certain courses which are not compulsory (e.g. Plant structure and Transport systems) are found wanting when they follow special degree programs. Hence some provision should be made for such students to follow these courses once they are selected for special degree programs.

Those students who are following the newly introduced course in Bioinformatics find it hard to follow certain courses offered by the School of Computer Science. They feel inadequate in their knowledge in mathematics despite the knowledge gained from the enhancement course followed during their 1<sup>st</sup> year. An earnest request was made to make arrangements for them to get exposed to advanced math relevant to computer science. With regard to the courses in English offered to them on admission to the university, certain students expressed the view that it is illogical to have the same course to all students after categorizing them into different groups of competence following the initial test of English competency. For those students of high competency the common course offered is of little use and largely boring. Reviewing the English orientation program appears to be desirable in the light of these comments. A few students admitted to the

degree in Biochemistry through the special intake wanted provision for them to move laterally into other special degree programs offered by all the departments in the Faculty of Science. When questioned whether they would agree to such lateral movement into the degree in Biochemistry by other students in the Faculty, they became silent. The meeting with the students was cordial, highly participatory and productive and the review team was impressed by the uninhibited expression of views by the students.

*The judgment given to this aspect is GOOD.*

#### **4.2. Teaching, Learning and Assessment Methods**

The review team observed the facilities available for implementing the programs offered by the DoP.S. The facilities observed included the two large lecture theaters (each for 120 students), 2 seminar rooms, 3 large general laboratories (each with a capacity for 60 students) and 4 research laboratories including an equipment room, 2 garden laboratories and other infra-structure facilities, library, IT facilities, Green House, Herbarium, lecture theaters, seminar room, common room etc. The reviewers express their satisfaction of the adequacy of the facilities available. One seminar room is air-conditioned and is provided with multimedia and other audio-visual equipment.

The DoPS has a staff of experienced academics including two senior professors and a professor. The academic staff specialized in various fields in Plant Sciences together with several visiting lecturers and the supportive staff is fully involved in undergraduate and post-graduate teaching processes. There are 11 senior academics and 02 junior academics for 300 students making a ratio of 1:18.

Most academics have interactions with industry, research institutes, other government & public sector organizations established through their work. These include, research contracts with International agencies such as: IAEA (Vienna), UN/FAO, IFS (Sweden) and Royal Botanic Gardens, Kew UK. These enable them to keep up to date on current innovations and include them into teaching programs. Periodic changes are made to course units in all four years of the program.

The younger staff members have participated in staff development programs/workshops which are held periodically by the University Staff Development Center. The knowledge gained is used in enhancing the teaching and learning process.

The learning outcomes are achieved through lectures, practicals and assignment components. Theoretical knowledge disseminated during lectures is supported by practicals during laboratory and field exercises. Lectures and practicals are supplemented with handouts which enhances the learning and understanding capacity of students considerably.

Reviewers observed a lecture in Plant Systematics conducted for the 3<sup>rd</sup> year special degree students. The reviewers were quite impressed by this demonstration and the lecturer satisfied all aspects of good teaching. She was audible, confident, introduced the subject very well referring to the previous day's lecture and used the multimedia projector very effectively. Student participation was high and enthusiastic. A novel feature was that the handouts distributed had all the slides shown leaving ruled areas adjacent to each slide giving provision for students to make relevant brief notes. Reviewers also observed a lecture given to 1<sup>st</sup> year general degree students in Plant Physiology. The teacher has put

in a lot of preparation to explain the Pentose Phosphate Pathway using a single rather complicated diagrammatic transparency showing all the reactions in this process. Hand outs of this diagram had been made available to students and that certainly would be useful as a reference in the future. While providing this hand out is helpful to understand the overall reaction, if the teacher had a few more transparencies depicting the different reactions within the entire process, it would have made her task of teaching more effective and comprehension by the students easier. A peer observation of this probationary lecturer's teaching by a senior colleague would certainly improve her performance.

Laboratory classes in general are designed to encourage self-learning in students and to inculcate analytical thinking. Instructional materials, schedules and manuals are usually given in all the laboratory courses. It is proposed to prepare manuals for all taught courses using IRQUE funds, to be sold to students at nominal prices just to cover the cost of production. The team observed two laboratory classes in progress: one for the 1<sup>st</sup> year general degree students and the other for the 2<sup>nd</sup> year general degree students. The 1<sup>st</sup> year class under Cell Biology was well formulated to inculcate practical skills to separate and identify major cell components. Instructions and hand outs were comprehensive and the students appeared to have well understood the procedures and performed the assigned tasks with enthusiasm. The 2<sup>nd</sup> year lab class on Microbiology was handled primarily by a temporary Assistant Lecturer-in-Charge guided by the Senior Lecturer conducting the course. Some novel features of this teaching process are: a) well formulated, comprehensive practical schedules are provided to the students one week ahead of the lab classes. This enables the students to read, discuss and come well prepared for the class. ***This is a good practice*** and a few random checks among the students following the class showed that they have understood the principles and instructions very well. b) class details are not discussed by the Senior Lecturer with the temporary demonstrators. They are expected to study the schedules, discuss with the Assistant Lecturer in charge and independently prepare themselves for the classes. The purpose is to get the demonstrators to develop their own skills and become self confident. However it is necessary to carefully monitor the impact of this practice on the teaching competency of the demonstrators. The primary objective of these classes is to adopt the most effective delivery systems to ensure maximum benefits to the students and the development of the temporary staff should be considered as secondary.

There was evidence that tutorial classes are conducted for each course unit regularly exposing students to problem solving and providing the opportunity to clarify doubts. Contrary to common practice these tutorials are conducted by the lecturers themselves who are instructing the respective course units. Tutorials are an important component in a study program as they encourage self studying and critical thinking. They also provide formative evaluation of students and give opportunities to discuss problems and take corrective actions. To achieve all these desirable objectives instructors have to devote enormous amounts of time and effort particularly with large classes. The possibility of getting supervised assistance from temporary staff could be explored particularly because tutorial evaluations are not taken into consideration at the end semester evaluations.

Individual assignments are given to 3<sup>rd</sup> year students with the objective of improving their abilities to develop independent thinking, planning & execution. The team had the opportunity of observing a seminar presentation by a group of three 3<sup>rd</sup> year students (two general degree and one special degree). The topic for such seminars are selected by the

students themselves depending on their interest and under minimum guidance from the teacher the group gathers and collate information, organize the presentation. The seminar witnessed by the team was of a very high standard on a topical subject covering major aspects of Genomics. All three participants have prepared themselves well, multi-media slides were clear and comprehensive, presentation was excellent and questions were answered correctly with confidence. The objectives of development of presentation skills, self confidence and personality development among these students have been achieved very well and ***the teacher and the department should be congratulated for their efforts.*** The research projects, assignments and industrial training form major components in the study program of the special degree students and these are intended to develop self confidence, communication skills, positive attitudes, professional & entrepreneurial skills among them.

Depending on the interests of the students, topics for research projects on current issues are given by the staff. They should seek information, plan the work schedule and communicate with relevant persons in gathering information. All planning, execution, results interpretation and discussion must be done by the student under the guidance of the supervisor who is a senior staff member. A presentation on the research work is made by the student in the presence of academic staff, supportive staff and other students. Questions are asked. The whole exercise assists in confidence building and improvement of presentation skills of students. Noting the list of project titles submitted with the SER and having gone through some project reports the reviewers were convinced that topics relevant to national interests have been given to students and that there had been good supervision and the final project documents produced were of good quality and standard. Field visits are conducted for special degree students and these are well organized and form a vital part of the teaching process outside the classrooms and closer to reality in nature. Though desirable, major constraints to extend this activity to the general degree students are the lack of vehicles and logistical problems of food and accommodation for large numbers of mixed groups particularly if overnight stays are involved. It is suggested that at least one field visit per year is arranged for general students with the assistance of a relevant student society.

The industrial training program focuses on different specialty areas giving the opportunity for the students to select an area of interest for their training. Students are given the freedom to choose from a selected group of institutes/companies in which they would like to undergo industrial training (e.g. Tea, Rubber & Coconut Research Institutes, Industrial Technology Institute, Link Natural Products Ltd., Ceylinco Foliage Company Ltd. and Institute of Fundamental Studies). The industrial training program is a noteworthy exercise that not only enhances personality development and orientation of the students to the 'world of work' it also increases their employment opportunities. Some of the documents from the department showed students obtaining good employment in the organizations where they have undergone industrial training. One little deficiency the reviewers noted is that there is no feedback from the counterpart agencies involved in this exercise on student performance during the training. Some form of response or report from the students' immediate supervisor from the affiliated agency during such training would certainly improve this program.

The facilities made available for students to develop their soft skills were observed to be favourable. The general degree students use the central IT facility of the Faculty which is adequate and well organized. Ten computers have been made available for the use of

special degree students within the Department. All special degree students are allowed to use the IT facilities in the Department to access internet, writing of documents etc, which naturally give them opportunities to develop their skills on fact finding and preparing reports. Students are trained to make their own multimedia presentations. Because of their large numbers such facilities are available to the general degree students only to a limited extent.

The award of credits and the calculation of GPA values are done according to standard procedures. A student following the General Degree in Biological Sciences should register for a minimum of courses leading to 30 credits in each academic year, spread over two semesters (each of 15 weeks). The 30 credits consist of 18 core courses (6 per subject, 3 subject combinations) and 12 optional/non core courses. The credit values of courses vary from 1-4 (1 credit = 15 h lecture/ 30 h practical). There are 6 subject combinations in each year (Appendix 3A).

The Department offers 120 credit units spread over 46 course units, during the 4 years. Each student following a three year program needs to collect a minimum of 90 credits while students in the four year program needs to collect a minimum of 120 credits. In the first and second years, 6 credits are from core courses and a student should follow a minimum of 12 core courses in order to be eligible for the four year special degree program. There are also 12 credit courses each year which are non-core/optional.

Majority of the course units are evaluated by theory and practical examinations at the end semester examinations. However, several course units are assessed by reports, assignments, student presentations and viva-voce. The marks obtained for the courses are graded as follows:

Final average is calculated as follows:

$(1^{\text{st}} \text{ year weighted total average} \times 2) + (2^{\text{nd}} \text{ year} \times 3) + (3^{\text{rd}} \text{ year} \times 5) + (4^{\text{th}} \text{ year} \times 5)$ .

The value is divided by 135 and weighted average is calculated.

There are 3 other requirements for award of classes as given in Handbook (2006). All requirements must be fulfilled for the degree/class to be awarded.

Theory and practical examinations of all course units are conducted and completed at the end of a semester. While this system appears to work satisfactorily, it could be improved by introducing at least one formative evaluation per unit (MCQ, short answer, quiz) within the semester in order to help the weaker students prior to their final examinations.

In the case of special degree students, examinations for the research projects, viva-voce examination, field taxonomy course and student assignments are arranged by the department after the theory and practical examinations. Students are well informed of the assessments. The student has to make a presentation on the research work which is examined by all the staff. At the end, a dissertation on the research work must be submitted.

All special degree students have to face a viva-voce after the fourth year examination. Students are interviewed by a panel of examiners comprising of departmental academic staff, one academic member from another university and an industrialist. Students are examined on their core competency, general knowledge, IT literacy, current issues etc. The external examiners are requested to evaluate the students' the overall quality and professionalism of the students. Almost every year, positive comments have been received from the external examiners.

Individual assignment of the third year special degree program is a three credit (3C) course unit. The examination is by evaluating the report and a viva-voce or by evaluating a presentation of a project profile.

The course on taxonomic field survey is evaluated by assessing the herbarium collection of each student, a field report and a viva-voce.

Each senior academic staff member supervises at least 1 fourth year student on the research project and at least one third year student on the assignment.

Question papers are moderated and answers scripts of 1<sup>st</sup> and 2<sup>nd</sup> years are examined by both internal and external examiners (local). The 4 year special degree examination answers scripts are assessed by internal and overseas external examiners. Reports received from the external examiners during past five years have been positive and commendable. Prof. Brian Moss of the Liverpool University U.K. acts as the External examiner and moderator of the special degree examination. The reviewers had the opportunity to go through some of the valuable comments made by him. His comments had been critical, constructive and helpful in maintaining high standards. He has given a good rating for the overall performance of the students.

*The review team finds this aspect as GOOD.*

#### **4.3. Quality of Students including Student Progress and Achievements**

Admission of students to the Biological Sciences program is through the UGC mainly based upon the Z score values as indicated in the appendix 5A. Since 2003, with the introduction of the credit evaluation and semester system, 90% of the total student intake to the faculty (both in physical and biological streams) has been registered to follow core, optional and enhancement courses offered by the Department. Out of the student intake nearly 71% has been coming from schools in the Western Province mainly from Colombo, Gampaha districts and the Southern Province, Galle district. From the interaction the reviewers had with first year undergraduate students during their meeting it became evident that the majority of them are equipped with a satisfactory level of proficiency in English. This was confirmed by the very satisfactory level of English in the answer scripts examined by the reviewers. The students expressed satisfaction with the English course offered by the University at the commencement of their academic career that helps them to follow academic programs (lectures, practicals and tutorials) conducted in the English medium. Some students however were of the view that in spite of an initial grading test to assess their English knowledge all students are required to follow the same level of English, making the subject content often boring and useless.

Biological Science students who satisfy the faculty requirements to follow a special degree program are given a chance to apply for admission at the end of the 2<sup>nd</sup> year (Faculty Handbook, 2006). Six students could enroll for each of the special degree programs offered by the Department and the selections are based on their marks in the first two years for relevant core courses and their preferences. Thus students with high potential are admitted to follow special degree programs of the Department.

Student performance (in theory and practicals) for each course offered by the Department is assessed either at the end of semester or academic year via examinations.

Many students have progressed well in their studies (Appendix 2B (ii)). Attendance is maintained for lectures, practicals and field visits if any, for each course offered by the

Department. Unsatisfactory attendances (80% or less) are reported to the office of the Dean, Faculty of Science at the time of registration for examinations and such students are barred from sitting at examinations to maintain standards. However it was indicated that for many students who simultaneously follow outside professional courses, i.e. CIMA, BIT, Attorney-at-Law etc., provision may be granted on their requests by the Faculty Board.

Each student is allowed to repeat an examination only twice and grace chance/s when granted by the Faculty Board are on a case by case basis.

A high level of success has been achieved by students on almost all the disciplines in plant sciences via general and special degree programs conducted by the Department, from its inception.

From the evidence shown reviewers were convinced of the high academic performance of both general and special degree students in Plant Sciences. For example, in 2003 examinations conducted under the old system, out of the 98 students who sat for first and second year courses in Botany, 14 obtained grade A, 53 obtained grade B, 26 obtained grade C and only 5 have obtained D and E. With the introduction of the course unit system compilation of such numbers to indicate performances in Plant Sciences has become complex as grades are given for individual units.

However data from the last few years show good performances and that more than 92% of the undergraduates have been able to complete their study during a period of 3-3.5 years. Data presented in Appendix 2B(ii) of the SER for general degree graduates was inaccurate because it reflected the overall performance of students inclusive of subjects other than those offered by the Department of Plant Sciences. This anomaly was corrected during the review by examining the performance of students in the courses offered by the department under review (Appendix 2C).

It was observed that less than 20% of undergraduates following general degree program were unable to graduate at the time of completion of their degree but obtain the degree a few years later. The reasons for such occurrences have been found to be related to student's commitments to part-time employment and involvement in external study programs (Computer, Information Technology, Accountancy, Marketing etc) conducted by professional institutions.

All the students who followed the special degree program of the Department of Plant Sciences were able to successfully complete their degrees at the exact time of completion. More than 40% has graduated with a second upper or first class degree (Appendix 2B (ii)).

The Department offers several awards in the name of distinguished Professors/Academics who have served the Department (Handbook, 2006). The Academics offer the "Staff Prize" to the student who has scored highest overall mark for plant science core courses during a four year program of the Department. On graduation, the Department awards five prizes to the best achievements in several subjects (Handbook, 2006).

The Department of Plant Sciences provides opportunities to improve general attitudes, ethics, self-confidence and thus the over-all personality of students. It is evident that most of the graduates are employed or start higher studies within one year of their graduation (Appendix D).

More than 50% (recently this is > 70%) of the general degree graduates obtain their first job within one year of graduation (Figure 4). Over the past five years 30-40% of special degree graduates continued their higher studies (majority in United States) and others were employed in suitable posts in public and local private sector. A survey in 2004, on employment of biological science graduates who passed out from the faculty during the past five years identified that nearly 33% of them are now directly contributing to the industrial sector and a few are in the process of developing their own organizations through their entrepreneur skills (Appendix 3C) .

The Department is maintaining a very high level of academic standards in the four year B.Sc special degree programs. This is proven by US Universities selecting (with Assistantships) at least 3 – 4 special degree graduates out of 12 every year for Doctoral research/postgraduate positions. Nearly one year after the final examination they get these opportunities. Strong emphasis on course units such as plant pathology/virology, molecular biology and biotechnology enables these students in obtaining postgraduate placements. Currently 15 graduates who have followed the four year degree program at this Department are completing their Doctoral degrees in USA and UK.

*This aspect is judged as GOOD.*

#### **4.4 The Extent and Use of Student Feedback, Qualitative and Quantitative**

The Department obtains students' feedback quantitatively by using a questionnaire known as Course Evaluation Form adopted by the Faculty of Science. At the end of each course this form is given to students and the duly filled forms are collected and the data is statistically analyzed to find the significance of each character viz. a) learning (10 aspects), b) teaching (19 aspects), c) facilities (02 aspects) and d) practices/assignments/assessments. The questionnaire is quite comprehensive, has a wide coverage and is a positive development. A majority of students have expressed satisfaction on teaching and learning aspects. The feedback obtained from the students enabled the lecturer/administration to take positive steps to improve the quality of teaching and learning environment. Currently these forms are distributed and collected by the same instructor who conducts the course prior to end semester evaluations. Although some anonymity is ensured by not having the students' identities in the forms, the authenticity of the views expressed could be improved by assigning the conduct of this exercise to persons other than the teaching staff. Perhaps the Dean's office could conduct this under the supervision of the Assistant Registrar. In the sample form attached to the SER as Appendix 6A, out of the 36 questions 23 responses were 'strongly agree', with 09 as 'agree', 01 'no opinion' and only 02 as 'disagree' and these were with reference to faculty facilities. According to this *either* there is hardly any room for improvement as far as the department is concerned *or* the mechanism of obtaining feedback needs to be reviewed. Reviewers could have drawn a more balanced inference if a representative set of responses were made available for scrutiny. Nonetheless ***having a system with a comprehensive questionnaire is certainly commendable***, but the implementation could be improved in order to obtain a more realistic assessment. Perhaps the questionnaire can be posted in the faculty website and the departmental notice boards so that the students get accustomed to its contents and become competent to provide accurate responses.

It was also revealed that the Department acquires students' feedback qualitatively at the lecture/practical time discussions and at the monthly Research Forum. On these occasions

face-to-face interaction between the academic staff and the students is practiced about the quality of academic programs, teaching methods and infrastructure facilities. This type of interaction takes place more frequently between the special students and staff. Student feedback within the department could be improved by making provision for student representation in the departmental committee during which they can submit their views on non-confidential matters. Also the student representatives in the Faculty Board could be made use of, to obtain student feedback on academic and non-academic matters affecting their learning process.

***It is the view of the Review Team that the extent and use of student feedback by the members of the staff of the Department can be judged as GOOD.***

#### **4.5. Postgraduate Studies**

The Department of Plant Sciences is conducting several postgraduate programs. Among them the M.Sc. courses have taught units to the value of 22 credits together with a research project of 08 credits. Those students who successfully complete the 22 credit taught units but are unable to satisfy the research component can obtain a postgraduate Diploma instead of the M.Sc.

The SER has listed three M.Sc programs viz: i) Plant Pathology, ii) Weed Science and iii) Plant Cell & Tissue Culture. Of these three courses only that on Plant Cell & Tissue Culture is currently in operation and it has been offered uninterrupted since its inception in 1995.

Only three students are following the research programs leading to M.Phil and Ph.D. degrees. This is primarily because research students are available only if certain members of the department are able to secure research grants that make provision to employ research students. Of these three research students one has already transferred from a M.Phil to a Ph.D. degree while the other two have just started their programs. All of them were satisfied with the courses and facilities available for their graduate studies. One had reservations about the limited access to reference material, but she appeared to have depended entirely on what is available in the Department and the Faculty. It was pointed out to her that besides the internet there are relatively well equipped sources of reference material in the National Library, Colombo and at the National Science Foundation.

The review team had the opportunity to meet five postgraduate students two of whom were nearing completion of their M.Sc. program on Plant Cell & Tissue Culture. Both of them are contented with the teaching units they followed which have given them a lot of new and useful knowledge and skills. They were however struggling to complete their research projects and have already gone beyond the minimum period to complete the program. Their main difficulty is to find adequate time for research work as both of them are employed full time.

While the single taught M.Sc. program appears to be good and useful, there is a lot of room for improvement in the department on postgraduate teaching and research.

The Department has adequate senior academics with strong research capabilities. This is revealed not only in the research awards and recognition but also in the large number of publications both nationally and internationally. With further support from the highly

motivated, capable young academic staff who have returned with their graduate training abroad the department can look forward to significant improvements in their postgraduate programs in the near future.

*At present this aspect can be judged as SATISFACTORY.*

#### **4.6. Peer Observation**

Due to a misinterpretation of the instructions given in the UGC Handbook for the preparation of the SER, the department has stated 'that a well developed system of peer observation is lacking'. This was rectified during the site visit and the Head of Department provided lot of evidence of peer observation during her presentation as well as through various documents maintained in the department.

All lecture and practical material prepared by junior staff members are done under the guidance and supervision of senior academics. Every question paper and other material used for end semester evaluations are moderated by counterpart teachers and all answer scripts undergo a 2<sup>nd</sup> correction. The special degree questions and the answer scripts are examined by an external examiner from abroad (currently Prof. Brian Moss, School of Biological Sciences, University of Liverpool, U.K.). The team was able to read comments sent by him during past three years. Suggestions made by him have been adopted by the department to sustain and improve the standards of the degree programs. This has also resulted in the degree qualification been recognized internationally. Such recognition is reflected in the number of graduates winning scholarships and assistantships and securing positions in foreign universities for postgraduate studies. Awarding marks for the seminar presentations and viva voce of students supervised by individual staff members are done by a group of academics and educated professionals from outside.

Thus there are several mechanisms of indirect peer observation implemented in the department. What is lacking is the observation of class teaching *in situ* by staff colleagues although the value and importance of such observation is appreciated. Such systems are yet to be implemented in most other departments and universities. It is recommended that such a process is started by implementing peer observation of teaching by junior staff through senior members of the department including emeritus professors.

*It is the view of the Review Team that the present status of the Peer Observation adopted by the department is considered as SATISFACTORY.*

#### **4.7. Skills Development**

Besides the academic knowledge, all the courses comprise various skills development as an integral component of its curriculum They are: critical thinking, communication & presentation skills, scientific investigation, report writing skills, IT skills, professional & entrepreneurial skills. Also the 04 credit compulsory enhancement courses (not aggregated to the overall GPA) help in the development of talents and leadership qualities. The industrial training given at the end of 4<sup>th</sup> year provides the special students to build managerial & inter-personal skills, communication skills, entrepreneurial skills and enhance their employability.

The activities of the Botanical Society of the undergraduates having both academic and social events such as guest lectures, annual trip, exhibitions, sale of plants, further develop their talents, entrepreneurial attributes, leadership qualities and personalities.

The staff-student interactions and student community interactions are further strengthened by organizing social events, shramadana, and through community service center at Weligatte, Hambantota. These good practices not only enable the development of skills, but also inculcate attitudes towards community service among students.

The Community Development Center at Weligatte can be considered as a landmark development among all departments and institutes coming under the university system and should be emulated by others.

The Department has indicated its intention of extending skills development activities to general degree students as far as possible. Towards this end certain staff members have organized student seminars among 3<sup>rd</sup> year general degree students. The review team had the opportunity of witnessing such a seminar presentation by a group of 03 students. The topic is one of their own choice related to a course of lectures they have followed. Information gathering (mostly from the internet) planning, organizing and preparation of the presentation is largely by the students themselves. The team was impressed by the high quality of presentation material, overall confidence of the presenters and the effective communication skills displayed by them. This exercise is certainly a good practice and a wonderful opportunity provided to general degree students.

***It is the view of the Review Team that the skills development of the department can be judged as GOOD.***

#### **4.8. Academic Guidance and Counseling**

Certain senior academic staff members of the Department have been engaged in academic guidance and counseling: one as an Academic Advisor, two as Student Counselors and three as Coordinators for the three special degree study programs. In addition all the academic staff members are helping and guiding the student community. As far as academic matters are concerned the Academic Advisor gives the necessary guidance on the selection of different subject combinations to the undergraduates at the beginning of first year. Also at the beginning of the third year students are provided some guidance to select their special degree programs based on the merit and preferences.

The Faculty handbook is made available and is updated annually. Further details of the syllabi are available from the Department website. The course contents, text books, references and other learning aids recommended by academic staff members are available for students in the Faculty Handbook. Guidance is also provided with regard to the facilities available for academic work in the faculty and the department including the use of some rare and special collection of books and herbarium material kept in the department.

To attend to the personal problems encountered by the undergraduates there is a professional counselor attached to the university and in addition two academic staff members of the department engaged as student counselors. There is a close interaction between the students and counselors and every effort is taken to provide counseling in an

informal manner. However this aspect could be improved by providing some training in counseling to academic members of the staff. This aspect could also be improved by having records of academic guidance and counseling vis-à-vis student achievements in their academic performances and career development.

*It is the view of the Review Team that the present situation with regard to academic guidance and counseling adopted by the Department can be judged as GOOD.*

## 5. CONCLUSIONS

### **Curriculum Design, Content and Review**

#### ***Strengths/Good Practices:***

- The diversity of courses offered for the Special degree and the flexibility to move from special degree to general degree programs
- The introduction of new courses that emphasize applied aspects of Plant Sciences
- Concept of inter departmental and inter institutional collaboration in offering teaching programs

#### ***Weaknesses:***

- Lack of courses in Plant Taxonomy, Plant Ecology and Soil Science to students following the General Degree programs.
- Lack of flexibility of course selection during the 3<sup>rd</sup> and 4<sup>th</sup> year Special Degree programs.
- Non participation of outside stake holders from research institutes and industry in curriculum revisions.

### **Teaching, Learning and Assessment Methods**

#### ***Strengths/Good Practices:***

- Provision of laboratory class manuals to students at least one week ahead of each class which enables pre-preparation
- 3<sup>rd</sup> year Research seminars for general and special degree students that contribute immensely for skills development
- Industrial training that moulds students towards the 'working environment' and helps them to secure relevant employment

#### ***Weaknesses:***

- Lack of formative evaluations during courses
- Lack of monitoring progress during industrial training and absence of feedback from the external supervisors

### **Quality of Students including Student Progress and Achievements**

#### ***Strengths/Good Practices:***

- Overall good performance by students in courses offered by the department except in a few during the 2<sup>nd</sup> and 3<sup>rd</sup> years (Appendix 2C)
- High level of skills development including community service, besides subject knowledge

#### ***Weaknesses:***

- Limited admission to Special Degree programs
- Limited opportunities for general degree students for skills development

## **Extent and Use of Student Feedback, Qualitative and Quantitative**

### ***Strengths/Good Practices:***

- Well formulated questionnaire given to students for course evaluation

### ***Weaknesses:***

- Inadequate, authentic student feedback due to lack of liberal systems

## **Postgraduate Studies**

### ***Strengths/Good Practices:***

- The single program in operation is good

### ***Weaknesses:***

- Inadequate programs and low student enrolment in both taught courses and research degrees

## **Peer Observation**

### ***Strengths/Good Practices:***

- Having moderation of examination papers, 2<sup>nd</sup> corrections and external examiners local and foreign (for special degree programs)

### ***Weaknesses:***

- Lack of direct peer observation of teaching

## **Skills Development**

### ***Strengths/Good Practices:***

- Enhancement courses offered by the Faculty in the 1<sup>st</sup> year
- Seminars, assignments and industrial training
- Community service particularly the establishment of the service center at Weligatte where social consciousness and responsibility among students are stimulated

### ***Weaknesses:***

- Inadequate monitoring particularly during industrial training

## **Academic Guidance and Counseling**

### ***Strengths/Good Practices:***

- Participation of departmental staff in guidance and counseling is good

### ***Weaknesses:***

- Lack of records to show improvements of student progress and achievement through academic guidance and counseling

Based on the observations made during the visit by the review team and discussed above, the eight aspects were judged as follows:

### **Aspect Reviewed**

Curriculum design, content and review

Teaching, learning and assessment methods

Quality of students including student progress and achievement

Extent of student feedback, qualitative and quantitative

Postgraduate studies

Peer observation

Skills development

Academic guidance and counseling

### **Judgment given**

Good

Good

Good

Good

Satisfactory

Satisfactory

Good

Good

## **6. RECOMMENDATIONS**

### **Curriculum Design, Content and Review**

- Include some courses in Plant Taxonomy, Plant Ecology & Conservation, Forestry and Soil Science for the 3-year General Degree programs.
- Consider the introduction of a few elective/optional courses during the 3<sup>rd</sup> and 4<sup>th</sup> year programs of the Special Degree students.
- Offer an additional enhancement course in mathematics to strengthen the capability of students selected for the special degree in Bioinformatics to successfully complete the computer science courses offered by the School of Computer Science.
- Look into the possibility of revising the English language orientation program to offer courses at different levels to the different competency groups categorized on the basis of the initial test of competency in English.
- Invite outside participants (institutional, professional and industrial) to at least one annual meeting for the review and revision of curricula.

### **Teaching, Learning and Assessment Methods**

- Introduce some form of formative evaluations (quizzes, MCQs, structured short answers etc) during the courses in order to detect and assist the weaker students. Involve the temporary staff in these activities.
- Introduce some form of feedback from the external supervisors during industrial training. Compulsion to maintain a diary during the training period with a certification from the external supervisor could be an alternative.

### **Quality of Students, including Student Progress and Achievements**

- Improve resources and strengthen the capacity of the department so that more students can be admitted to the well formulated, research and employment oriented special degree programs offered by the department.
- Improve resources to strengthen the skills enhancement aspects of the general degree students.

### **Extent & Use of Student Feedback, Qualitative and Quantitative**

- Improve the implementation of the questionnaire system in operation in order to obtain more reliable and authentic responses.
- Make provision for the participation of representatives from among Special Degree students in departmental committee meetings where non-confidential items are discussed.

### **Postgraduate Studies**

- Introduce more taught courses. Expedite the implementation of the new courses as stipulated in the SER.
- Qualified academic staff should be encouraged to secure research funds from both local and foreign sources that would enable the enrolment of more students for research degrees. There is plenty of scope for this development as the department has a number of staff members who have returned from overseas with postgraduate qualifications and excellent research records.

- Explore the possibilities of generating funds from industry, alumni (local and abroad) to offer scholarships to capable students who perform well at the Special Degree programs.

### **Peer Observation**

- Introduce at least occasional *in situ* peer observation of teaching by the junior staff using senior staff and emeritus professors.

### **Skills Development**

- Strengthen the programs particularly for the General Degree students.
- Provide additional support for the community service based activities.

### **Academic Guidance and Counseling**

- Introduce a more formal system within the department.
- Maintain records that would enable the assessment of these activities on student progress.

### **General Recommendations**

The review team observed certain very expensive equipment (obtained through aid programs) that require operation, regular servicing and maintenance by technicians with specialized training. Some such equipments are not being used at present due to the dearth of technical capability. It was also observed that expensive equipments whose proper functioning and longevity depends upon temperature are kept in laboratories without air conditioning. Urgent remedial measures should be taken to rectify such situations. It is a colossal waste of resources to find that equipments obtained with high investment are left idle in this manner.

The team was also informed that plans are afoot to construct another new building for the department. Special attention should be paid to the designing of these buildings in relation to the main purpose of their use. This comment is made because the team observed that the two main laboratories of the present department building could have been better designed. The ‘instructor’s table’ is so placed that except for the 2 students closest to the table on either side, others occupying the 1<sup>st</sup> row cannot see the instructions given on the board. This is evident from the fact that there are two ‘instructor’s tables’ in the large laboratory on the 3<sup>rd</sup> floor.

Some provision should be made for the department or at least the faculty to purchase a bus that would enable the accommodation of more students for field studies.

## 7. ANNEXES

### 1. Agenda of the Visit

#### Day 01 (26<sup>th</sup> September 2006)

- 09.00 – 09.30 Meeting with the Dean, Faculty of Science and Head of the Department of Plant Sciences.
- 09.30 – 10.00 Discuss the agenda of the visit and meet the Department staff.
- 09.30 – 10.30 Tea
- 10.30 – 11.30 Presentation of the SER by the Head of Department.
- 11.30 – 12.00 Discussion
- 12.30 – 13.30 Lunch
- 13.30 – 14.30 Observation of Departmental facilities.
- 14.30 – 15.30 Observation of other facilities (IT unit, Garden, Library etc.)
- 15.30 – 16.30 Meeting with the Department Academic staff (with tea).
- 16.30 – 17.30 Meeting with undergraduate students.
- 17.30 – 18.30 A meeting among reviewers.

#### Day 02 (27<sup>th</sup> September 2006)

- 09.00 – 09.30 Observation of teaching-learning (lecture 1)
- 09.30 – 10.00 Observation of teaching-learning (lecture 2)
- 10.00 – 11.00 Observation of documents (tea)
- 11.00 – 12.00 Meeting with demonstrators, technical and other staff.
- 12.00 – 12.30 Observation of learning-practical class\*
- 12.30 – 13.30 Lunch
- 13.30 – 14.00 Observation of students' presentation\*
- 14.00 – 14.30 Meeting with postgraduate students.
- 14.30 – 15.30 Meeting with special degree students.
- 15.30 – 16.30 Observation of documents (tea)
- 16.30 – 17.00 Meeting with counselors.
- 17.00 – 17.30 Meeting among reviewers.

#### Day 03 (28<sup>th</sup> September 2006)

- 09.30 – 12.30 Observation of documents and report writing
- 12.30 – 13.30 Lunch.

As the review visit has coincided with the mid-semester vacation of the faculty large classes of general degree students were not available for observation. In consultation with the QAA unit of the UGC, it was decided to postpone these activities to the following week, Thursday October 05, 2006 the agenda of which is given below.

#### Day 04 (5<sup>th</sup> October 2006)

- 09.00 – 09.30 Seminar presentation by a group of 3<sup>rd</sup> year students.
- 09.30 – 10.00 Observation of a 1<sup>st</sup> year general degree lecture.
- 10.00 – 10.30 Tea
- 10.30 – 11.00 Observation of a 1<sup>st</sup> year general degree lab class.
- 11.00 – 11.30 Observation of a 2<sup>nd</sup> year general degree lab class.
- 11.30 – 12.30 Winding up meeting with Head and permanent staff of the Department.
- 12.30 – 13.30 Lunch.

## **2. List of Persons Met**

- i) Prof. R. L. C. Wijesundera, Dean, Faculty of Science.
- ii) Prof. Mrs. K. Hirimburegama, Head, Department of Plant Sciences.
- iii) Permanent members of the Academic Staff, DoPS.
- iv) Mixed group of students from General and Special Degree programs including 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> years (31 participants).
- v) Students from the 3<sup>rd</sup> and 4<sup>th</sup> year Special Degree programs (21 participants).
- vi) Postgraduate students (5 participants).
- vii) Temporary academic staff, technical and supporting staff (25 participants)

## **3. List of Teaching Sessions Observed**

- i) One lecture each from the 3<sup>rd</sup> and 4<sup>th</sup> year Special Degree programs.
- ii) A lecture from the 1<sup>st</sup> year General Degree.
- iii) A laboratory class of the 1<sup>st</sup> year General Degree.
- iv) A laboratory class of the 2<sup>nd</sup> year General Degree
- v) A 3<sup>rd</sup> year research forum seminar presentation by a group of 03 students (2 general degree and 1 special degree).

## **4. List of Facilities Observed**

- i) Two large lecture theaters.
- ii) Three large laboratories (one in the department of Chemistry).
- iii) A small laboratory for 30 students.
- iv) One air conditioned seminar room with necessary equipment.
- v) Two small seminar rooms.
- vi) A room for molecular biology work.
- vii) A herbarium in its infancy but having a valuable collection.
- viii) An equipment room.
- ix) A departmental computer unit for the use of staff and special degree students.
- x) It facility of the Faculty.
- xi) Small room having the department's collection of specialized books with provision for limited seating.
- xii) The Faculty library.
- xiii) Office of the Head of Department and the adjoining Departmental office.
- xiv) A plant house with horticultural plants some of which are tissue cultured.
- xv) A small garden of the Department where a limited collection of specimens are maintained.

## **5. List of Documents Observed**

### **LIST OF DOCUMENTS / PROOFS / EVIDENCES UNDER EACH ASPECT**

#### **1 – CURRICULUM DESIGN, CONTENT AND REVIEW**

- 1.1 CONTENT OF THE STUDY PROGRAMS AND DETAIL SYLLABI OF THE PRESENT COURSE UNITS
  - 1<sup>st</sup> YEAR COURSE CONTENT AND THE SYLLABUS
  - 2<sup>nd</sup> YEAR COURSE CONTENT AND THE SYLLABUS

- 3<sup>rd</sup> YEAR COURSE CONTENT AND THE SYLLABUS (GENERAL & SPECIAL)
- 4<sup>th</sup> YEAR COURSE CONTENT AND THE SYLLABUS (SPECIAL DEGREE)
- OLD SYLLABI 1991, 2002/2003

#### 1.2 FACULTY AND DEPARTMENT REGULATIONS

#### 1.3 CURRICULUM REVISION I

- DISCUSSIONS FROM CURRICULUM DEVELOPMENT COMMITTEE MEETINGS 2002

#### 1.4 CURRICULUM REVISION II

- CIRCULARS AND DISCUSSIONS FROM CDEC (CURRICULUM DEVELOPMENT AND EVALUATION COMMITTEE MEETINGS) 2004 – 2006

#### 1.5 CURRICULUM REVISION III

- MEMO FROM FACULTY BOARD – CURRICULUM REVISION
- MINUTES FROM DEPARTMENT MEETINGS – CURRICULUM REVISION
- DEPARTMENT SUBCOMMITTEE ON CURRICULUM REVISION

#### 1.6 EXAMPLES FOR TEACHING, LEARNING AND ASSESSMENT STRATEGY

- FACULTY CALENDARS, DEPARTMENT CALENDARS AND COURSE SCHEDULES AND NOTICES

### 2 – TEACHING, LEARNING AND ASSESSMENT METHODS

#### 2.1 TEACHING AND LEARNING MATERIALS

- LECTURE NOTES, TRANSPARENCIES AND HANDOUTS
- MULTIMEDIA PRESENTATIONS USED FOR TEACHING
- PRACTICAL COURSE MATERIAL
- AUDIO VISUAL AIDS USED FOR TEACHING
- TUTORIALS AND QUIZZES

#### 2.2 SAMPLE STUDENT WORK

- 1<sup>st</sup> YEAR PRACTICAL REPORTS
- 2<sup>nd</sup> YEAR PRACTICAL REPORTS
- 3<sup>rd</sup> YEAR PRACTICAL REPORTS
- 4<sup>th</sup> YEAR PRACTICAL REPORTS
- SEMINAR PRESENTATIONS
- ASSIGNMENTS (BT 3055)
- REPORTS – SPECIFIC COURSE UNITS
- DISSERTATIONS – RESEARCH PROJECTS
- TUTORIAL AND QUIZZES – ANSWERS

#### 2.3 ASSESSMENT

- REGULATIONS AND GUIDELINES
- EXAMINATION GUIDELINES 2005
- EVALUATION PROCEDURES AND DEGREE AWARDDING CRITERIA (HANDBOOK OF THE FACULTY OF SCIENCE 2006/ 2007)
- B.Sc. DEGREE PROGRAMME – BY-LAWS AND REGULATIONS
- SAMPLE QUESTION PAPERS AND DIFFERENT ASSESSMENT METHODS

#### 2.4 MINUTES OF DEPARTMENTAL MEETINGS

- MATTERS RELATING TO – EXTERNAL EXAMINERS, MODERATORS, ASSESSMENT

#### 2.5 MODERATION OF QUESTION PAPERS AND EXTERNAL MARKING

- MODERATED QUESTION PAPERS
- EXTERNAL EXAMINER'S REPORT

- STATISTICS OF MARKS
- 2.6 MARKING SCHEMES
- 2.7 DETAILED MARK SHEETS AND MARKING CONVENTIONS

### 3 – THE QUALITY OF STUDENTS, RECRUITMENT, ADMISSIONS, STUDENT PROGRESS AND ACHIEVEMENT

- 3.1. DETAILS OF ENTRY QUALIFICATIONS
- 3.2. STATISTICS- RATIO OF APPLICATIONS TO PLACES AVAILABLE
- 3.3. SUMMARY OF THE ADMISSION PROCESS
- 3.4. STUDENT PROGRESSION THROUGH THE PROGRAM
- 3.5. DETAILS OF STUDENT ACHIEVEMENTS
- 3.6. EXTERNAL EXAMINERS' REPORT
- 3.7. DETAIL OF GRADUATE DESTINATIONS/EMPLOYMENT

### 4 – EXTENT OF STUDENT FEEDBACK, QUALITATIVE AND QUANTITATIVE

- 4.1 COPIES OF QUESTIONNAIRES
- 4.2 ANALYSIS OF QUESTIONNAIRES
- 4.3 RESEARCH AND DEVELOPMENT FORUM
  - MINUTES OF THE DEPARTMENT MEETINGS SHOWING EVIDENCES OF THE DISCUSSIONS MADE ON THE FORMATION OF A RESEARCH AND DEVELOPMENT FORUM
  - DOCUMENT CIRCULATED AMONG STAFF MEMBERS FOR THEIR FEEDBACK
  - TRANSPARENCY PREPARED TO INFORM THE STUDENTS
  - NOTICE AND ABSTRACT OF THE PRESENTATIONS MADE AT THE INAUGURAL MEETING
  - PRESENTATION BY DR. A. BOTELLA - SECOND MEETING
  - NOTICE OF THE THIRD MEETING
- 4.4 ACTUAL EXAMPLES OF STUDENT FEEDBACK
  - GENETICS
  - BIostatISTICS
  - TRANSPORT SYSTEM IN PLANTS
  - BIOTECHNOLOGY IN CROP PROTECTION 2005
  - PLANT TISSUE CULTURE TECHNOLOGY & BIOLOGICAL CONTROL OF PLANT DISEASES 2005
  - ASPECTS OF MICROBIOLOGY – PRACTICAL CLASSES
  - FOOD MICROBIOLOGY
  - MICROBIOLOGY PRACTICAL CLASS
  - STUDENT REPORTS ON INDUSTRIAL TRAINING
  - STUDENT E-MAILS
  - DEMONSTRATORS FEEDBACK – ASPECTS OF MICROBIOLOGY
- 4.5 CASE STUDIES
  - CASE STUDY I - LECTURES ON VARIETY OF PLANT LIFE
  - CASE STUDY II -QUESTIONNAIRES ANALYZED FOR THE COLLECTION OF DATA ON THE EMPLOYABILITY OF BIOSCIENCE GRADUATES DURING PAST 5 YEARS (FROM 1998 – 2003) AND THE REPORT PRODUCED

### 5 – POST-GRADUATE STUDIES

- 5.1 DEPARTMENT / FACULTY / UNIVERSITY POLICY ON POST-GRADUATE STUDIES
- 5.2 POST-GRADUATE STUDENT NUMBERS (2003 – 2006)
- 5.3 M.Sc. – PLANT, CELL AND TISSUE CULTURE (2003 – 2006)
  - APPLICATIONS
  - STUDENT REQUESTS
  - PAST EXAM PAPERS
  - SYLLABUSES + SEMESTER SCHEDULES

- WORK ASSIGNMENT - DEMONSTRATORS
- EXAM SCHEDULES
- EXTERNAL EXAMINER'S REPORTS

#### 6 – PEER OBSERVATION

- 6.1 PEER EVALUATION CONDUCTED AS A REQUIREMENT OF THE COURSE CERTIFICATE FOR TEACHING IN HIGHER EDUCATION
  - PEER EVALUATION DOCUMENTS
  - EXCERPT FROM AN ACADEMIC PORTFOLIO – CHAPTER ON PEER REVIEW
- 6.2 MODERATION OF EXAMINATION QUESTION PAPERS AND EXTERNAL MARKINGS
  - MODERATED EXAMINATION QUESTION PAPERS
  - EXTERNAL EXAMINER'S COMMENTS
  - MINUTES OF THE DEPARTMENTAL MEETINGS
- 6.3 EVALUATION OF 'A' GRADES OF FIRST YEAR STUDENTS (REVIEW BY THE CURRICULUM DEVELOPMENT AND EVALUATION COMMITTEE, FACULTY OF SCIENCE)

#### 7– SKILLS DEVELOPMENT

- 7.1 A COPY OF THE SKILLS DEVELOPMENT SECTION OF THE SELF EVALUATION
  - DEPARTMENT STRATEGIES FOR SKILLS DEVELOPMENT
  - LIST OF SKILLS
- 7.2 LABORATORY CLASS
  - PRACTICAL SCHEDULES
  - LAB REPORTS
- 7.3 COURSES WITH 'PRESENTATION MODULES'
- 7.4 SPECIAL PRACTICAL COURSES FOR SKILLS DEVELOPMENT
- 7.5 FIELD VISITS (FOREST AND INDUSTRIAL)
- 7.6 THIRD YEAR ASSIGNMENT AND *VIVA VOCE*
- 7.7 FOURTH YEAR RESEARCH PROJECT AND *VIVA VOCE*
- 7.8 RESEARCH AND DEVELOPMENT FORUM
- 7.9 INDUSTRIAL TRAINING
- 7.10 INTENSIVE COURSE IN ENGLISH ORIENTATION PROGRAM
- 7.11 ESSAY
- 7.12 OTHER ACTIVITIES (BOTANICAL SOCIETY, SHRAMADANA, EXHIBITIONS, DEMONSTRATORS ETC.)

#### 8 – ACADEMIC GUIDANCE & COUNSELING

- GUIDANCE AT THE ORIENTATION PROGRAM – FACULTY & DEPARTMENT LEVEL
- GUIDANCE AT THE BEGINNING OF THE ACADEMIC YEAR
- GUIDANCE AT THE END OF THE 2<sup>ND</sup> YEAR
- GUIDANCE AT THE COMMENCEMENT & DURATION OF THE ACADEMIC COURSES
- ACADEMIC & PERSONAL COUNSELING
- GUIDANCE, COUNSELING FOR THE NEW GRADUATES
- PROFESSIONAL COUNSELING UNIT & CARRIER GUIDANCE UNIT

**6. Revised lists submitted by the Head of Department of student numbers registering for courses in Plant Sciences and their degree completion rates and revised lists of examination results of students following courses in Plant sciences (Tables given below).**

APPENDIX 2C							
Grades obtained for each course unit for first and second year courses offered by Department of Plant Sciences during 1998 - 2003 period.							
First year <u>grades</u> presented <u>as a percentage</u> from the total number of students							
Year	Total no	Grade	Percentage Grade			Overall Result	Other
			BT 117	BT 118	BT 119		
2003	98	A	10	38	18	14	1FT
		B	49	42	54	55	
		C	37	16	25	27	
		D	2	2	2	2	
		E	2	2	2	2	
2002	70	A	17	34	34	18	1nc
		B	48	41	50	63	
		C	30	21	14	16	
		D	1	3	3	1	
		E	3	1	0	1	
2001	97	A	13	23	3	7	1FT
		B	48	39	54	44	
		C	37	31	42	47	
		D	1	5	1	1	
		E	0	2	0	0	
2000	106	A	8	17	19	7	1 nc
		B	41	50	47	51	
		C	45	31	33	40	
		D	6	1	0	2	
		E	0	1	0	0	
1999	97	A	10	21	18	6	6 nc
		B	59	54	38	57	
		C	30	22	36	32	
		D	1	2	7	4	
		E	0	0	1	0	
1998	87	A	1	23	5	2	1 nc,1 FT
		B	25	26	49	40	
		C	60	38	40	48	
		D	13	6	12	7	
		E	1	6	1	2	
FT:Fail Theory							
Source:Department of Plant Sciences Examination Records,2005							

## Analysis of second year results

### Second year examination result analysis 2004/ 2005

Course Unit	Number of students registered	No. passed	No. failed	Other*	Passed %	Failed %
<b>BT 2001</b>	71	56	13	2	79	17
<b>BT 2002</b>	18	13	3	2	72	17
<b>BT 2003</b>	82	76	16	0	92	8
<b>BT 2004</b>	25	22	2	1	88	8
<b>BT 2005</b>	81	72	8	1	89	10
<b>BT 2006</b>	81	67	11	3	83	14
<b>BT 2007</b>	81	66	12	3	81	15
<b>BT 2008</b>	81	71	7	3	88	9

### Second year examination result analysis 2005/ 2006

Course Unit	Number of students registered	No. passed	No. failed	Other*	Passed %	Failed %
<b>BT 2001</b>	97	68	24	5	70	25
<b>BT 2002</b>	18	17	0	1	94	0
<b>BT 2003</b>	83	46	36	1	55	43
<b>BT 2004</b>	71	68	1	2	96	2
<b>BT 2005</b>	87	79	8	0	91	9
<b>BT 2006</b>	28	25	3	0	89	11
<b>BT 2007</b>	89	58	31	0	65	35
<b>BT 2008</b>	78	75	1	2	96	1

NB:\* Please note that the students who were absent and not completed the unit are categorized as 'other' category.

Failed = Grade C<sup>-</sup> and below

**Also note:** Only two sets of results are available with the Semester System/Credit course system.

### Analysis of third year results

NB:\* Please note that the students who were absent and not completed the unit are categorized as 'other' category.

Failed = Grade C<sup>-</sup> and below

### Third year examination result analysis 2004 / 2005

Course Unit	No. of students registered	No. passed	No. failed	*Others	Passed %	Failed %
<b>BT 3001</b>	30	20	9	1	67	30
<b>BT 3002</b>	25	16	7	2	64	28
<b>BT 3003</b>	35	21	12	2	60	34
<b>BT 3005</b>	9	8	1	0	89	11
<b>BT 3006</b>	31	16	14	1	52	45

**Also note:** only one year results are available for third year with the Semester system/Course system (which was started 03 years ago).