

**Report of the
Accreditation Inspection Committee
(AIC)**

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and Biotechnology (CABB)
University of Agriculture, Faisalabad**

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The Evaluation Team acknowledges the support and cooperation of the honorable Vice Chancellor/ Director, Consultant and Faculty / Staff members of the CABB, University of Agriculture Faisalabad, Pakistan.

The immense help, guidance and logistic support of Mr. Naseer Alam Khan (Secretary), and Dr M Tasneem Chairman, NAEAC is highly appreciated.

Accreditation Inspection Committee (AIC), NAEAC

1. General:

Executive Summary

In pursuance to its mandate given by the HEC under clause 10 subsections (d) and(1) of the bye laws of NAEAC, an Accreditation Inspection Committee (AIC) was constituted comprising Dr. Hidayat ur Rahman, Professor PBG, Agricultural University, Peshawar, Dr Shahid Masood, Director Crop Sciences Institute, NARC (Islamabad) and Mr Naseer Alam to review the B.Sc Hons Agri. with Biotechnology as major subject and M. Sc(Hons) Agri.Biotechnology degree programs of the Centre of Agricultural Biochemistry & Biotechnology (CABB) at the University of Agriculture, Faisalabad. The inspection was aimed to validate the self-assessment report (SAR) of the degree programs (BSc.Hons and MPhil) offered by the Centre of Agricultural Biochemistry & Biotechnology (CABB) the University of Agriculture, Faisalabad and carrying out external evaluation of the degree programs in a transparent, neutral, holistic and participatory manner for accreditation and rating based on seven (7) evaluation criteria given in the Evaluation Manual. The onsite visit was made during December 17-18, 2012. The meetings of the inspection team with various stakeholders including the teaching faculty and students were held in a very conducive manner. The center has a well qualified team of 19 members with 17 having PhD degrees. The remaining two members are enrolled as PhD scholars. Most of the labs were found well equipped with the requisite lab equipments including, centrifuges, PCR machines, gel electrophoresis as well as documentation systems and were in quite workable conditions. The labs were in actively occupied state as the graduate students were seen working on their research projects. The classes were busy as well, reflecting a rigorous schedule for various classes. The curricula being offered were well in line with HEC approved standards and requirements. The students were satisfied with the teaching methodology of the faculty as well as with the transparency of the examination process. However, they were concerned with the non inclusion of biotechnology as a component in the domain of Public Service Commission for absorption of biotechnology graduates in the public sector. The curricula covers diverse aspects of biotechnology including industrial and medical aspects which could help significantly in producing well qualified manpower equipped with the latest technical know how in the area of biotechnology. Based on the excellent infrastructure and having well qualified teaching faculty with diverse fields of expertise, the CABB should further broaden its clientele and include industrial sector particularly pharmaceuticals to cater to the emerging needs of this rapidly growing sector.

1.1 Introduction:

The Accreditation Inspection Committee (AIC) setup by the National Agriculture Education Accreditation Council (NAEAC) for the external review of the Degree Programs (BSc (Hons) Agri. with major in Biotechnology and M. Sc (Hons) Agri. Biotechnology) of the Centre of Agricultural Biochemistry & Biotechnology (CABB) visited the University of Agriculture, Faisalabad on December 17-18, 2012 for in-depth review. The AIC met on December 17-18, 2012 in the CABB to carry out external review of the said degree programs. TORs of the AIC are given in Annexure-I.

1.2 The Centre of Agricultural Biochemistry & Biotechnology (CABB)

The Centre of Agricultural Biochemistry & Biotechnology was inaugurated in 2003 and Master degree was started in 2005, with an initial enrollment of 25 students. At present there are 97 students in BSc (Hons) and M Sc (Hons) degree programs. The mission of the center is to produce trained and skilled work force, with focus on innovation and entrepreneurship, capable of employing knowledge input for the rapid and sustainable agriculture developments of Pakistan.

The curriculum and duration of degree program is in line to that approved by HEC. There are 38 students enrolled in MSc (Hons) degree program. The center has a total of 19 Faculty members out of which 16 hold PhD while the remaining three are enrolled in Ph D degree programs. There are three Professors in the center, one Associate Professor, four Assistant Professors and 12 Lecturers in the center. Of the four Assistant Professors, one is on Tenure Track System (TTS). The center owns enough field area to conduct field experiments. The support staff for laboratory and office work is 15 in number which is sufficient to a reasonable extent.

1.3 Program Mission

The program mission is to produce quality graduates of higher caliber in the discipline of Biotechnology with a strong research background in innovative techniques and emerging technologies. The center has to play role in capacity building and offer solutions to agriculture related issues of national importance.

1.4 Academic Program

Section-2: Point wise Analysis

2.1 Curriculum Design and Development

The curriculum being followed is according to the national curriculum developed through HEC. The present curricula were designed in 2010 under HEC curriculum review program.

Students Perception: The undergraduate and post-graduate students were contacted for their views about the contents of the courses, the method of teaching, use of teaching aids, the conduct of practical and field exposure, examinations, grading and awards. The students were satisfied with the teaching methodology and the theoretical part of the courses. The laboratory facilities for under graduates were quite adequate. The existing labs were functional and the equipment in most of the labs under intense use. The farm field facilities were available for the students and faculty research, accompanied with green house and screen house facilities. According to the students, the teachers are performing their duties in an excellent manner and teaching aids like multimedia, projectors are used in the class room.

The center has state of the art research in comparison with the other stakeholders and local industry to improve traits of economic importance in field crops. The center has an internal library, with a limited collection of 65 text and reference books of Biotechnology in addition to the main Library on campus which is just at walking distance from the centre. Net instructional hours are according to HEC plans and courses are generally completed before the examinations. Course files are maintained by the teachers and were found complete and satisfactory. Admissions, course registration and withdrawal policy matches with that planned by HEC. The course evaluation system is more or less according to the HEC instructions. The mid semester, final semester and practical examinations are being held according to the schedule given by the Director of the Centre/ Controller of Examinations. Quizzes, Assignments are also given to the students. Board of Study, Faculty Board and Academic Council exist and the meetings of academic bodies are held regularly.

2.2 Strength and Quality of Faculty

The faculty of the department was found sufficient. Out of total 20 faculty members, 16 possessed PhD degrees while only 4 were having M Sc (Hons) degrees. Most of the staff members earned their PhD degrees abroad. Some faculty members have exposure to Post-Doctoral training abroad and one staff member has gone abroad (UK) recently for post-doc. Most of the faculty members are young and energetic and put maximum efforts for developing their own careers. It is certainly possible with the better management and directions by the seniors.

Academic Programs:

Following academic programs are being catered within the Centre of Agricultural Biochemistry and Biotechnology

A) B Sc. (Hons) Agriculture majoring in Biotechnology. The students are taken after F.Sc. and are being offered general introductory courses of agriculture and allied subjects as per HEC guidelines for the 1st half (4 semester). The students opt for major in 5th semester and spend two years in the center with internship/ research project in the center or in other institutions of similar nature. Presently the department has 37 students in two major classes.

B) M Sc (Hons) Degree Program: The students after graduation in B Sc (Hons) Agriculture are offered M Sc Honors degree program comprising two years of taught

courses and thesis research. The number of MSc Honors students taken were 6 in two semesters. The students have to take 38 credit hours of teaching and thesis research.

2.3 Students Support and Progression

The students have access to the Central Library. The online facilities for literature does exist within the main library. The centre library has a collection of 165 text books. Some computers and internet facilities are available for under graduate and post graduate (Master and PhD) students within the department but needs improvement.

Admissions system is transparent, and intake is adequate. The students' drop out percentage is very low. Sports facilities for students are only available at main campus.

2.4 Infrastructure and Learning Resources

The center has sufficient lecture rooms and laboratories to cater the presently enrolled undergraduate and graduate students. There is adequate infrastructure for field experiments and research for the students. The teaching aids like multimedia, white boards and others are already in use. There are multimedia systems in the centre which is catering the present needs of graduate and post-graduate students. There is some separate space for sitting of students (Post graduate) where they can work peacefully after the lectures or while performing research work independently. The internet and computer facility is available for students and the staff within the center, however, it needs to be strengthened according to the students load and enrollment.

2.5 Research and Consultancy activities

Research activities of the staff and the students were visited in labs. It was observed that the research facilities for the staff and the post-graduate student's were at adequate level. Most of the students are engaged in their thesis research in the same centre, however some of the student do carry out their research in the near by labs and institutions. The research activities indicated that most of the staff is actively involved in research and groups according to the specialized area i.e. genomics, proteomics, tissue culture are well established.

2.6 Governance and Leadership

The centre activities were well organized both in teaching and research. It was observed that the funds for practical and research are controlled centrally by the Director of the Centre. The centre needs are met through centrally administered academic and financial control and the Director has no funds at his disposal. There is some funding from outside through research grants and the staff have several projects being funded by various funding agencies including HEC. The university statutory bodies like the Faculty Board, Academic Council and Syndicate are in place for supervision of the teaching and research activities as well as other matters of concern. The student's affairs and other counseling

facilities are available in the centre. Salaries of the teachers are according to the National pay-scales except for the teachers on tenure track system (TTS).

Innovative Practices

The qualification and potential of the faculty was quite impressive and the young staff members are gaining experience. The faculty has several publications in journals with impact factor. The innovations and research require healthy competition, which was prevailing indeed among the teaching staff. The number of publications in the quality journals was also reasonable. The staff members were willing to do productive work.

Section-3 Overall/ SWOT Analysis

3.1 Major Strengths:

The Department has the following strengths

- Qualified faculty with vision and will to work for students training and research.
- The center has ample research farm to conduct staff and student's research.
- The number of students both at graduate & post graduate level has improved in a short life span of the center and it will further improve in future.
- The teaching faculty along with the supporting staff was found to be satisfied with their salaries.
- Faculty members have publications in HEC recognized and impact factor journals.
- The statutory bodies including Board of Studies and governing bodies were in place for solving the academic matters of staff and students.
- The examination system was found to be intact through the University Controller of Examinations.

3.2 Major Weaknesses:

Following weaknesses were observed while visiting and contacting the stake holders.

- The library facilities within the department are limited.
- Functional tutorial groups and counseling for students at the centre needs to be initiated.
- The computer facilities for staff and the students within the department are there but limited indeed and hence needs to be extended for an easy access to online facilities.
- There is no canteen or cafeteria at the centre, hence the students and staff suffer for refreshments during day time.
- The support staff of the center is insufficient and is less than the criteria set by HEC.

- There is no individual sitting arrangements for research students (Post-grads) within the centre.
- Post-graduate research funds are not enough
- Research Journals were altogether missing in the centre library.

3.4 Major Opportunities:

- Although the CABB is at its infancy but it may gain good reputation by developing linkages with the institutions like NIBGE, CEMB and others. The center is in the industrial hub of the country and can take lead in tackling the special problems of the farmers as well as industrial sector.
- The center needs to put emphasis on training in advanced techniques of plant breeding including MAS (marker assisted selection), double haploid production and tissue culture.
- The students have good employment opportunities in fruit industry, seed and pesticide companies because of the important cropping zone of Punjab.

3.5 Major Challenges:

- The major challenge for the center in future is to establish well equipped labs for practical training to the students in emerging technologies.
- The documentation of important crop plant material (wild and cultivated) of the area based on molecular markers would be a challenge for the center in future.
- To produce quality students cognizant of the new techniques and emerging challenges.
- Production of transgenic plants under controlled conditions.

Section- 4 Recommendations:

4.1 Salient Findings

1. The CABB is progressing well however, more efforts are required to make it fully functional.
2. A good quality education is being given to the students. Hands on training in laboratories is satisfactory to some extent.
3. The student's exposure to latest developments is good but need improvement, particularly laboratory facilities at undergraduate level.
4. The computer and internet facilities for the students are limited and the departmental library is having a very limited collection.
5. The Post-graduate research laboratory although have few equipment, however more equipments are needed as demand for these will increase with more enrollment. The infrastructure in the under graduate laboratory also needs improvements.
6. The number of lecture rooms according to the number of classes B.Sc Hons and MSc Honors are not sufficient, and needs to be increased.

7. There is central control of budget and the center has no regular research and student's practical budget at its end and need serious attention.
8. The students and staff need cafeteria/ canteen at the center for snacks and refreshment during long days as the center is located at a distant place from the main campus.

4.2 Actionable Recommendations

The Institute has state-of- the- art research laboratories and good teaching facilities.

1. More furnished lecture rooms and teaching aids like e.g. multimedia and digital library resources within the center are recommended.
2. The students and teachers must be given access to laboratories after late hours to carry out their research work uninterruptedly.
3. Computer facilities need to be upgraded within the center to have an access to online journals and textbooks.
4. The senior teachers may be encouraged to write course books for graduate and post graduate students.
5. The students must be provided scholarship facilities at least the merit scholarship within the center for motivation and better incentives.
6. The sports and co-curricular activities must be initiated at the center to inculcate healthy and competitive environment.

4.3 General Recommendations

1. Lecture rooms facility may be increased according to the number of classes and degree programs.
2. The under-graduate students may be given exposure to established and fully functional laboratories of the center.
3. Facilities to digital library with online linkages may be provided at the center for free access to final year BSc and the post-graduate students.
4. There must be some space for the post graduate students to sit and plan the experiments and to keep their research material safely.
5. The facilities for post graduate laboratory including molecular techniques, tissue culture and in-vitro embryo rescue may be created within the department.
6. The Green house and screen house facilities are urgently required for the department to control the environmental factors in research activities.
7. The students support and co-curricular activities/ facilities need creation at center level by establishing students counseling desk at the center level.
8. Capacity building of teaching and supporting staff is needed.
9. There should be some budget at the disposal of the Director of the center so that the immediate student research needs may be met.

4.4 Recommendation for Equation of Biotechnology Degree with MSc (Hons) Agri.

Students having degree of B.Sc.(Hons) Agriculture with major subject of Biotechnology, Plant Breeding and Genetics, Horticulture, Entomology, Plant Pathology, Microbiology, Agronomy etc are eligible for getting admission to M.Sc.(Hons) Agriculture Biotechnology.

Master degree students in the CABB apprised the AIC Team that the name of their degree (M.Sc.(Hons) Agri. Biotech) has not yet been added in the eligibility criteria for the recruitment of AROs/Ros in Agri. Research wings of the provincial as well as federal Governments.

They demanded to equate their degree of M.Sc.(Hons) Agri. Biotech with the degree of M.Sc.(Hons) Agri. In other subjects based on major subjects of their B.Sc.(Hons) degree on the basis of which they got admission in M.Sc.(Hons) Agri. Biotech degree program.

This is because they have additional knowledge of Biotechnology over and above the major subject of their B.Sc.(Hons) degree.

This demand of the students was endorsed by the faculty member of the CABB who further informed the AIC Team that this type of equation has already been approved by the statutory bodies of the university.

It is, therefore, recommended that the degree of M.Sc.(Hons) Agri. Biotech may be equated with other M.Sc.(Hons) degrees in Agriculture as have already been approved by the statutory bodies of the University of Agriculture, Faisalabad.

4.5 Final Recommendations

Most of the faculty members (16 out of 19) of the center are PhD degree holders in Plant Breeding & Genetics/ molecular biology. Most of the faulty members are very young and energetic and are just at the beginning of their careers. In order to harness the full potential of the physical infrastructure and trained manpower following suggestions may be considered for institutional and national interest.

1. More lecture rooms and teaching aids like the use of multimedia and digital library resources within the center are recommended.
2. The students and teachers need well established functional laboratories for the conduct of research and trainings.
3. Better computer facilities for students as well as teachers within the center for approaching the online journals and textbooks are required

4. The support and co-curricular activities including counseling may be initiated at the center level.
5. Green house and tissue culture facilities need creation within the center at an earlier time.
6. Departmental Library with text books and research journals is essentially required.
7. Director of the center may be given some financial and administrative powers to run day to day matters more efficiently and effectively.
8. The Public Service Commission both at Federal and Provincial level may be approached to incorporate Biotechnology as a component like other disciplines of Agriculture for possible absorption of biotechnology graduates in the public sector through public service commission.

On the basis of the inspection / evaluation, the team recommends Accreditation of the Degree Programs of the CABB in “W” category of National Agriculture Education Accreditation Council/HEC.

4.4 Signatures of AIC Members

<u>Name and Designation</u>		<u>Signatures</u>
Dr. Hidayat ur Rahman Professor Department of Plant Breeding & Genetics University of Agriculture, Peshawar	(Convener)	
Dr. Shahid Masood Director/ Chief Scientific Officer, NARC, Park Road, Islamabad	(Member)	
Dated: 30. 12, 2012		

4.6 Comments and Signatures of Chairman

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ANNEXURE I. Accreditation of Agriculture Education Institutions in Pakistan

In pursuance to its mandate given by the HEC under clause 10 subsections (d) and(1) of the byelaws of NAEAC, an Accreditation Inspection Committee (AIC) was constituted comprising the following scientists to review the Degree Programs (B.Sc (Hons), M. Phil and PhD) of the Centre of Agricultural Biochemistry & Bitechology (CABB) visited the University of Agriculture, Faisalabad for the assessment and accreditation of degree awarding academic programs:

- i) Dr. Hidayat ur Rahman Convener
Professor, Department of Plant Breeding & Genetics
University of Agriculture, Peshawar

- ii) Dr. M. Shahid Masood Member
Senior Director/ Chief Scientific Officer,
NARC, Park Road, Islamabad

The main terms of reference (TORs) of the committee were as follows:

- To validate the self-assessment report (SAR) of the degree programs (B. Sc.(Hons) and M. Phil.) offered by the Centre of Agricultural Biochemistry & Bitechology (CABB) the University of Agriculture, Faisalabad.
- To carry out external evaluation of the degree programs in a transparent, neutral, holistic and participatory manner for accreditation and rating **based on seven (7) evaluation criteria given in the Evaluation Manual.**
- To submit synthesized and concise analytical report (4-5 pages only) comprising SWOT Analysis and actionable recommendations based on the instructions with the Director, Consultant, Faculty Members, Students and Support Staff and Alumni as well as detail visit of physical infrastructure, facilities and other teaching-learning resources available for the degree programs.
- To submit clear, specific and justified degree programs accreditation and rating recommendations to the chairman NAEAC within two weeks of the on-site visit.

ANEXXURE II. List of full time and part time faculty members indicating their highest qualification, teaching experience and Specialization, etc.

Sr. No.	Name	Highest qualification	Teaching Experience (Years)	Specialization
1	Prof. Dr. Iqrar Ahmad Khan	PhD	More than 35	Molecular Virology/ Tissue culture
2	Prof. (R) Dr. Iftikhar Ahmad Khan	PhD	More than 37	Plant Breeding, Genetics and Biotechnology
3	!Prof. Dr. Muhammad Sarwar Khan	PhD	~18	Plant Molecular Biology/Biotechnology
4	Dr. Azeem Iqbal Khan	PhD	8	Plant Biotechnology
5	Dr. Nisar Ahmed	PhD	8	Plant Molecular Biology/Biotechnology
6	Dr. Bushra Sadia	PhD	6	Plant Cell Biotechnology
7	Dr. Sultan Habibullah Khan	PhD	6	Plant Molecular Biology/Genetics
8	Dr. Faisal Saeed Awan	PhD	5	Plant Biotechnology
9	Dr. Muhammad Ahsan Iqbal	PhD	5	Plant Biotechnology
10	Dr. Rana Iqrar Ahmad	PhD	3	Molecular Biology/Stress tolerance in plants
11	Dr. Shah Nawaz-ur-Rehman	PhD	1	Molecular Virology
12	Dr. Sohail Ahmad	PhD	1	Biotechnology/Insect Plant Interaction
13	Dr. Muhammad Mubin	Ph D	3	Molecular Virology
14	Dr. Ghulam Mustafa	PhD	4	Plant Molecular Biology
15	Dr. Faiz Ahmad Joyia	PhD	4	Plant Molecular Biology/Plant Transformation
16	Dr. Siddra Ijaz	PhD	4	Biotechnology
17	Mrs. Sehar Nawaz	M Sc (Hons)	4	Plant Biotechnology
18	Mrs. Fauzia Saleem	M Sc (Hons)	5	Plant Biotechnology
19	Mr. Yadish Bukhari	M Sc (Hons)	2	Bioinformatics

ii- List of support staff (technical and non-technical) with qualification and experience.

S.No	Name	Designation	Qualification	Experience (Year)	Bps-#
1	Muhammad Riaz	Senior Clerk	BA.	12	9
2	Mudassar Ahmad	Juitor Lab Assistant	Matric/	6	5
3	Muhammad Usman	Juitor Lab Assistant	BA	8	5
4	Muhammad Sajjad Haider	Tuitor Lab Assistant	B Sc	6	5
5	Mehmood Ahmad	Tuitor Lab Assistant	Matric	10	5
6	AsifHameed	Tuitor Lab Assistant	F.A	4	5
7	Muhammad Asif Raza	Driver	Matric	6	5
8	Shamshad Khan	Beldar	Primary	6	1
8	Muhammad Yasin	Beldar	Primary	7	1
9	Nasir Mahmood	Chowkidar	Primary	6	1
10	Abdul Jabbar	Chowkidar	Primary	6	2
11	Muhammad Shaban Raza	Chowkidar	Matric	6	2
12	Imran Kausar	Naib Qasid	Primary	9	2
13	Zahida Perveen	Naib Qasid	IMatric	8	2
14	Nasir Masih	Sweeper	Primary	6	2

**ANNEXURE III. Complete inventory of Lab equipment and operational status.
LAB 1.**

Sr. No.	Equipment Name	Detail	Condition
1	Cooling Bucket	PARB Project	Working
2	Mini Spin	PARB Project	Working
3	Vortex	PARB Project	Working
4	Mild Shaker	PARB Project	Working
5	Shaker	PARB Project	Working
0	Hot Plate	PARB Project	Working
7	PH Meter	PARB Project	Working
8	Distillery	PARB Project	Working
9	Centrifuge	PARB Project	Working
10	Refrigerator	PARB Project	Working
11	Oven	PARB Project	Working
12	Irthermal Cycler	P ARB Project	Working
13	Electrophoresis	PARB Project	Working
14	Freezer	CABB	Working
15	Oven	CABB	Working
16	GDS	CABB	Working
17	Microscope	CABB	Working
18	Spectrophotometer	CABB	Working

Lab No.2

Sr. No.	Equipment Name	Detail	Condition
1	Centrifuge (small)	CABB	Working
2	Agarose gel Apparatus	CABB	Working
3	Water Bath	CABB	Out of Order
4	Ice Machine	CABB	Working
5	Centrifuge Machine (Large)	CABB	Out of Order
6	Gel Documentation System	CABB	Out of Order
7	Irthermal Machine	CABB	Working
8	Hot Plate Stirrer	Mega Project	Working
9	Vortex Mixer	Mega Project	Working
10	2-D Gel Electrophoresis	Mega Project	Working
11	Gilson micropipettes	Mega Project	Working
12	Inverted fluorescence triocular microscope	Mega Project	Working
13	Cool CCD Camera for microscope	Mega Project	Working
14	Ultra-pure water Unit	Mega Project	Working

Lab No.5

Sr. No.	Equipment Name	IDetail	Condition
1	Water circulation unit	Citrus project	Working
	PCR Machine (2)	Citrus project	Working
3	Freezer -45°C	Citrus project	Working
	Hybridization oven	Citrus project	Working
5	Hot Plate	Citrus project	Working
6	37°C incubator	Citrus project	Working
7	Distillery	Citrus project	Working
8	Non-refrigerated centrifuge machine	Citrus project	Working
9	Horizontal Gel-electrophoresis unit with power supply	IEFS project	Working
10	Vertical electrophoresis unit With power supply	IEFS project	Working
11	Freezer (-25°C)	EFS project	Working
12	pH Meter	EFS project	Working
13	Weighing balance	EFS project	Working
14	Laminar air flow	EFS project	Working
15	Microwave oven(2)	EFS project	Working
16	Hot plate with stirrer	EFS project	Working
17	x-ray developing cassette	EFS project	Working
18	Freezer (-30°C)	EFS project	Working
19	cooling incubator (4°C)	EFS project	Working
20	Biological safety cabinet Level-II	EFS project	Working
21	Freezer (-80°C)	Mega Project	Working
72	Refrigerated centrifuge machine	Mega Project	Working

Lab No.6

Sr. No.	Equipment Name	Detail	Condition
1	Freezer (-70°C)	ALP	Working
2	Thermal Cycler (Gradient	ALP	Working
3	Micro Centrifuge	ALP	Working
4	Refrigerator	CABB	Working
5	Freezer (-20°C)	CABB	Working
6	Centrifuge (refrigerator)	CABB	Working

7	Gel Electrophoresis	CABB	Working
8	Water Bath + Shaker	CABB	Working
9	OD Gel Apparatus	CABB	Working
10	Oven	CABB	Working
II	Electrical balance	CABB	Working
12	Hot Plate Stirrer	CABB	Working
13	Thermal Cycler	CABB	Working
14	Micro Centrifuge	CABB	Working
15	PH Meter	CABB	Working
16	UV Transilluminator	CABB	Working
17	Bio Safety Cabinet	Mega Project	Working
18	Water Bath	Mega Project	Working
19	Electrical Balance	Mega Project	Working
10	Orbital shaker	Mega Project	Working

Lab No.7

Sr. No.	Equipment Name	Detail	Condition
1	Microscope	3	Working
2	Wight balance	1	Working
3	Hot plate	1	Working
4	Magnet stirrer	1	Working
5	Vortex mixture	1	Working

iv- Number of teaching and research labs with working capacity, greenhouses, growth chambers and cold storages, etc.

Lab#1

Lab Title	Functional Genomics Lab
Location & Area	Lab#1CABB,26X18'
Objectives	Teaching and Research
~dequacy of Instruction	Excellent
Courses Taught	Biotech-202, Biotech-301, Biotech-302, Biotech-303, Biotech-31 0, Biotech-405, Biotech-304, Biotech-701, Biotech-706.
A. vailable Software	MS. Office
Major Apparatus	Thermo Mixer, Racks and stands for different tubes, Agarose gel electrophoresis, Stirrer/Vortex Mixer, Mini spin, Cooling Bucket/Block, Heater/Cooled, Mini Vacuum-Centrifugal Evaporator, Dry thermo unit, Thermal Cycler PCR Gradient, PH Meter, Magnetic Stirrer with Hot Plate, Dry Block Thermostat (Thermo Mixer), Orbital Shaker, Shaker WB Digital Water Bath, Mini Rocker Shaker, Stirrer Mixer Cell Disintegration Shaker Disruptor, Hot Plate With Magnetic Stirrer, Dry Thermo Unit, Multi-channel Dispenser, Mild Shaker, Bead Shocker (Grinding Mill)
Major Equipment	Refrigerated centrifuge Machine, Mini Personal Micro-centrifuge, Hybridization Oven With Rotisserie, Orbital Shaker Digital
Safety Regulations	IAs guided by institutional bio-safety committee.

Lab#2

Lab Title	Genetic Diversity lab
L,ocation & Area	Lab#2 CABB, 26X18'
Objectives	Teaching and Research.
A.dequacy of Instructio	Excellent
Courses Taught	Biotech-304, Biotech-306, Biotech-703, Biotech-305, Biotech-308, Biotech-401, Biotech-703, Biotech-707
Available Software	MS. Office
Major Apparatus	Horizontal Gel electrophoresis, Vertical gel electrophoresis, Gel Detection system
Major Equipment	Micro-centrifuge machine
Safety Regulations	As guided by institutional bio-safety committee.

ANNEXURE IV. Last three years list of completed/ongoing projects in CABB, UAF

Sr. No	Name of project	Funding agency	Amount (Million Rs)	Status
1	Generation Advancement of transgenic wheat lines	HEC	5.00	Completed
2	Establishment of Biomonitoring cell in order to check Bt cotton efficiency	EFS	3.99	Completed
3	Micropropagation and commercial exploitation of papaya, a potential candidate for Dengue Fever Treatment	EFS	1.5	Completed
4	Molecular characterization of dengue disease related viruses from Pakistan	EFS	2.00	Completed
5	Quantification of different dengue serotypes	EFS	0.5	Completed
6	Management of citrus greening by producing healthy plants, monitoring vector and identification of tolerance	Pak-US linkage	US\$245513	In Progress
7	Transgenic approach to improve drought and salinity tolerance in wheat	PARB	14.08	In Progress
8	Gene functional analysis through transposon induced mutations in rice	HEC	4.9	In Progress
9	Impact assessment of transgenic sugarcane overexpressing antifungal proteins on endophytic rhizospheric and microorganisms	CERA, USA	US\$15,000	In Progress
10	Molecular characterization of host factors interacting with replicase complex of CLCVD.	HEC	8.0	In Progress
11	Services for citrus disease diagnosis	EFS	10.00	In Progress
12	Gene stacking in cotton using site-specific recombination	HEC	8.3	Approved

ANNEXURE V. List of textbooks and reference books available in department library

Sr. No.	Name of Book	Sr. No.	Name of Book
1	The pursuit of perfection	33	Viruses, bacteria and thalloid
2	Protein purification appliance	34	Applied biotechnology
3	Protein purification technology	35	Green house technology
4	Plant signal transduction	36	Genetics, principles, concepts and implications
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