REPORT ON

SKILL VIGYAN PROGRAM IN TELANGANA STATE

DEPARTMENT OF BIOTECHNOLOGY (DBT), GOVERNMENT OF INDIA

TELANGANA STATE COUNCIL OF SCIENCE & TECHNOLOGY (TSCOST)

ENVIRONMENT, FORESTS AND SCIENCE & TECHNOLOGY DEPARTMENT, GOVERNMENT OF TELANGANA
4TH FLOOR, ARANYA BHAVAN, SAIFABAD, HYDERABAD

PARTNER INSTITUTIONS

1. National Institute of Pharmaceutical Education and Research (NIPER), Hyderabad

2. Professor Jayashankar Telangana State Agricultural University (PJTSAU), Hyderabad

3. CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad

4. Centre for Plant Molecular Biology (CPMB), Osmania University, Hyderabad

5. Centre for Biotechnology, Institute of Science & Technology, Jawaharlal Nehru Technological University (JNTU), Hyderabad

6. Forest College and Research Institute (FCRI), Hyderabad

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TSCOST – DBT GoI Skill Vigyan Initiative

Potential of Telangana State in Biotechnology and Life Sciences

Telangana State demonstrated a strong presence in Biotechnology and Life Sciences Research and the relevant applications in the areas of Health care, Agriculture, Pharmaceuticals, Food Processing etc, for the past many decades. Hyderabad traditionally has been the pharma hub, vaccine capital, seed capital, healthcare capital and has a rich talent pool, enabling seamless forward and backward linkages, integration for product development including talent acquisition, clinical development and translational research.

The growth trajectory of the life sciences sector in Hyderabad has accelerated rapidly for the past 15 years, when recognizing the vast potential of the sector, the Biotechnology Policy was framed in the year 2001. Under this policy, the state executed a wide array of initiatives that have accelerated R&D, industrial and human capital development in the life sciences domain and established the state as a major biotechnology hub in South Asia.

One of the major steps towards development of the sector was the establishment of Genome Valley, the first and the largest organized life sciences cluster in Asia, with an area of 600 square kilometers near the city of Hyderabad. Genome Valley has emerged as a preferred destination for about 150 Indian and global life science companies, providing employment to over 10,000 qualified personnel. Global players like Lonza, Novartis, Mylan, DuPont, Sanofi, Merck and US Pharmacopeia are located here. Plenty of land is available at a very reasonable price in Phase III of Genome Valley at Karakapatla.

Hyderabad also boasts of having a robust Research and Development infrastructure for Biotechnology sector backed by research institutions and universities. The leadership of the state in the Pharmaceutical and Information Technology sectors, coupled with the presence of premier research institutions have given added impetus to the cluster, resulting in substantial investments and industrial growth. Considering the vast potential in these sectors, the Government of Telangana brought out a wholesome Life Sciences Policy (2015-2020) which encompassed a wide range of new initiatives focusing on development of Infrastructure, R&D, Entrepreneurial Opportunities.

Life Sciences Knowledge Centre, Pharma City, Vaccine Testing Facility, Medical Devices Park, RICH and Research to Market Fund to promote Innovation and Entrepreneurship, Promoting Start Up eco-system through T-Hub and many other components of the policy

provide ample of Skill Development opportunities in Bio-Technology Sector. These initiatives call for the availability of Skilled Human Resource in several areas of Biotechnology.

TSCOST Initiatives for Skill Vigyan Program of Dept. of Bio Technology, GoI

TSCOST made a presentation on 25-5-2018 at DBT, New Delhi on the Skill Development Programs that can be initiated under Bio-Technology and Life Sciences sectors in Telangana State. The Secretary, DBT suggested to submit a comprehensive proposal duly taking the suggestions of the all the stakeholders like R&D labs, industry, academicians etc.

As a part of Skill Vigyan Initiative of Department of Bio-Technology, Govt. of India & State Partnership Program, Telangana State Council of Science & Technology (TSCOST) organized a Consultation Meeting with Stakeholders for Formulating Proposals based on Skill Vigyan on 4-7-2018 at Aranya Bhavan, Hyderabad

Sri Ajay Misra, IAS, Special Chief Secretary to Government, EFS&T Department, Govt. of Telangana; Prof. Ravi Kumar Puli, Member Secretary, TSCOST; Smt. G. Krishnaveni, Joint Secretary to Govt., EFS&T Dept., Govt. of Telangana and several Scientists, Academicians & Experts from R&D Institutes, Universities & Industry have participated and discussed about several options available for Skill Development among unemployed youth, faculty & working professionals in the Biotechnology sector. The domain wise demand of Skilled Manpower in areas of Life Sciences and Biotechnology was discussed among the Stakeholders as under:-

Thrust areas identified for Skill Development	**Requirement of Skilled manpower in State**
Pharmaceuticals	Drug Discovery & Development, Generics / Active Pharmaceutical Ingredients / Formulations and Injectables
Medical Devices	Implants / General Devices / Diagnostics and imaging equipments / Ophthalmology and ancillary component suppliers.
Bio-Technology	Biologicals and Bio-similars / Vaccines / Medical Biotechnology / Agricultural Biotechnology / Industrial Biotechnology/ Marine Biotechnology / Nanotechnology/ Regenerative Medicine and Clinical Research
Bio-Services	Contract Research Organizations / Clinical Data Management Services / Bio-informatics, R&D Science Parks and Lab Space Providers, Instrumentation and Analytical Equipments Facility, Design and Engineering Support Services
Nutraceuticals	Research and Manufacturing organizations for nutrition products, R&D/ Science Parks for Functional Foods, Prebiotics and probiotics categories

Finally, it was concluded that there is an urgent need to concentrate on human resource development in Biotechnology sector by way of injecting skills among the unemployed youth, students, research scholars and also the faculty members of Telangana State so as to make them employable or self-employable or turn them into prospective entrepreneurs. Skill Development among Human Resources is a must for a flourishing Biotechnology Sector.

Accordingly, as per the suggestions of DBT to furnish a comprehensive proposal from Telangana State on Skill Vigyan Initiative, TSCOST invited the interested R&D Institutes, Universities & Industry experts to prepare project proposals and forward to TSCOST for consolidation and for onward submission of a comprehensive proposal to DBT through the State Government.

Objectives of the Proposal

TSCOST has prepared a comprehensive 3-year project proposal on Biotechnological Skills Development among Youth of Telangana State connected to Biotechnology as a part of DBT - Skill Vigyan Initiative with the following objectives and submitted to DBT, GoI.

1) Developing Skills of Youth at various levels and also the Faculty & Research Scholars in the field to sustain the growth and prepare the ground for a flourishing Biotechnology sector in Telangana State.

2) Familiarising Youth of Telangana State to the Industry requirements/ standards/ technologies/ procedures and to make them best suited for industry, research and entrepreneurship.

3) To meet the Industry / R&D / Academic requirements with a view to enhance the performance levels of these wings of the entire BioTech Sector.

4) To generate employment, self-employment / entrepreneurial opportunities to the Youth and different sections of persons involved in Bio-Technology sector.

TSCOST made a presentation before the Expert Committee at DBT, GoI on 4-6-2019 and also provided relevant inputs and information sought by DBT, GoI from time to time. Additional information on the Quantifiable Deliverables, Qualification Packs, National Occupational Standards and Syllabus of each program was submitted as desired. After thorough discussion, the DBT, GoI sanctioned the following programs (3-year duration project) for implementation through the Partner Institutions.

S.#	Name of the Partner Institution	Name of program
I	**Students Training Program**	
1	National Institute for Pharmaceutical Education & Research (NIPER), Hyd	Quality Control & Quality Assurance in Pharma Industry
II	**Faculty Training Program**	
1	Professor Jayashanker Telangana State Agricultural University (PJTSAU)	Hands on Training on Biotechnological tools in crop improvement
2	Centre For Cellular & Molecular Biology (CCMB)	Basic Techniques in Genetics and Molecular Biology
3	National Institute for Pharmaceutical Education & Research (NIPER), Hyderabad	Animal Cell Culture
4	National Institute for Pharmaceutical Education & Research (NIPER), Hyderabad	Molecular Docking, Virtual Screening & Computational Biology
5	Centre for Plant Molecular Biology (CPMB), Osmania University, Hyderabad	Hands-on skill development training on advanced areas of Life sciences and Biotechnology for undergraduate and postgraduate Faculty
6	Centre for Biotechnology, IST, JNT University, Hyderabad	Animal cell line Technology
III	**Entrepreneurship Development Program (EDP)**	
1	Forest College and Research Institute , Hyderabad	Forestry Based Skill Development Programme
2	National Institute for Pharmaceutical Education & Research (NIPER), Hyderabad	Entrepreneurial Development in Pharma Sector

TSCOST Coordination – An Overview

The Screening & Selection Committee headed by Smt. Neetu Kumari Prasad, IAS, Member Secretary, TSPCB as Chairperson in it's meeting held on 23-06-21 recommended to hire the services of Dr. Ahmed Kamal, Former Pro Vice Chancellor, Jamia Hamdard, Deemed to be University, Former Acting Director, Indian Institute of Chemical Technology (IICT) & Former Project Director, National Institute of Pharmaceutical Education and Research (NIPER) as Consultant. Accordingly, as per the approval of the Council authorities, Dr. Ahmed Kamal has been appointed as Consultant.

As per the guidelines of the DBT, GoI the Program Advisory Committee (PAC) has been constituted duly involving the DBT representatives, External experts, industrial representatives, nominees from concerned sector skill development councils and the Program coordinators from the partner Institutions. The PAC meeting was held on 14-7-2021.

Composition of Program Advisory Committee

S.No.	Name of the Organization	Name of the Member	Position
1	Member Secretary, TSCOST	Sri M.Nagesh	Chairman
2	Consultant, SVP, DBT, GoI	Dr. Ahmed Kamal	Vice Chairman
3	DBT Representative	Dr. Manoj Singh Rohilla	Member
4	DBT Representative	--	Member
5	External Experts	Dr. Someswar R Sagurthi, OU	Member
6	External Experts	Dr. Y Rajasri, HoD, Biotechnology Dept. CBIT	Member
7	Industrial Representative	Sri N NarasimhaRao, MD / CEO, Clonz Biotech Pvt. Ltd.	Member
8	Industrial Representative	Smt. B Rama Devi, Associate Vice President, Hetero Drugs.	Member
9	Representative from concerned sector skill development council	The CEO, Life Sciences Skill Sector Development Council (LSSSDC)	Member
10	Representative from concerned sector skill development council	The CEO, Agriculture Skill Council of India (ASCI)	Member
	Program Coordinator from Partner Institution		
11	National Institute of Pharmaceuticals Education & Research (NIPER)	Dr. S. Gananadhamu (QC& QA - Students Skill Dev.)	Member
12	Institute of Biotechnology, PJST State Agricultural University	Dr. Ch. V.Durga Rani (FDP – BT tools in Crop Impr.)	Member
13	CSIR – Centre for Cellular and Molecular Biology (CCMB)	Dr. Archana B Siva (FDP – Genetics & Mol. Biol)	Member
14	National Institute of Pharmaceuticals Education & Research (NIPER)	Dr. Santosh Kumar Guru (FDP – Animal Cell Culture)	Member
15	National Institute of Pharmaceuticals Education & Research (NIPER)	Dr. Venkata Rao Kaki (FDP – Molecular Docking)	Member
16	Centre for Plant Molecular Biology, Osmania University	Dr. Srinivas Naik (FDP –Adv. Areas of LS & BT)	Member
17	Centre for Biotechnology, IST, JNT University, Hyderabad	Dr. A Uma & Dr. L Saida (FDP – Animal Cell Line Tech)	Member
18	Forest College and Research Institute	Prof. M Mamatha (EDP –Forest based Skill Dev.)	Member
19	National Institute of Pharmaceuticals Education & Research (NIPER)	Dr B Lakshmi	Member
20	State Nodal Officer, TSCOST	Dr C V Rama Krishna	Member Convener

Further to the guidelines of DBT, GoI, the Faculty Development Program is for UG, PG Faculty and Mid Scientist and informed to go ahead with FDP activities and the syllabus proposed by Partnering Institute holds good and no standards developed by LSSSDC for FDP.

Accordingly, TSCOST entered **Memorandum of Understanding (MoU)** with the following Sector Skill Development Councils and Partner Institutions.

Sector Skill Development Councils:

1. Life Sciences Sector Skill Development Council (LSSSDC).
2. Agriculture Skill Council of India (ASCI).

Partner Institutions.

1. National Institute of Pharmaceuticals Education & Research (NIPER).
2. Institute of Biotechnology, PJST State Agricultural University.
3. CSIR – Centre for Cellular and Molecular Biology (CCMB).
4. Centre for Plant Molecular Biology (CPMB), Osmania University.
5. Centre for Biotechnology, IST, JNT University.
6. Forest College and Research Institute.

After entering MoU's, the budget sanctioned by DBT, GoI is released to the Partner Institutions for taking up the activities.

Summary of Activities Sanctioned by DBT:

Program Name	Number of Institutions	Number of seats sanctioned / year	Number of students/ faculty training
Student Training	01	60 (2 batches @ 30 per batch)	1 batch of 30 students
Faculty Training	06	120	129
Entrepreneurship Training	02	20	FCRI - ……., NIPER - 20

Students Training Program: The target of students' training programme is to provide the skill training to 10+2 and B.Sc. Life Science and Biotechnology students. The skill courses under this category are designed in consultation with experts of Sector Skill Councils.

Name of Participating Institute/College/Centre/University located in State and Name of Training coordinator	Title of Skill Training	Duration of Course	Number of Students Admitted / Trained
National Institute for Pharmaceutical Education & Research (NIPER), Hyd **Dr.S Gananadhamu**	Quality control & Quality Assurance in Pharma Industry.	3 Months 05-07-2022 to 04-10-2022	30

The Life Sciences Sector Skill Development Council (LSSSDC) is the concerned Sector Skill Council for Assessment and Certification of trainees. The Qualification Pack (QP) Code as per Sector Skill Council is Quality Control Chemist QP code: .LFS/1301 NSQF Level 5

Student Training Program - Placement Details:

Name of Program	Number of Institutions/Industry identified for placement of skilled manpower come out from the approved program	Number of Students/technicians placed for job
Student Training	04	05

Details of placements facilitated under the Student training program:

1. Jyoti Sarva- Project Assistant in CSIR NEERI, Nagpur
2. Bhagya Unni- working at Aurobindo Pharma limited, Hyderabad
3. Maruthi Srinivas, Spectrum labs, Medchal, Hyderabad
4. Birugonda Ravikumar, MSN laboratories, Bonthupally, Hyderabad
5. Sheik Parvin Begum, MSN formulation unit 1, Bollaram in QC department
   The remaining students are pursuing higher studies.

Faculty/Refresher Training: The main objective of the training programme is to impart hands-on training (up-skilling) using modern tools and techniques in advanced and emerging areas of Life Science and Biotechnology so that the faculty/scientists can apply them in their research /teaching programmes. The training is techniques oriented and emphasis given on laboratory work rather than lectures.

Name of Participating Institute/College/Centre /University located in State and Name of Training coordinator	**Title of Training**	**Duration of Training Course**	**Number of Trainings Conducted**	**Number of Beneficiaries Trained**
Professor Jayashanker Telangana State Agricultural University (PJTSAU) **Dr. Ch.V Durga Rani**	Hands on Training on Biotechnological tools in crop improvement	14-03-2022 to 26-03-2022 Two Weeks	One program	19
Centre For Cellular & Molecular Biology (CCMB) **Dr. Archana B Siva**	Basic Techniques in Genetics and Molecular Biology	**First Batch** 30-5-22 to 10-6-22 **Second Batch** 30-1-23 to 11-2-23	Two program	23
National Institute for Pharmaceutical Education & Research (NIPER), Hyderabad **Dr. Santosh Kumar Guru**	Animal Cell Culture	23-5-22 to 03-06-22	One program	19
National Institute for Pharmaceutical Education & Research (NIPER), Hyderabad **Dr. K Venkata Rao**	Molecular Docking, Virtual Screening & Computational Biology	28-3-22 to 8-4-22	One program	14

Centre for Plant Molecular Biology (CPMB), Osmania University, Hyd. **Dr. K Srinivas Naik**	Hands-on skill development training on advanced areas of Life sciences and Biotechnology for UG / PG Faculty	21-02-2022 to 05-03-2022 Two weeks	One program	20
Centre for Biotechnology, IST, JNTU, Hyderabad **Dr. A. Uma & Dr. L. Saida**	Animal cell line Technology	7-3-22 to 17-3-22	One program	14

Entrepreneurship Training Programs: The objective of this programme is to develop the entrepreneurial abilities and enhance the skill sets required for entrepreneurship among Life Science and Biotechnology students and the training imparted should enable a trainee to establish his / her own enterprise. The course is designed in a phase manner for imparting comprehensive entrepreneurship development training to students and hand holding support for setting up of MSME in well-established areas of Life Science and Bio technology sectors.

Name of Participating Institute/College/Centre/University located in State and Name of Training coordinator	Area and Title of Entrepreneurship Training	Duration of Course (No. of Month, Day and total Hours	Number of Beneficiaries Trained
Forest College and Research Institute, Hyderabad **Prof. Mamata**	Forestry Based Skill Development Programme		
National Institute for Pharmaceutical Education & Research Hyd. **Dr. B. Lakshmi**	Entrepreneurial Development in Pharma Sector	6 months 28-3-22 to 28-10-22	10

Training of Trainers (ToT):

S. No.	Date of Training Workshop organized	Venue	Number of Representatives attended the workshop
1	17-20, October, 2022 – (4) Days	Centre for Biotechnology, IST, JNT University, Hyderabad **Course Coordinator: Dr. Uma**	20
2	23-26 November, 2022 - (4) Days	Centre for Plant Molecular Biology, Osmania University, Hyderabad **Course Coordinator: Dr. K. Rama Krishna**	18

Quality Assurance and Quality Control in Pharma Industry
(Student training program)

Course Coordinator: Dr. S. Gananadhamu
National Institute of Pharmaceutical Education and Research (NIPER), Hyderabad

Brief Introduction about the program: The main objective of quality control in the Pharmaceutical Industry is to test the medicines in their various stages of production, verifying that they meet the quality regulations and specifications required for consumption. Traditionally the quality of medicinal products was determined by testing the products and determining that they complied with the established specifications. However, the regulatory agency requirement today is that quality is not determined only by end-product testing, but the quality is to be built up into the product. This requires that at each step quality is to be ensured right from drug development to the finished product manufacturing and sale.

Quality assurance plays a pivotal role at the manufacturing facility to ensure that the Quality is built up in the plant in letter and spirit. It ensures that a rugged Quality system is in place. The role of QA is evidenced throughout the life cycle of the product. Medicines are consumed daily like food products. The safety and efficacy of these medicinal products depend on the quality of raw materials and excipients used during the manufacturing of these products.

Recent regulations on impurities like nitrosamine impurities, Extractables and Leachables, Elemental impurities, etc., make the quality testing of medicinal products more challenging. Nowadays state-of-the-art analytical instruments are available for testing the quality of medicinal products. Trained and skilled manpower is required to test the quality of medicinal products using these sophisticated analytical instruments.

Objectives of the program:

1) Define the Life Sciences/Pharma industry, legal and regulatory framework, and pharmacopeia to enable him/herself to establish the Industry Standards in his/her performance.
2) Maintain a healthy, safe, and secure working environment at the pharmaceutical manufacturing shop floor, laboratory, and area around in conformance with environmental health and safety (EHS) rules
3) Demonstrate cleanliness at the work area and instruments
4) Demonstrate use of scientific knowledge about organic and analytical chemistry and statistics in quality control analysis of chemical/pharmaceutical products
5) Conduct sample preparation, preservation and ensure stability as per good laboratory practices (GLP) and good manufacturing practices (GMP)

6) Operate analytical equipment and instruments as per standard operating procedures (SOP) and good laboratory practices (GLP)
7) Perform routine analysis in the lab in compliance with good manufacturing practices (GMP) and good laboratory practices (GLP)
8) Conduct quality checks for samples in conformance with acceptance limits as per standard operating procedures (SOP)
9) Demonstrate good documentation practice (GDP) and data integrity while reporting and documentation as per standard operating procedures (SOP) and good laboratory practices (GLP)
10) Demonstrate and defend the pieces of evidence of the work performed and state the responses to audit queries.
11) Demonstrate use of core communication skills and professional skills such as plan & organize, problem-solving, analytical and critical skills, decision making and customer centricity at work

The NIPER conducted the student training program "Quality Assurance and Quality Control in Pharma Industry" during 05th July 2022 to 04th October 2022. The program is of 3 months duration. A total of 30 students were trained.

Methodology / Selection criteria adopted for selection of Candidates: The applications were invited from the students who have qualifications of B.Pharm or B.Sc with Biotechnology/Chemistry/Life Sciences/Analytical Chemistry; M. Pharma. in Pharmaceutical Analysis or Quality Control & Assurance; M.Sc in Biotechnology/Chemistry/Life Sciences/Analytical Chemistry. The eligible candidates were called for a written entrance test that was conducted at NIPER Hyderabad. The entrance test was conducted on 19th June 2022. The question paper consisted of 100 multiple choice questions with negative marking for wrong answers for a duration of 2hrs comprising Section 1: General knowledge, Mental ability and Arithmetic reasoning; Section 2: General English; Section 3: General Chemistry; Section 4: General Biology and Section 5: Analytical Chemistry. The top 30 students were selected for the program.

Importance of the program: Quality Control and Quality Assurance are very important for ensuring the quality of medicinal products. Many of the students after completion of their formal UG and PG programs, lack the skills required for performing the activities required for QAQC in pharma industry. There is a gap between the education and industry requirements. The students were provided training on various analytical techniques which are widely used in the quality control of Active Pharmaceutical ingredients, excipients, and pharmaceutical formulations. The students were given training on the concepts of GMP and GLP. The students were trained in various Quality Assurance concepts like good documentation practices and data integrity, SOPs, equipment qualification and calibration, analytical method validation etc. The students were taken to industry visits, assigned on job training for two weeks at industry to familiarize with the industry requirements.

Techniques/Methods/New things learned: Operation of various basic and advanced analytical equipment such as Analytical Balance, pH meter, Karl Fischer auto titrator, UV-Visible Spectrometer, FTIR Spectrometer, Gas Chromatograph, High Performance Liquid Chromatograph. Demonstration and applications of LC-MS, NMR, ICP-MS, DSC and TGA. Functioning of accredited laboratories such as NABL testing lab at NIPER Hyderabad. Good documentation, following up of SOPs and preparation of SOPs. On job training.

Justification*:* All the techniques/methods mentioned above are required for working efficiently in the QA and QC laboratories of the pharmaceutical industry. The skills and knowledge of these techniques are helpful in performing day-to-day activities.

Methodology followed for conducting the program: The student training program was conducted for 3 months. The training program was conducted in two sessions. Theory/technical discussion was conducted in the morning session followed by hands-on training on analytical techniques and equipment, in the afternoon session.

List of training modules and course contents (both lectures and hands on sessions) and Training Curriculum:

1. Orientation (Bridge Module)
   Unit 1.1 - Life Sci. Industry and Drug Regulatory Authorities for Life Sciences Sector
   Unit 1.2 - Standards for Manufacturing in Life Sciences
   Unit 1.3 - Role of Quality Control Chemist in Life Sciences Sector
2. Overview of Production Process for Life Sciences Industry (Bridge Module)
   Unit 2.1 - Fundamental Science in API Production
   Unit 2.2 - Basics of Formulation Production
   Unit 2.3 - Quality Management System in Life Sciences
3. Fundamentals for Quality Control Analysis in Life Sciences Industry
   Unit 3.1 - Basics of Analytical Chemistry
   Unit 3.2 - Basic Principles of Separation Sciences and Critical System Parameters
4. Sample Preparation, Preservation and Storage
   Unit 4.1 - Basics of Sample Preparation, Preservation and Storage
   Unit 4.2 - Standards and Guidelines for Sample Handling
   Unit 4.3 - Storing the Samples
5. Operating Knowledge of Analytical Instruments
   Unit 5.1 - Analysis of Metals Including Detailed Knowledge about Vibrational Spectroscopy
   Unit 5.2 - Scientific Knowledge about Analytical Equipment and Machinery
   Unit 5.3 - Chromatographic Techniques for analysis and its Analytical Equipment
6. Perform Quality Checks in QC Process
   Unit 6.1 - Overview of Quality Check in QC
   Unit 6.2 - Productivity Concepts for QC Chemist
   Unit 6.3 - Statistical Analysis of Laboratory data
   Unit 6.4 - Advance QC Approaches and Troubleshooting

7. Documentation for Quality Control
   Unit 7.1 - Documentation in QC Process
   Unit 7.2 - Good Documentation Practices and Data Integrity as per GMP and GLP
   Unit 7.3 - Responding to an Audit / Process related Query
   Unit 7.4 - Orientation with Organizational Policy
   Unit 7.5 - Core Skills and Professional Skills
8. Maintain a Healthy, Safe and Secure Working Environment
   Unit 8.1 - Basic Concepts of Safety
   Unit 8.2 - Water Systems at Life Sciences Facility and Water Usage techniques
   Unit 8.3 - Process of Safety Analysis
   Unit 8.4 - Managing Emergency Procedures and First Aid
9. Ensure Cleanliness in the Work Area
   Unit 9.1 - Materials, Chemicals and Equipment's and Cleaning Procedures
   Unit 9.2 - Knowledge about Electronic and Optical Sensors and their operations
   Unit 9.3 - Storage Area Inspection and Waste Management
10. Coordination with Supervisor, Cross Functional Teams and within Team
    Unit 10.1 - Managing Relationship and Collaborating with Team
    Unit 10.2 - Conceptual and Practical Skills Required by QC Chemist in Audits
    Unit 10.3 - Core Skills and Professional Skills
11. Information Technology Skills for QC Chemist
    Unit 11.1 - Basic Computer Skills
    Unit 11.2 - Basic understanding of Software's in QC
    Unit 11.3 - 21 CFR Part 11 Compliance System and its Requirements

List of Faculty/Experts/ Resource persons associated with the programme:

1. Dr. U. Satyanarayana
2. Dr. S. Gananadhamu
3. Dr. Rajesh Sonti
4. Dr. Amol G. Dikundwar
5. Dr. Y. V. Madhavi
6. Dr. Dr. Neelesh Kumar Mehra
7. Mr. Hara Prasad Padhy
8. Mr. Nagesh Bhale
9. Ms. Roshitha K R
10. Ms. Vijaya M G
11. Mr. Rahul Khemchandani
12. Ms. Ch. Sowmya
13. Mr. G. Bharath Reddy
14. Ms. Upasana Gholap
15. Ms. Supriya Jagtap
16. Ms. Drishti Jain
17. Ms. N. Chagnya
18. Mr. Dattu Naik Dhanavath

Training Schedule (day wise schedule):

1st Week:

Day	Theory	Practical
Day 1	Orientation: Life Sciences Industry and Drug Regulatory Authorities for Life Sciences Sector, Standards for Manufacturing in Life Sciences, Role of Quality Control Chemist in Life Sciences Sector	
Day 2	Fundamental Science in API Production	Identification of critical quality attributes (CQA), critical process parameters (CPP) and critical process controls (CPC) related to API
Day 3	Basics of Formulation Production	Identification of critical quality attributes (CQA), critical process parameters (CPP) and critical process controls (CPC) related to formulations
Day 4	Quality Management System in Life Sciences	
Day 5	Basics of Analytical Chemistry	Implement basics of pharmaceutical science and chemistry for test and analysis
Day 6	Basic Principles of Separation Sciences and Critical System Parameters	Perform assay and calculation as per SOP

2nd Week:

Day 1		Follow basic principles of separation science use in quality control analysis
Day 2		Follow basic principles of separation science use in quality control analysis
Day 3	Basics of Sample Preparation, Preservation and Storage	Sample Preparation
Day 4		Sample Preparation
Day 5		Sample Preparation

3rd Week:

Day 1		Sample Preparation
Day 2	Operating Knowledge of Analytical Instruments	Analytical Balances, Ultrasonicator, pH meter
Day 3	Operating Knowledge of Analytical Instruments	Acid-base titration
Day 4	Operating Knowledge of Analytical Instruments	Complexometric titration
Day 5	Operating Knowledge of Analytical Instruments	KF titration
Day 6	Operating Knowledge of Analytical Instruments	UV spectrometer

4th Week:

Day 1	Operating Knowledge of Analytical Instruments	UV spectrometer
Day 2	Operating Knowledge of Analytical Instruments	IR spectrometer
Day 3	Operating Knowledge of Analytical Instruments	HPLC Instrumentation
Day 4	Operating Knowledge of Analytical Instruments	HPLC Software familiarization
Day 5	Operating Knowledge of Analytical Instruments	HPLC Separations

5th Week:

Day 1	Operating Knowledge of Analytical Instruments	HPLC assay API
Day 2	Operating Knowledge of Analytical Instruments	HPLC assay formulation
Day 3	Operating Knowledge of Analytical Instruments	HPLC assay impurities
Day 4	Operating Knowledge of Analytical Instruments	Dissolution by UV
Day 5	Operating Knowledge of Analytical Instruments	Dissolution by HPLC
Day 6	Operating Knowledge of Analytical Instruments	GC instrumentation and software

6th Week:

Day 1	Operating Knowledge of Analytical Instruments	GC analysis of solvent
Day 2	Operating Knowledge of Analytical Instruments	GC analysis of API/formulation
Day 3	Operating Knowledge of Analytical Instruments	HPTLC experiment
Day 4	Operating Knowledge of Analytical Instruments	HPTLC experiment
Day 5	Operating Knowledge of Analytical Instruments	LC-MS experiment

7th Week:

Day 1	Operating Knowledge of Analytical Instruments	GC-MS experiment
Day 2	Operating Knowledge of Analytical Instruments	ICP-MS experiment
Day 3	Operating Knowledge of Analytical Instruments	NMR experiment
Day 4	Quality Checks in QC Process	Calibration of UV and IR Spectrometer
Day 5	Quality Checks in QC Process	Calibration of HPLC
Day 6	Quality Checks in QC Process	Calibration of HPLC

8th Week:

Day 1	Documentation for Quality Control	Preparation of SOP for instrument
Day 2	Documentation for Quality Control	Preparation of protocol
Day 3	Documentation for Quality Control	Laboratory incidents
Day 4	Maintain a Healthy, Safe and Secure Working Environment	Basic Concepts of Safety
Day 5	Maintain a Healthy, Safe and Secure Working Environment	Process of Safety Analysis

9th Week:

Day 1	Maintain a Healthy, Safe and Secure Working Environment	Managing Emergency Procedures and First Aid
Day 2	Maintain a Healthy, Safe and Secure Working Environment	Managing Emergency Procedures and First Aid
Day 3	Ensure Cleanliness in the Work Area	Chemicals and Equipment's and Cleaning Procedures
Day 4	Ensure Cleanliness in the Work Area	Storage Area Inspection and Waste Management
Day 5	Coordination with Supervisor, Cross Functional Teams and within Team	Core Skills and Professional Skills
Day 6	Coordination with Supervisor, Cross Functional Teams and within Team	Practical Skills Required by QC Chemist in Audits

10th Week:

Day 1	Coordination with Supervisor, Cross Functional Teams and within Team	Practical Skills Required by QC Chemist in Audits
Day 2	Information Technology Skills for QC Chemist	Use of excel functions in QC
Day 3	Information Technology Skills for QC Chemist	Use of MS Power point
Day 4	Information Technology Skills for QC Chemist	Chemistry software
Day 5	Information Technology Skills for QC Chemist	21 CFR Part 11 Compliance System and its Requirements

11th Week:

Day 1	On job training	On job training
Day 2		
Day 3		
Day 4		
Day 5		
Day 6		

12th Week:

Day 1	On job training	On job training

Industrial training / internship details:

The students were given internship training at

1. MSN labs, API QC, Rudraram facility
2. MSN labs, Forulatons QC, Kothuru facility
3. Pleiades Therapeutics Private Limited, Jeedimetla, Hyderabad.

Qualification pack as per sector skill council (QP Code Number and course contents) is Quality Control Chemist, LFS/Q1301 V1.0 NSQF Level 5

Details of placements facilitated under the Student training program:

1 Jyoti Sarva- Project Assistant in CSIR NEERI, Nagpur
2 Bhagya Unni- working at Aurobindo Pharma limited, Hyderabad
3 Maruthi Srinivas, Spectrum labs, Medchal, Hyderabad
4 Birugonda Ravikumar, MSN laboratories, Bonthupally, Hyderabad
5 Sheik Parvin Begum, MSN formulation unit 1, Bollaram in QC department

The remaining students are pursuing higher studies.

List of participants / Beneficiaries with qualifications

S.No.	Name of Student/Beneficiaries	Complete Address	eMail ID	Contact No.
1	Adepu Veda Sriya	4-1-144 VST Colony Nacharam, Hyderabad.	vedasriya.adep@gmail.com	7396895371
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7	Ayesha Mohammed Abdul Moin	2-241, Baitul Ismail, Muradnagar, Mehdipatnam, Hyderabad - 500028	aish.mohammed07@gmail.com	6303738755

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11	Bhagya Unni	Room no-202, VMB Arcade, Gayathri Nagar colony, Godavari homes, Quthbullapur Rd, Suchitra-500055	bhagyaponnu1999@gmail.com	7093635802
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21	Kasturi Jahnavi	7-22, Siddharth Nagar, Near Sai Siddartha Nagar, Dammaiguda, Nagaram, Hyd-50083	jahnavikasturi678@gmail.com	7842994453
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23	Nagireddy Vasantha	1-6-141/181/1, Vidya Nagar Colony, Suryapet-508213	vasanthanagireddy56@gmail.com	6305335428
24	Pallavi Pandey	Flat no. A25/105, Sanskriti Singapore Township, Pocharam, Ghatkesar, Hyd-500088	ppandey2132000@gmail.com	6309088658
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27	Savale Ambika	5-7-2 & 5-7-2/1/301, Elite Enclave, Sangeeth Nagar, Behind Metro, Kukatpally, Hyd-500072	ambikasavale18@gmail.com	7798912356
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29	Soham Khairnar	Flat no 76, House No.2b, Sri Vijaya Nilayam, Engineers Enclave, Chandanagar, Hyd	soham19854@gmail.com	8185884005
30	V Sree Shravya	H.No 2-4-123/252 Street No-2 , South Swaroop Nagar, Uppal, Hyd	shravyavakiti2002@gmail.com	8688706056

Inauguration of student training program by
USP Vice president Shri Girish Kapur on 5th July 2022

Inaugural speech by USP Vice president Shri Girish Kapur on 5th July 2022

Students operating FTIR instrument

Students training on HPLC

Students operating GC instrument

Students industrial visit at USP India Pvt Ltd

Certificate distribution after completion of training program

Students group photo after certificate distribution

Assessment Certificate issued by Life Sciences Sector Skill Development Council (LSSSDC)

Participation certificate issued by NIPER, Hyderabad

Hands on Training on Biotechnological Tools in Crop Improvement

Course Coordinator: Ch.V Durga Rani

Institute of Biotechnology, PJTSAU, Rajendranagar, Hyderabad

Introduction

The program was conducted with the major objective to train the young faculty from Agriculture and Horticulture colleges and universities of Telangana State in the field of biotechnology tools for crop improvement. The program was conducted for conducted for two weeks with twenty faculty members. Emphasis was given to practical sessions rather than theory lectures. The training was exclusively conducted in PJTSAU campus with internationally eminent speakers who are involved in crop improvement. The training was conducted in hybrid mode followed by exposure visits to Agri-Hub (PJTSAU campus) and ICAR-IIOR. At the end of training program, the faculty submitted research proposals to Govt of India for funding.

Objectives

The proposed training program at PJTSAU is for faculty from SAUs, ICAR institutes and other colleges in Telangana State - faculty involved in human resource development and strengthening of Biotechnology research and also to fulfil the mandatory requirement of faculty for CAS programme

Importance

In the recent years biotechnological tools are being utilised for accelerated crop improvement in both field crops and horticulture crops. Training of young faculty in this important area is required not only to disseminate knowledge to UG/PG/Ph.D. students but also for their research program, including student research.

Techniques / Methods / New Things that were taught

1) Faculty were taught both theory and hands on training in tools and techniques related to molecular breeding approaches and basic bioinformatics tools for crop improvement.
2) Bioinformatic tools for phylogeny and Genomic data resources.
3) Mapping genes and marker assisted Crop Improvement.
4) Intervention of molecular tools for genetic purity and hybrid purity assessment.
5) Role of next generation sequencing in accelerating high-resolution mapping and gene discovery.
6) Application of next-generation breeding approaches and tools to enhance the genetic gain in staple crops.
7) PPV FRA and Intellectual property management in agriculture

Methodology / Selection Criteria adopted for Selection of Candidates

1) Faculty involved in both teaching and research
2) Recently recruited faculty/Assistant Professor cadre were given preference
3) Faculty from both State government and private agriculture colleges
4) Faculty from both Horticulture and Agriculture University.
5) Faculty from the departments that utilize biotechnology tools - Plant breeding, Plant pathology, Entomology, Physiology, Microbiology, Fruit science, Floriculture, Vegetable Science.

Teaching Methodology

More emphasis was given to Hands on training. Imparted twenty-six hours of theory and fifty-eight hours of practical training. The program was of Two weeks duration and conducted during Marth 14th to March 26th 2022. A total of 19 faculty have participated in the program.

List of training modules and course contents (both lectures and hands on sessions) and Training Curriculum

MODULE – I	**Genotyping tools for Crop Improvement in pre-NGS Era**	**NO. OF DAYS : 5 TOTAL NO. OF HOURS – 35 (8.5+26.5)**
CHAPTER – 1	Introduction of training programme and basic principles of biotechnological tools for crop improvement	NO. OF DAYS : 2
	Theory Introduction of training programme Lecture:I.1.1 Integration of conventional and modern biotechnological tools towards crop improvement Lecture: I.1.2 Basic Principles a) Polymerase chain reaction b) Gel Electrophoresis	TOTAL NO. OF HOURS: 2.5
	Lab Good laboratory practices Acquaintance with the lab equipment Preparation of solutions and buffers Plant Genomic DNA Isolation -CTAB method -Kit method	TOTAL NO. OF HOURS: 11.5
CHAPTER – 2	Molecular markers - Overview	NO. OF DAYS : 2
	Theory Lecture:I.2.1 Introduction to molecular markers- Overview and classification Lecture I.2.2: Development of SSR and derived markers (SCAR & CAPS)	TOTAL NO. OF HOURS: 3
	Lab Quantification of genomic DNA -Agarose gel electrophoresis and nanodrop -PCR using dominant (RAPD) & codominant (SSR) markers	TOTAL NO. OF HOURS: 11

	-Agarose and polyacrylamide gel electrophoresis (SSR markers)	
CHAPTER – 3	Bioinformatic tools for phylogeny and Genomic data resources	NO. OF DAYS : 1
	Theory Lecture I.3.1: Phylogeny & genetic diversity Lecture I.3.2: Genomic data resources Lecture I.3.3: BLAST tool	TOTAL NO. OF HOURS: 3
	Lab Genetic diversity analysis using SSR data; NTSYS-Pc; DARwin; Power Marker & Primer designing- Primer 3	TOTAL NO. OF HOURS: 4
MODULE – II	**Molecular Breeding approaches in Field Crops**	**NO. OF DAYS : 5** **TOTAL NO. OF HOURS – 35 (12.5+22.5)**
CHAPTER – 1	Marker assisted Crop Improvement	NO. OF DAYS : 2
	Theory Lecture II.1.1: Introduction to marker assisted Crop Improvement (MABC, MAPB, MAGP) Lecture II.1.2 : Mapping populations and their development Lecture II.1.3 : Linkage and QTL mapping	TOTAL NO. OF HOURS: 4.5
	Lab Detection of multiple genes for rice gall midge and bacterial blight resistance in pyramided lines Preparation and arrangement of genotypic and phenotypic data Linkage map construction QTL identification	TOTAL NO. OF HOURS: 9.5
CHAPTER – 2	Marker assisted breeding - Case studies	NO. OF DAYS : 1
	Theory Lecture II.2.1: Marker assisted breeding for climate resilient rice varieties Lecture II.2.2: Marker assisted breeding in groundnut for disease resistance and high oleic content	TOTAL NO. OF HOURS:3
	Lab Screening of F_2 population and F_3 progenies for detection of genes for biotic stress resistance and yield in rice	TOTAL NO. OF HOURS: 4
CHAPTER – 3	Association mapping	NO. OF DAYS : 1
	Theory Lecture II.3.1: Association mapping and its application in crop improvement	TOTAL NO. OF HOURS: 3
	Lab Association mapping using SSRs	TOTAL NO. OF HOURS: 4
CHAPTER – 4	Molecular markers in genetic purity testing	NO. OF DAYS : 1
	Theory	TOTAL NO. OF HOURS: 2

	Lecture II.4.1: Intervention of molecular tools for genetic purity analysis Lecture II.4.2: Hybrid purity assessment in field crops	
	Lab DNA fingerprinting of released varieties of rice SSRs for hybrid purity assessment in maize	TOTAL NO. OF HOURS: 5
MODULE- III	**Genotyping tools for Crop Improvement in post-NGS Era and IPRs in agriculture**	**NO. OF DAYS : 2** **TOTAL NO. OF HOURS: 14 (5+9)**
CHAPTER – 1	Next generation sequencing; high throughput genotyping	NO. OF DAYS : 1
	Theory Lecture III.1.1: Role of NGS in accelerating high-resolution mapping and gene discovery Lecture III.1.2: High throughput genotyping and its applications in GWAS and genomic selection Lecture III.1.3: Application of next-generation breeding approaches and tools to enhance the genetic gain in staple crops	TOTAL NO. OF HOURS: 3
	Lab GWAS using SNP data Genomic selection models using R	TOTAL NO. OF HOURS: 4
CHAPTER – 2	IPRs in agriculture and field visit	NO. OF DAYS : 1
	Theory Lecture III.2.1: PPV FRA Lecture III.2.2: Intellectual property management in agriculture	TOTAL NO. OF HOURS:2
	Field visits- Visit to Agri Hub; RRC (ARI); ICAR-IIRR -MAB derived material	TOTAL NO. OF HOURS: 4
	Valedictory function	TOTAL NO. OF HOURS: 1

List of Experts/Resource persons

S.No.	Name of the Speaker & Centre	Date	Time	Topic
1.	Dr. Rajeev K Varshney Director, State Agricultural Biotechnology Centre, Murdoch University, Australia	14-03-2022	11.00 AM - 12.00 Noon	"Integration of conventional and modern biotechnological tools towards crop improvement
2.	Dr. P. Rajendra Kumar Principal Scientist ICAR-IIMR, Hyderabad	18-03-2022	9.00 AM – 12.00 Noon	Phylogeny & genetic diversity; Genomic data resources and BLAST tool
3.	Dr. C. Bharadwaj Principal Scientist Division of Genetics IARI, New Delhi-110012	21-03-2022	9.30 AM – 11.00 AM	Linkage and QTL mapping

4.	Dr. R.M. Sundaram Director ICAR-Indian Institute of Rice Research Rajenranagar, Hyderabad	22-03-2022	9.30 AM – 11.00 AM	Marker assisted breeding for climate resilient rice varieties
5.	Dr Janila Pasupuleti Cluster Leader – Crop Breeding, Principal Scientist - Groundnut Breeding, ICRISAT	22-03-2022	11.15 AM – 12.45 PM	Marker assisted breeding in groundnut for disease resistance and high oleic content
6.	Dr Santosh Deshpande Research Coordinator Hytech Seed India Private Limited, Patancheru, Hyd	23-03-2022	9.30 AM – 12.30 PM	Association mapping and its application in crop improvement
7.	Mrs. Usha Kiran Scientist IIOR, Rajendranagar, Hyd.	23-03-2022	2.00 PM – 5.00 PM	Association mapping using SSRs
8.	Sri. RajaguruBohar Regional Genotyping Coordinator (South Asia) / Senior scientist (Project management)*CGIAR Excellence in Breeding, CIMMYT*, C/o ICRISAT	24-03-2022	9.30 AM-10.30 AM	Intervention of molecular tools for genetic purity analysis
9.	Dr. V. Dinesh Kumar Principal Scientist (Biotechnology) Head - Crop Improvement ICAR-IIOR, Hyderabad	24-03-2022	11.00 AM-12.00Noon	Hybrid purity assessment in field crops
10.	Dr Manish K Pandey Senior Scientist Groundnut Genomics ICRISAT, Hyderabad	25-03-2022	9.30 AM – 10.30 AM	Role of NGS in accelerating high -resolution mapping and gene discovery
11.	Dr. T. Nepolean Principal Scientist ICAR-IIMR, Hyderabad	25-03-2022	12.15 PM-1.15 PM	Application of next-generation breeding approaches and tools to enhance genetic gain in staple crops
12.	Dr. *Manish Roorkiwal* Research A. Professor Khalifa Center for Genetic Engineering and Biotechnology, UAE University, Al Ain Abu Dhabi, UAE	25-03-2022	2.00 PM-3.00 PM	High throughput genotyping and application in GWAS and genomic selection
13.	Dr. Santosha Rathod Scientist (Agricultural Statistics)ICAR-IIRR, Hyd	25-03-2022	3.00PM-5.00 PM	Genomic Selection models using R
14.	Dr Kalpana Sastry Managing Director, Ag-Hub Foundation PJTSAU, Hyderabad	26-03-2022	10.30 AM-12.00 Noon	Intellectual property management in agriculture

List of Faculty Members

S.No.	Name of the Speaker & Centre	Date	Time	Topic
1.	**Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad	15-03-2022	1 Hour	Basic Principles: a) Polymerase chain reaction b) Gel Electrophoresi
2.	**Dr ChAnuradha** Prof., IBT, PJTSAU, Hyd.	16-03-2022	1.5 Hours	Introduction to molecular markers-Overview and classification
3.	**Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad	17-03-2022	1.5 Hours	Development of SSR and derived markers (SCAR & CAPS)
4.	**Dr Ch V Durga Rani** Director, IBT, PJTSAU, Hyderabad	19-03-2022	1 Hour	Introduction to marker assisted Crop Improvement – MABC - MAGP for Crop Improvement
5.	**Dr. K.N Yamini** Tech Officer Dean PGS PJTSAU, Hyderabad	19-03-2022	1 Hour	Introduction to marker assisted Crop Improvement – MAPB for biotic stress resistance in rice
6.	**Dr S Vanisri** Prof., IBT, PJTSAU, Hyd.	19-03-2022	1.5 Hours	Mapping populations and their development
7.	**Dr Ch V Durga Rani** Director, IBT, PJTSAU, Hyd.	26-03-2022	1 Hour	PPV FRA

Practical Component

S.No.	Name of the Speaker & Centre	Date	Time	Topic
1.	**Dr ChAnuradha** Professor, IBT, PJTSAU, Hyderabad **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad	14-03-2022	5.5 Hours	Good laboratory practices Acquaintance with the lab equipment Preparation of solutions and buffers
2.	**Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad **Dr Ch. Anuradha** Professor, IBT, PJTSAU, Hyderabad	15-03-2022	6 Hours	Plant Genomic DNA Isolation CTAB method Plant Genomic DNA Isolation Kit method
3.	**Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad **Dr ChAnuradha** Professor, IBT, PJTSAU, Hyderabad	16-03-2022	5.5 Hours	Quantification of genomic DNA Agarose gel electrophoresis Quantification of genomic DNA nanodrop (5.5hr)

4.	**Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad **Dr ChAnuradha** Professor, IBT, PJTSAU, Hyderabad	17-03-2022	5.5 Hours	PCR using dominant (RAPD) & PCR using codominant (SSR) markers Agarose gel electrophoresis (SSR markers) Polyacrylamide gel electrophoresis (SSR markers)
5.	**Dr S Vanisri** Professor IBT, PJTSAU, Hyderabad **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad	18-03-2022	4 Hours	Genetic diversity analysis using SSR data - NTSYS-Pc - DARwin - Primer designing: Primer 3
6.	**Dr Ch V Durga Rani** Director **Ms Nagamani**, Research Scholar, IBT, PJTSAU, Hyderabad **Dr S Vanisri,** Professor IBT, PJTSAU, Hyderabad	19-03-2022	3 Hours 1 Hour	Detection of multiple genes for rice gall midge and bacterial blight resistance in pyramided lines Preparation and arrangement of genotypic and phenotypic data:
7.	**Dr S Vanisri** Professor, IBT PJTSAU, Hyderabad	21-03-2022	5.5 Hours	Linkage map construction QTL identification
8.	**Dr Ch V Durga Rani** Director **Ms Nagamani,** Research Scholar IBT, PJTSAU, Hyderabad	22-03-2022	4 Hours	Screening of F_2 population and F_3 progenies for detection of genes for biotic stress resistance and yield in rice
9.	**Mrs. Usha Kiran** Scientist, ICAR-IIOR, Hyd	23-03-2022	3 Hours	Association mapping using SSRs
10.	**Dr S Vanisri** Professor IBT, PJTSAU, Hyderabad **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad	24-03-2022	5 Hours	DNA finger printing of released varieties of rice SSR markers for hybrid purity testing in maize
11.	**Dr S Vanisri** Professor IBT, PJTSAU, Hyderabad	25-03-2022	2 Hours	GWAS using SNP data
12.	**Dr. Santosha Rathod** Scientist (Agricultural Statistics) ICAR-IIRR, Hyderabad	25-03-2022	2 Hours	Genomic Selection models using R
13.	**Dr Ch. Anuradha** Professor, IBT, Hyd	26-03-2022	4 Hours	Visit to Agri Hub Visit to IIOR

List of training modules and course contents (both lectures and hands on sessions) and Training Curriculum

Day-wise Schedule of the Program

WEEK - 1

Day	THEORY	PRACTICALS
DAY - 1 14-03-2022	Inauguration and Introduction of training programme (30 Min) Program Coordinator: **Dr Ch V Durga Rani** Director, IBT, PJTSAU, Hyderabad Lecture: I.1.1Integration of conventional and modern biotechnological tools towards crop improvement Faculty Name: **Dr Rajeev K Varshney** Director, State Agricultural Biotechnology Centre, Murdoch University, Australia	Good laboratory practices Acquaintance with the lab equipment Preparation of solutions and buffers (5.5hr) Faculty Name: **Dr ChAnuradha** Professor, IBT, PJTSAU, Hyderabad **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad
DAY -2 15-03-2022	Lecture: I.1.2 Basic Principles: a) Polymerase chain reaction d) Gel Electrophoresis (1hr) Faculty Name: **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad	Plant Genomic DNA Isolation CTAB method Kit method (6hr) Faculty Name: **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad **Dr ChAnuradha** Professor, IBT,PJTSAU, Hyd.
DAY -3 16-03-2022	Lecture:I.2.1 Introduction to molecular markers-Overview and classification: (1.5hr) Faculty Name: **Dr ChAnuradha** Professor, IBT, PJTSAU, Hyderabad	Quantification of genomic DNA - Agarose gel electrophoresis - nanodrop (5.5hr) Faculty Name: **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad **Dr ChAnuradha** Professor, IBT, PJTSAU, Hyd.
DAY -4 17-03-2022	Lecture I.2.2: Development of SSR and derived markers (SCAR & CAPS): (1.5hr) Faculty Name: **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad	PCR using dominant (RAPD) & codominant (SSR) markers - Agarose and polyacrylamide gel electrophoresis (SSR markers): (5.5hr) Faculty Name: **Dr SNCVL Pushpavalli** Asst. Prof., IBT, PJTSAU, Hyd. **Dr ChAnuradha** Professor, IBT,PJTSAU, Hyderabad

DAY - 5 18-03-2022	Lecture I.3.1: Phylogeny & genetic diversity Lecture I.3.2: Genomic data resources Lecture I.3.3: BLAST tool (3hr) Faculty Name: **Dr. Rajendra Kumar** Principal Scientist ICAR-IIMR, Hyderabad	Genetic diversity analysis using SSR data - NTSYS-Pc - DARwin - Primer designing: Primer 3 (4hr) Faculty Name: **Dr S Vanisri** Prof., IBT, PJTSAU, Hyd. **Dr SNCVL Pushpavalli** Asst. Prof., IBT, PJTSAU, Hyd.
DAY -6 19-03-2022	Lecture II.1.1: Introduction to marker assisted Crop Improvement – MABC – MAGP for Crop Improvement Faculty Name: **Dr Ch V Durga Rani** Director, IBT, PJTSAU, Hyd. Lecture II.1.2: Introduction to marker assisted Crop Improvement – MAPB for biotic stress resistance in rice Faculty Name: **Dr. K.N Yamini** Tech Officer, Dean PGS, PJTSAU, Hyd. Lecture II.1.3: Mapping populations and their development (1.5hr) Faculty Name: **Dr S Vanisri** Professor, IBT, PJTSAU, Hyderabad	Detection of multiple genes for rice gall midge and bacterial blight resistance in pyramided lines (3hr) Faculty Name: **Dr Ch V Durga Rani** Director Ms Nagamani, Research Scholar IBT, PJTSAU, Hyderabad Preparation and arrangement of genotypic and phenotypic data: (1hr) Faculty Name: **Dr S Vanisri** Professor IBT, PJTSAU, Hyderabad

WEEK - 2

Day	THEORY	PRACTICALS
DAY - 1 21-03-2022	Lecture II.1.3 : Linkage and QTL mapping (1.5hr) **Dr. C. Bharadwaj** Principal Scientist IARI, New Delhi **9.30 to 11.00 AM**	Linkage map construction QTL identification (5.5hr) Faculty Name: **Dr S Vanisri** Professor, IBT PJTSAU, Hyderabad
DAY -2 22-03-2022	**Theory** Lecture II.2.1: Marker assisted breeding for climate resilient rice varieties (1.5 hr) **9.30 to 11.00 AM** Faculty Name: **Dr R M Sundaram** Director, ICAR-IIRR, Hyd. Lecture II.2.2: Marker assisted breeding in groundnut for disease resistance and high oleic content (1.5 hr) Faculty Name: **Dr P Janila**	Screening of F_2 population and F_3 progenies for detection of genes for biotic stress resistance and yield in rice (4 hr) Faculty Name: **Dr Ch V Durga Rani** Director Ms Nagamani, Research Scholar IBT, PJTSAU, Hyderabad

	Principal Groundnut Breeder, ICRISAT, Hyderabad **11.15 AM to 12.45 PM**	
DAY – 3 23-03-2022	LectureII.3.1. Association mapping and its application in crop improvement (3 hr) Faculty Name: **Dr Santosh Deshpande** Research Coordinator HYTECH SEED INDIA PRIVATE LIMITED Patancheru, Hyderabad **9.30 AM to 12.30 PM**	Association mapping using SSRs (4 hr) Faculty Name: **Mrs. Usha Kiran** Scientist, ICAR-IIOR Hyderabad **2.00 to 5.00 PM**
DAY-4 24-03-2022	Lecture II.4.1: Intervention of molecular tools for genetic purity analysis (1hr) Faculty Name: **Sri. Rajaguru Bohar** Regional Genotyping Coordinator (South Asia) / Senior scientist (Project management) CGIAR Excellence in Breeding, CIMMYT C/o ICRISAT, Patancheru**9.30 AM to 10.30 AM** Lecture II.4.2: Hybrid purity assessment in field crops (1hr) Faculty Name: **Dr. V. Dinesh Kumar** Principal Scientist (Biotechnology)Head- Crop Improvement ICAR-IIOR, Hyderabad **11.00 AM to 12.00 Noon**	DNA finger printing of released varieties of rice SSR markers for hybrid purity testing in maize (5 hr) Faculty Name: **Dr S Vanisri** Professor IBT, PJTSAU, Hyderabad **Dr SNCVL Pushpavalli** Assistant Professor, IBT, PJTSAU, Hyderabad
DAY – 5 25-03-2022	Lecture III.1.1: Role of NGS in accelerating high-resolution mapping and gene discovery (1.0hr) **Dr Manish Pandey** Senior Scientist Groundnut Genomics ICRISAT, Hyderabad **9.30 to 10.30 AM** Lecture III.1.2: Application of next-generation breeding approaches and tools to enhance genetic gain in staple crops (1.0hr) Faculty Name: **Dr. T. Nepolean** Principal Scientist ICAR-IIMR, Hyderabad	GWAS using SNP data (2 hr) Faculty Name: **Dr S Vanisri** Professor IBT, PJTSAU, Hyderabad Genomic Selection models using R (2.0hr) Faculty Name: **Dr. Santosha Rathod** Scientist (Agricultural Statistics) ICAR-IIRR, Hyderabad **3.00 to 5.00 PM**

	12.15 to 01.15 PM Lecture III.1.3: High throughput genotyping and application in GWAS and genomic selection (1.0hr) Faculty Name: **Dr. *Manish Roorkiwal*** Research A. Professor Khalifa Center for Genetic Engineering and Biotechnology UAE University, Al Ain Abu Dhabi, UAE **2.00 to 3.00 PM**	
DAY – 6 26-03-2022	Lecture III.2.1: PPV FRA (1.0hr) Faculty Name: **Dr Ch V Durga Rani** Director, IBT, PJTSAU, Hyderabad Lecture III.2.2: Intellectual property management in agriculture(1.0hr) Faculty Name: **Dr Kalpana Sastry** Managing Director, Ag-Hub Foundation, PJTSAU, Hyderabad **10.30AM to 12.00 Noon**	Visit to Agri Hub: IIRR; RRC (ARI) field visits – MAB derived material (4 hrs) **Dr Ch Anuradha** Professor, IBT, PJTSAU, Hyderabad Valedictory function- 1hr

PROFESSOR JAYASHANKAR TELANGANA STATE AGRICULTURAL UNIVERSITY

INSTITUTE OF BIOTECHNOLOGY

Rajendranagar, Hyderabad-500030

www.pjtsau.edu.in

Certificate of Participation

This is to certify that _____

has successfully completed Hands on Training course: ***Biotechnological tools in crop improvement under TSCOST-DBT, GoI - Skill Vigyan Program*** for Faculty Development organised by Prof. Jayashankar Telangana State Agricultural University , Hyderabad from 14th – 26th March 2022.

Program Coordinator PJTSAU	Member Secretary TSCOST	Director of Research PJTSAU

Basic Techniques in Genetics and Molecular Biology

Course Coordinator : Dr. Archana Bharadwaj Siva,
Senior Principal Scientist Head HR & BD, Coordinator SDP,
CSIR-Centre for Cellular and Molecular Biology (CSIR-CCMB)

The Faculty Development training program is a refresher course, for faculty teaching life sciences and it is conducted in partnership with Telangana State Council of Science & Technology. In this regard a hands on training workshop was conducted in CSIR-Centre for Cellular and Molecular Biology, on 'Basic Techniques in Genetics and Molecular Biology' targeted to faculty teaching Undergraduate and Postgraduate courses in Life Sciences & Allied areas. The targeted faculty were mostly from Hyderabad Telangana. Lectures and Laboratory training was provided by skilled resource persons, participants were exposed to the laboratory safety regulations, and participation certificate was issued to the trainees after the successful completion of the course.

The main objective of the program to address the need of faculty to upgrade their knowledge in the areas of Genetics & Molecular Biology. Participation in this hands on training workshop will help in upgrading the knowledge of the participants in modern areas of life sciences, planning short term projects for UG and PG students, better understanding of the research in curriculum, designing and execution of the experiments, and training their student. Two Faculty training programs were conducted and each program was for two weeks. First program was from 30th May to 10th June 2022 (Batch I – 10 participants) and the second program was from 30thJanuary to 11th February 2023 (Batch II – 13 participants).

Techniques and new things: Participants who attended this program were given theory and practical exposure to the topics related to the Basic bacteriology, Transposon-mediated mutagenesis, and Recombinant DNA technology, Gene Transfer mechanisms in bacteria, and Research ethics and Research methodology.

Methodology / Selection criteria adopted for selection of Candidates: The selection of the candidates was done based on screening the applications received on line with respect to the advertisement posted in the CCMB Official website, and Statement of Purpose submitted by the candidates along with the application.

Methodology followed for conducting the program includes Lectures and Laboratory training by skilled resource persons, Exposure to laboratory safety regulations, Assessment through written test and certificate of participation issued to the participants

The training modules and course contents (both lectures and hands on sessions) and Training Curriculum includes Basic bacteriology, Transposon-mediated mutagenesis, Recombinant DNA technology, Gene Transfer mechanisms in bacteria, Research ethics and Research methodology.

List of Faculty/Experts/ Resource persons associated with the programme

S.NO	Name of the Faculty/Expert/ Resource Person	Designation
1	Dr. Manjula Reddy	Chief Scientist, CSIR- Center for Cellular and Molecular Biology (CCMB) Hyderabad
2	Dr. Archana Bharadwaj Siva	Senior Principal Scientist, Head HR, Coordinator SDP, CSIR-Center for Cellular and Molecular Biology (CCMB) Hyderabad
3	Dr. Sravanti Vaidya	Skill Development & Science Management India CSIR-CCMB Associate Fellow, Telangana Academy of Sciences CSIR-Center for Cellular and Molecular Biology (CCMB) Hyderabad.
4	Dr. A. S Sreedhar	Senior Principal Scientist CSIR- Center for Cellular and Molecular Biology (CCMB) Hyderabad.
5	Mr. Krishna Chaitanya N	Research Scholar (PhD), with Dr. Manjula Reddy, CSIR-Center for Cellular and Molecular Biology (CCMB) Hyderabad.
6	Dr. Krishna Leela J	Technical personnel with Dr. Manjula Reddy, CSIR- Center for Cellular and Molecular Biology (CCMB) Hyderabad.
7	Ms. Moneca Kaul	Research Scholar (PhD),) with Dr. Manjula Reddy CSIR-Center for Cellular and Molecular Biology (CCMB) , hyd
8	Ms. Vaidehi Rajguru	Research Scholar (PhD), with Dr. Manjula Reddy, CSIR-Center for Cellular and Molecular Biology (CCMB) , Hyd
9	Mr. Suraj Kumar Meher	Research Scholar (PhD), with Dr. Manjula Reddy, CSIR-Center for Cellular and Molecular Biology (CCMB), Hyd
10	Mr. Debadutta Patra	Research Scholar (PhD), with Dr. Mandar V Deshmukh, CSIR-Center for Cellular and Molecular Biology (CCMB) Hyderabad.

Batch – I :: Training Schedule (day-wise schedule)

Day	Date	Time	Module	Presenter	Topic
1	30.05.22	9:00-9:30 am			Registration
		9:30 -10:30 am	Lecture	Ms. Moneca Kaul	Basic bacteriology
		11 am-6:00 pm	Practicals		Media preparation, pouring plates, bacterial growth of wild-type *E. coli*
2	31.05.22	9:30 -10:30 am	Lecture	Dr. Krishna Leela	Importance of transformation and gene transfer mechanisms in bacteria
		11 am-6:00 pm	Practicals		Transposon-mediated mutagenesis - Initiation Genomic DNA isolation - initiation
3	01.06.22	9:30 -10:30 am	Lecture	Dr. Manjula Reddy	Use of Transposons in mutagenesis
		11 am-6:00 pm	Practicals		Screening for mutants,

					Genomic DNA isolation,
4	02.06.22	9:30 -10:30 am	Lecture	Ms. Vaidehi Rajguru	Recombinant DNA-I
		11 am-6:00 pm	Practicals		PCR (Polymerase Chain Reaction)
5	03.06.22	9:30 -10:30 am	Lecture	Mr. Krishna Chaitanya	Recombinant DNA-II
		11 am-6:00 pm	Practicals		PCR clean-up Restriction enzyme digestion
6	04.06.22	10:00-1:00 pm	Practicals		Setting up ligation
	06.06.22	9:30 -10:30 am	Lecture		
		11 am-6:00 pm	Practicals		Transformation
8	07.06.22	9:30 -10:30 am	Lecture	Dr.Sravanti V	Overview of advanced tools and techniques used in biological research
		11 am-6:00 pm	Practicals		Selection of recombinants
9	08.06.22	9:30 -10:30 am	Lecture	Dr.Archana B Siva	The gut feelings: Microbiome
		11 am-6:00 pm	Practicals		Plasmid isolation
10	09.06.22	9:30 -10:30 am	Lecture	Dr.A S Sreedhar	Research ethics and methodology
		11 am-6:00 pm	Practicals		Complementation
11	10.06.22	10:00 -1:00 am	Tour		CCMB Facility tour
		2:00-2:30 pm	Lecture	Dr.Sravanti V	Career opportunities for life science students
		2:30-3:00 pm	Practicals		Checking complementation
		3:00-3:30 pm			Feedback, assessments and discussion
		3:30 -4:00pm			Valedictory

Batch – II :: Training Schedule (day-wise schedule)

	Date	Schedule		Presenter Name	Topic
1	30.01.23	9.00-9.30 am			Registration
		9.30-10.30 am	Lecture	Manjula Reddy	Overview of the basic genetic and molecular techinques used in bacteria.
		11.00 am-6.00 pm	Practical		Media preparation, pouring plates, strain revival
2	31.01.23	9.30-10.30 am	Lecture	Bhargavi Krishna sree	Gene transfer mechanism in bacteria
		11.00 am-6.00 pm	Practical		Transposes – mediated mutagenesis
3	01.02.23	9.30-10.30 am	Lecture	Debadatta Patra	Recombinant DNA-I(cloning)
		11.00 am-6.00 pm	Practical		Screening for mutants, PCR(Polymerase Chain Reaction)
4	02.02.23	9.30-10.30 am	Lecture	Debadatta Patra	Recombination DNA-II(cloning)
		11.00 am-6.00 pm	Practical		Agarose gel electrophoresis, PCR clean-up , and Restriction enzyme digestion

5	03.02.23	9.30-10.30 am	Lecture	Suraj Kumar Mehra	Protein overexpression and purification-I
		11.00 am-6.00 pm	Practical		Ligation and transformation into DHSa
6	04.02.23	10.00am-1.00 pm	Practical		Screening for positive clones and porching
7	06.02.23	9.30-10.30 am	Lecture	Suraj Kumar Mehra	Protein overexpression and purification-II
		11.00 am-6.00 pm	Practical		Plasmid isolation
8	07.02.23	9.30-10.30 am	Lecture	Sravanti Vaidya	Overview of advanced tools and techniques used in boological reserch
		11.00 am - 6.00 pm	Practical		Transformation of Lac mutants Transformation ofb1.21 with PET21a-LacZ
9	08.02.23	9.30-10.30 am	Lecture	Archana B Siva	The got felling Microboome
		11.00 am - 6.00 pm	Practical		Protein overexpression, complementation
10	09.02.23	9.30-10.30 am	Lecture	A S Sreedhar	Research ethics and methodology
		11.00 am - 6.00 pm	Practical		SDS-PAGE and staining
11	10.02.23	10.00-1.00am	Tour		CCMB Facility tour
		2.00-2.30pm	Lecture	Sravanti Vaidya	Career opportunities for life science students
		2.30-3.00pm	Practical		Checking overexpression
		3.00-3.30pm			Feedback & assessment
		3.30-4.00pm			Valedictory

CSIR-Centre for Cellular and Molecular Biology

CERTIFICATE

This is to certify that Mrs. S. Malathi Varma *has participated in and successfully completed the TSCOST-DBT, Skill Vigyan sponsored "Faculty Development Program on Basic Techniques in Genetics and Molecular Biology" under CSIR Integrated Skill Initiative at CSIR - Centre for Cellular and Molecular Biology, Hyderabad, India from 30th January to 11th February 2023.*

Dr. Manjula Reddy	Dr. Archana Bharadwaj Siva	Dr. Vinay K. Nandicoori
Course Coordinator	Nodal Scientist, SDP	Director

Animal Cell culture Techniques

Course Coordinator: Dr. Santosh Kumar Guru
National Institute of Pharmaceutical Education and Research (NIPER), Hyderabad

The NIPER organized the Faculty Development program entitled "Animal Cell culture Techniques". The main objective of the program is aiming for India's higher education system in attaining sustainable development and achieving higher growth rates which could be enabled through creation, transmission, and dissemination of knowledge. The Program aims at enhancing the academic and intellectual environment in the Institutions by providing faculty members with enough opportunities to pursue research and also to participate in seminars / conferences / workshops. A development program describes the steps involved in improving somebody's knowledge, performance, and skills. In the context of business, development plans allow employees to increase their effectiveness at work. Handling of Cell lines/ Maintenance of Cell lines/ RNA Isolation/ DNA Isolation/ Protein Isolation are the new techniques and methods that were taught.

The program was of Two week and conducted during 23rd May to 3rd June, 2022. A total of 19 faculty have participated in the program. Demonstration of 3D Bio-Printer , Cell based assays – MTT, Cellular uptake, flow cytometry, apoptosis, RT PCR, Western blot & Many more topics were discussed

List of participants

Sr #	Name	Institute	Mobile	Email id
1	Dr. B Anil Kumar	PV Narsimha Rao Telangana Vet. Univ	9491822734	anilvetpharma@gmail.com
2	Dr. Ashok Kumar Devarasetti	C.V. Sc, Warangal, PUNR Telangana Vet. Univ.	9866184192	ashok99@gmail.com
3	C. Pavani	BV Raju Institute of Technology, Narsapur	9490784496 8555077292	pavani.c@bvrit.ac.in
4	Dr. Pavan K Chintamaneni	GITAM School of Pharmacy-GITAM Univ	8985680736	pavanchintamaneni@gmail.com, pchintam@gitam.edu
5	Penmetsa Durga Bhavani	Vishnu Institute of Pharmaceutical Edu & Res	9398963624	durgabhavani.p@viper.ac.in
6	Boreddy Himaja	Vignan Institute of Pharmaceutical Sci.	9441771549	himajareddy02@gmail.com
7	Mr. C. Pradeep Kumar	Teegala Krishna Reddy College of Pharmacy	8121952454	pharmacologypradeep@gmail.com

8	Dr. M. Kasi Viswanadh	School of Pharmacy, GITAM University, Hyderabad	8309885828	kmatte@gitam.edu
9	Dr. K. Kasturi Devi	PVNR Telangana Veterinary University	9885884491	kasturi120@gmail.com
10	VANAM. PRIYANKA	St. Marys Pharmacy College, Hyderabad	7680929745	priyanka.vanam3@gmail.com
11	SHAIKH AKBARPASHA	Gissaj Govt. college (A), Nizamabad	8885300136	pryp88@gmail.com
12	A. Sowjanya	Marri Laxman Reddy Institute of Pharmacy	8106445852	akula.sowjuu@gmail.com
13	L. SRINIVAS REDDY	Girraj Govt. College (A), Nizamabad	9440899309	gaddamsreddy@gmail.com
14	A. SUMITHRA	Chaitanya Bharathi Institute of Technology	8978933631	sumithrab_biotech@cbit.ac.in
15	Dr. Vijay R Chidrawar	Raghavendra Institute of Pharmaceutical Education & Research (RIPER)	7038429925	vijay_pharmacology@yahoo.com
16	Dr. SOLOMON S. RAJ BHIMAJHATI	Netaji Institute of Pharm. Sciences	9989088216	drbssv69@gmail.com
17	Dr. Raju Bathula	Netaji Institute of Pharm. Sciences	9989294664	dr.rajubathula@gmail.com
18	Lavanya Bajja	Telangana Tribal Welfare Residential Degree college	8520869990	Lavanyathanu09@gmail.com
19	Dr. P. Arunadevi	University college of Technology, Osmania University	9949411899	arunabpharm@gmail.com

Course Contents

Day	Programme (10.30 to 4-pm)	Concerned Faculty Theory	Concerned Coordinator Experimental
23rd May 2022	Basics of Cell Culture	Dr. Dharmendra Khatri	Dr. SK Guru/ Biswajit/Hoshiyar
24th May 2022	Basics of Cell Culture- MTT Assay	Dr. Dharmendra Khatri	Dr. SK Guru/ Biswajit/Hoshiyar
25th May 2022	Introduction To Cell Culture Subculture/Freezing/Thawing/ Staining	Dr. Chandraiah Godugu	Dr. Chandraiah/ Biswajit Panda
26th May 2022	DNA Isolation	Dr. Nitin Pal Kalia	Dr. Nitin Pal Kalia/ Shashikant
27th May 2022	DNA Isolation/PCR	Dr. Nitin Pal Kalia	Dr. Nitin Pal Kalia/ Shashikant
30th May 2022	Design of Cell Culture Laboratory and Animal handling	Dr. Manoj Dandekar	Dr. Manoj Dandekar/ Zia
31st May 2022	Protein Isolation and Electrophoresis	Dr. SK Guru	Dr. Dharmendra/ Anika
1st June 2022	RNA Isolation/ RT PCR	Dr. Vasundhra Bhandari	Dr. Vasundhra Bhandari/ Siva
2nd June 2022	Introduction to Cell Death Mechanism	Dr. SK Guru	Dr. SK Guru/ Hoshiyar
3rd June 2022	Basic Flowcytometry Techniques	Dr. SK Guru	Dr. Dharmendra/ Sabiya

Molecular Docking, Virtual Screening and Computational Biology

Course Coordinator: Dr K Venkata Rao
National Institute of Pharmaceutical Education & Research (NIPER)-Hyderabad

The Faculty Development Programme (FDP) was designed to train the faculty who wish to upgrade the knowledge and skills in area of Drug Discovery. Hands on training had been provided to strengthen the practical knowledge emphasizing on Drug Design, Pharmacoinformatics, Pharmaceutical Sciences & Chemical Sciences. The training course for the workshop has been designed with the objective to provide the theoretical background as well as a hands-on approach to Molecular Docking and Virtual screening. The training covers the use of different software modules and will focus on Chemo-informatics, lead identification and optimization methods. The training is important for better understanding on drug discovery process. Training update skills on molecular modeling and drug design strategies and strengthen the research capabilities of the participants.

After attending the workshop, the faculty participants learned theoretical background on drug discovery approaches, different biological databases, use of different tools or software to Molecular Docking and Virtual screening, use of Cheminformatics methods for lead identification and optimization, knowledge and skills in the area of Drug Discovery.

The program is of two weeks from 28th March 2021 to 8th April 2022 - Monday to Friday 9:30am- 5:30pm (28th March 2021 to 8th April 2022). A notification Advertised in Telengana newspapers and Social media, NIPER-H website. Applications received through the Institutes are considered. 23 participants were shortlisted but 14 participants from different Academic/Research institutes attended. Delivery of the talks from the experts and Hands-on sessions.

The participants are:

1. Divya Pingili, Sri Venkateshwara College of Pharmacy, Madhapur, Hyderabad, Email: pingilidivya@gmail.com; contact: 9885223391

2. Dr. Divya P, Holy Mary Institute of Technology and Science, College of Pharmacy, Kondapur, Hyderabad, Email: divyapraj.26@gmail.com; contact: 8328363783

3. Padmini V, Sultan ul Uloom College of Pharmacy, Banjara Hills, Hyderabad, Email: vpadmini@sucp.ac.in; contact: 9704246073

4. Nattava Prasanna Lakshmi, Sri Venkateshwara College of Pharmacy, Madhapur, Hyderabad Email: lucky6prasanna@qmail.com; contact: 9908633362

5. Vishnu Thumma, Matrusri Engineering College, Saidabad, Hyderabad Email: thumma.vishnu@matrusri.edu.in.; contact: 9676172776

6. Yalamanchili Praharsha, Marri Laxman Reddy Institute of Pharmacy, Dundigal, Hyderabad Email: 1020harsha@gmail.com; contact: 9959644211

7. Kanakaiah Kodhadi, Guru Nanak Institution's Technical Campus, School of Pharmacy, Khanapur, Hyderabad, Email: kanakaiahk.pharmacy@gniindia.org; contact: 8074216690

8. G. Srinivas Reddy, Girraj Government College, Dubba, Nizamabad, Email: gaddamsreddy@gmail.com; contact: 9440899309

9. Shaik Mallika, Marri Laxman Reddy Institute of Pharmacy, Dundigal, Hyderabd, Email. mallikashaik29@gmail.com; contact: 9618494345

10. Baswaraju Macha, Jayamukhi College of Pharmacy, Narsampeta, Email: baswarajpharma1@gmail.com; contact: 9381874572

11. Dr K Mahesh Kumar, BLDEA's S.B. Arts and K.C.P. Science College, Karnataka, Email: mahesha.001@gmail.com; contact: 9916558040

12. Narsu Kumari Korrapati, A.M.Reddy Memorial College of Pharmacy, Narsarao Pet, Email: narsukumari87@gmail.com, contact: 9963638189

13. Dr Anil Kumar G, Jayamukhi College of Pharmacy, Narsampeta, Email: anilkumargarige@gmail.com; contact: 9949424160

14. Dr Rajveer CH, Jayamukhi College of Pharmacy, Narsampeta, Email: rajveerchiliveri@gmail.com; contact: 9948645156

The Faculty/Experts/ Resource persons associated with the programme are:

1. Dr Venkata Rao Kaki, Assistant Professor, NIPER-Hyderabad
2. Dr Sunil Kumar, Assistant Professor, NIPER-Hyderabad
3. Dr Vasundhara, Assistant Professor, NIPER-Hyderabad
4. Dr Goplalakrishnan Bulusu, Professor & Consultant, TCS Research
5. Dr. Ajay Kumar Singh, Associate Professor, CUSB, Patna, Bihar
6. Dr. Rituraj Purohit, Principal Scientist, CSIR-IHBT, Palampur
7. Dr. Puneet Kacker, Data Scientist, Accenture, Gurugram
8. Dr. Feroz Khan, Principal Scientist, CSIR-CIMAP, Lucknow
9. Dr. Evans C. Coutinho, Professor, BCP, Mumbai
10. Dr. Koushik Kasavajhala, Scientist, Schrodinger
11. Dr. Durg Vijay Singh, Assistant Professor, CUSB, Gaya, Bihar
12. Dr. Lalitha Guruprasad, Professor, UoH, Hyderabad
13. Dr. Manish Kumar Gupta, Associate Professor, VBSPU, Jaunpur (U. P.)
14. Dr. Parthasarathi Ramakrishnan, PrincipalScientist (IITR, Lucknow)

The List of training modules and course contents (both lectures and hands on sessions) and Training Curriculum is given below:

Date & Day	Time	Speakers	Activity / Notes
28-03-2022 (Monday)	9:30am - 10:00am	Registration	
	10:00am - 10:15am SH-1	Dr. Shashi Bala Singh Director- NIPER-Hyd.	Welcome and Introduction
	10:20am - 11:45am SH-1	Dr. Gopalakrishnan Bulusu, TCS Research, Hyd.	Keynote Speech
	11:45am - 12:15pm	High Tea	
	12:15pm - 01:00pm SH-1	Dr. Vasundhra Bhandari NIPER, Hyderabad	Bioinformatics: Introduction, Major Areas and Applications
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 03:00pm CL-2	Dr. Vasundhra Bhandari/ Dr. Sunil Kumar Gupta NIPER, Hyderabad	Biological Database (NCBI, DDBJ, EMBL)
	03:15pm - 04:15pm CL-2	Dr. Sunil Kumar Gupta NIPER, Hyderabad	Protein Information Resource (PDB, CATH, SCOPE etc.)
	04:15pm - 04:30pm	Tea Break	
	04:30pm - 05:00pm CL-2	Technical Session Dr. Vasundhra Bhandari/ Dr.Sunil Kumar Gupta NIPER, Hyderabad	Practice Session and Technical Discussion
29-03-2022 (Tuesday)	10:00am - 11:00am	Dr. K.Venkat Rao NIPER, Hyderabad	NIPER, Hyd. Visit
	11:00am - 11:30am	High Tea	
	11:30am - 12:30pm CL-2	Dr. Sunil Kumar Gupta NIPER, Hyderabad	Biological Sequence Analysis using various tools
	12:30pm - 01:00pm CL-2	Dr. Sunil Kumar Gupta NIPER, Hyderabad	Software demonstration
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 03.00pm CL-2	Dr. Ajay Kumar Singh CUSB, Patna, Bihar	Phylogenetic resources for exploring the connectivity and variations analysis: A Bioinformatics approach
	03:00pm - 04:00pm CL-2	Dr. Ajay Kumar Singh CUSB, Patna, Bihar	Phylogenetic tree generation using various tools
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm CL-2	Technical Session Dr.Vasundhra Bhandari /Dr. Sunil Kumar Gupta NIPER, Hyderabad	Practice Session and Technical Discussion
30-03-2022 (Wednesday)	10:00am - 11:00am CL-2	Dr. Sunil Kr Gupta NIPER, Hyderabad	Protein 3D structure prediction

	11:00am - 11:30am	High Tea	
	11:30am - 12:30pm CL-2	Dr. Sunil Kr Gupta NIPER, Hyderabad	Tools for protein structure prediction and validation
	12:30pm - 01:00pm CL-2	Technical Session Dr. Sunil Kr Gupta NIPER, Hyderabad	Model building and using Swiss-Model & Modeller program
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 03:00pm CL-2	Technical Session Dr. Rituraj Purohit CSIR-IHBT, Palampur	Protein 3D structure validation
	03:00pm - 04:00pm CL-2	Technical Session Dr. Sunil Kr Gupta NIPER, Hyderabad	Active Site Prediction tools
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm CL-2	Technical Session Dr.Vasundhra Bhandari /Dr. Sunil KumarGupta NIPER, Hyderabad	Practice Session and Technical Discussion
31-03-2022 (Thursday)	10:00am - 11:00am CL-2	Dr. Puneet Kacker Accenture, Gurugram	Chemoinformatics Introduction, Structure and Database
	11:00am - 11:30am	High Tea	
	11:30am - 12:30pm CL-2	Dr. Puneet Kacker Accenture, Gurugram	Hands on: Chemical Database, Structure and Web Search
	12:30pm - 01:00pm CL-2	Dr. Puneet Kacker Accenture, Gurugram	Chemoinformatics Tools: Datawarrior, Openbabel, Chimera
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 03:00pm	Dr. Feroz Khan CSIR-CIMAP, Lucknow	Quantitative Structure-Activity Relationship (QSAR) based Lead Identification & Optimization
	03:00pm - 04:00pm	Dr. Feroz Khan CSIR-CIMAP, Lucknow	Hands on: QSAR Data Set Analysis
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm	Dr. Feroz Khan CSIR-CIMAP, Lucknow	Practice Session
01-04-2022 (Friday)	10:00am - 11:00am	Dr. Sandip Bharate CSIR-IIIM, Jammu	Virtual High Throughput Screening (vHTS) Approaches to Discover Potential New Scaffolds for Oncology
	11:00am - 11:30am	High Tea	
	11:30am - 12:30pm	Dr. Sandip Bharate CSIR-IIIM, Jammu	Virtual High Throughput Screening

			(vHTS) Approaches to Discover Potential New Scaffolds for Oncology
	12:30pm - 01:00pm	Dr. Puneet Kacker Accenture, Gurugram	Chemoinformatics: Technical Discussion
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 03:00pm	Dr. Puneet Kacker Accenture, Gurugram	Hands on: Chemoinformatics Tools
	03:00pm - 04:00pm	Technical Session Dr. Puneet Kacker Accenture, Gurugram	Machine Learning with Weka
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm	Dr. Puneet Kacker Accenture, Gurugram	Technical Discussion (Future Trends in Chemoinformatics)
04-04-2022 (Monday)	09:00am - 10:00am	Dr. Evans C. Coutinho BCP, Mumbai	Molecular dynamics simulation
	10:00am - 10:30am	Dr. Koushik Kasavajhala and Schrodinger team	1. Opening-Molecular Modelling Introductory Presentation
	10:30am - 10:45am	Dr. Koushik Kasavajhala and Schrodinger team	2. Logging into Cloud instance
	10:45am - 11:15am	Dr. Koushik Kasavajhala and Schrodinger team	3. Maestro GUI: Building Molecules and Enumeration
	11:15am - 11:30am	High Tea	
	11:30am - 12:00am	Dr. Koushik Kasavajhala and Schrodinger team	4. Ligand Preparation and ADME
	12:00am - 12:30pm	Dr. Koushik Kasavajhala and Schrodinger team	5. Protein Preparation
	12:30pm - 12:45pm	Dr. Koushik Kasavajhala and Schrodinger team	6. Binding Pocket Identification
	12:45pm - 01:00pm		Continue to use software
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 02:40pm	Dr. Koushik Kasavajhala and Schrodinger team	7. Molecular Docking
	02:40pm - 03:15pm	Dr. Koushik Kasavajhala and Schrodinger team	8. Molecular Docking Analysis 1 – Pose visualization and evaluation
	03:15pm - 03:45pm	Dr. Koushik Kasavajhala and Schrodinger team	9. Molecular Docking Analysis 2 – Ligand Interaction Diagram and Calculation of Interaction Fingerprints

	03:45pm - 04:00pm	Dr. Koushik Kasavajhala and Schrodinger team	Review Day 1 activities and Finish
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm	Dr. Koushik Kasavajhala and Schrodinger team	Continue to use software
05-04-2022 (Tuesday)	10:00am - 10:30am	Dr. Koushik Kasavajhala and Schrodinger team	1. Opening - Molecular dynamics theory presentation
	10:30am - 10:45am	Dr. Koushik Kasavajhala and Schrodinger team	2. Logging into cloud instance
	10:45am - 11:15am	Dr. Koushik Kasavajhala and Schrodinger team	3. Protein Preparation
	11:15am - 11:30am	High Tea	
	11:30am - 12:00am	Dr. Koushik Kasavajhala and Schrodinger team	4. Desmond Introduction and building your MD simulation system
	12:00am - 01:00pm	Dr. Koushik Kasavajhala and Schrodinger team	5. Desmond Molecular Dynamics Submission
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 02:40pm	Dr. Koushik Kasavajhala and Schrodinger team	6. Desmond Molecular Simulation Analysis 1- Visual Analysis
	02:40pm - 03:20pm	Dr. Koushik Kasavajhala and Schrodinger team	7. Desmond Molecular Simulation Analysis 2- Quantitative Analysis using Simulation Interaction Diagram
	03:20pm - 04:00pm	Dr. Koushik Kasavajhala and Schrodinger team	8. Organic Molecules Enumeration and ADME
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm	Dr. Koushik Kasavajhala and Schrodinger team	Review Day 2 Activities and Finish with Concluding Remarks
06-04-2022 (Wednesday)	10:00am - 10:30am	Dr. Koushik Kasavajhala and Schrodinger team	1. Opening – Homology Modelling presentation
	10:30am - 10:45am	Dr. Koushik Kasavajhala and Schrodinger team	2. Logging into cloud instance
	10:45am - 11:00am	Dr. Koushik Kasavajhala and Schrodinger team	3. Homology Modeling Demo and Hands-on
	11:00am - 11:15am	High Tea	
	11:15am - 11:45am	Dr. Koushik Kasavajhala and Schrodinger team	4. Ligand Based Drug Design-Pharmacophore Modelling

	11:45am - 12:25pm	Dr. Koushik Kasavajhala and Schrodinger team	5. Pharmacophore Modelling Demo and Hands-on
	12:25pm - 01:00pm	Dr. Koushik Kasavajhala and Schrodinger team	6. Shape Screening and Core Hopping
	01:00pm - 02:00pm		Lunch Break
	02:00pm - 03:00pm	Dr. Koushik Kasavajhala and Schrodinger team	7. Auto QSAR
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm	Dr. Koushik Kasavajhala and Schrodinger team	Review Day3 Activities and Finish with Concluding Remarks
07-04-2022 (Thursday)	10:00am - 11:00am	Dr. Durg Vijay Singh CUSB, Gaya, Bihar	Screening, ranking, and estimation of binding affinity of small molecules through virtual screening and docking studies
	11:00am - 11:30am	High Tea	
	11:30am - 12:30pm	Dr. Durg Vijay Singh CUSB, Gaya, Bihar	Molecular Docking using AutoDock -1 (Software installation and demonstration)
	12:30pm - 01:00pm	Dr. Durg Vijay Singh CUSB, Gaya, Bihar	Molecular Docking using AutoDock -2
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 03:00pm	Dr. Durg Vijay Singh CUSB, Gaya, Bihar	Molecular docking result interpretation
	03:00pm - 04:00pm	Dr. Lalitha Guruprasad UOH, Hyderabad	Fragment based drug discovery
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm	Dr. Lalitha Guruprasad UOH, Hyderabad	Fragment based drug discovery
08-04-2022 (Friday)	10:00am - 11:00am	Dr. Parthasarathi R CSIR-IITR, Lucknow	Toxicoinformatics: Predictive applications and databases
	11:00am - 11:30am	High Tea	
	11:30am - 12:30pm	Dr. Durg Vijay Singh CUSB, Gaya, Bihar	Conformational analysis of large molecule in drug discovery through molecular dynamics simulation

	12:30pm - 01:00pm	Dr. Durg Vijay Singh CUSB, Gaya, Bihar	MD simulation using Gromacs (software installation and demonstration)
	01:00pm - 02:00pm	Lunch Break	
	02:00pm - 03:00pm	Dr. Manish Kumar Gupta VBSPU, Jaunpur (U.P)	Integrated Network analysis to identify potential targets for drug repurposing.
	03:00pm - 04:00pm		Valedictory Function and Certificate Distribution
	04:00pm - 04:15pm	Tea Break	
	04:15pm - 05:15pm		Feedback from participants

Hands-on skill development training on advanced areas of life science and biotechnology for undergraduate and postgraduate faculty

Course Coordinator: Dr. K Srinivas Naik,
Centre for Plant Molecular Biology, Osmania University, Hyderabad

The Centre for Plant Molecular Biology, Osmania University, organized the Faculty Development program entitled "Hands-on skill development training in the advanced areas of life science and biotechnology for undergraduate and postgraduate faculty". The main objective of the program is to improve the quality of higher education in the advanced area of Plant Biotechnology, Bioinformatics and Medical Biotechnology.

The main focus of the program is to Strengthening theoretical and practical skills of teachers and researchers. The program is designed to learn advanced techniques of Plant Biotechnology, Bioinformatics and Medical Biotechnology besides updating the participants with the latest developments in the field like isolation of DNA, RNA and Proteins from plants, PCR and gel electrophoresis, SDS-PAGE and staining, Mammalian cell culture, development of multiple shoots and biomass production and exploring databases (Genbank, Uniprot). The program was of Two week and conducted during February 21 – March 05, 2022. A total of 20 faculty have participated in the program.

List of participants

S. No.	Name & Designation	Name of the College & Address	E-Mail ID & Mobile No.
1.	Dr. Samabshiva. Daravath Assistant Professor	Department of Biotechnology, Nizam College(A), Basheerbagh, Hyderabad, Telangana	shivabt07@gmail.com 7799387755
2.	Dr. Mahesh Damodhar Mahendrakar, Associate Scientist	International Crops Research Institute for the Semiarid Tropics (ICRISAT), India	mahendrakar.mahesh@gmail.com; & m.mahesh@cgiar.org +91 988 577 4740
3.	Dr. Mahender Aileni Assistant Professor	Dept. of Biotechnology, Telangana University, Nizamabad 503322	mahenderaileni@telanganauniversity.ac.in +91-9848705652
4.	Dr. A.K. Sudhavani Assistant Professor	Government City College (autonomous), Nayapul, Hyderabad	svaani65@gmail.com
5.	Dr. P. Rupa, Degree Lecturer in Botany	Telangana Social Welfare Residential Degree College for Women, Bhongir, Telangana	rupareddyputta@gmail.com 9441454669
6.	Dr. Chaitanya K. Senior Project Associate	IICT, Hyderabad	kchaitanya03@gmail.com 919341156789

7.	Dr. Kamala Golla, Assistant Professor	Department of Biochemistry, Bhavan's Vivekananda College, Sainikpuri, Sec-bad	kamala_arudra81@yahoo.com 9348949912
8.	Dr. Swapna Gandham Assistant Professor	Dept. of Biotechnology, Jahanavi Degree and PG College, Hyd.	drswapnagandham@gmail.com 8309463460
9.	Dr. Sirisha Chittala Associate Professor	Dean of Academics, PG and Associate Professor in Department of M.Sc. biotechnology, Loyola Academy, Degree and P.G. College,Alwal, Secunderabad	sirishachittala@gmail.com 9441420977
10.	Dr. K. Madhuri , Assistant Professor,	Department of Biotechnology, Mahatma Gandhi University, Nalgonda	madhuriphd09@yahoo.com 9000595973
11.	Dr. Chakrapani Pullagummi	Indian Immunologicals Limited	chakriscience79@gmail.com +91-9912929525; 7660943332
12.	Dr. Prem , Lecturer	Government Degree College, Gadwal	premgenetics@gmail.com 9966433830
13.	Mrs. P. Pushpalatha, Head Department of Biotechnology	Government City College (autonomous), Nayapul, Hyderabad	pagidi.pushpalatha@gmail.com 9398213974
14.	Ms. B. Sandhya Kumari Gupta, Assistant Professor	Department of Botany, Kasturba Gandhi Degree and PG college for Women, Secunderabad	sandhyars186@gmail.com 8886357535 / 8639532142
15.	Ms. Askani Bhargavi Zoology Faculty	TSWRDCW- Nalgonda	askanibhargavi@gmail.com 7032218188
16.	Ms. V.Rohini Assistant Professor	Government Degree college for Women Begumpet	rohini.biotech@gmail.com
17.	Ms. Swathi Bantu, Lecturer	Vagdevi PG College, Hanmakonda,	swathibantu09@gmail.com 7981723130, whatsapp no: 9704909579
18.	Ms. G. Reena Teaching Assistant	Savetha School of Engineering, Saveetha Institute of Medical and Technical Sciences, Naidupeta SPSR Nellore, A.P.	reenag22001.sse@saveetha.com 9618548793
19.	Ms. G. Jamuna Teaching Assistant	Saveetha Institute of Medical and Technical Sciences, Naidupeta SPSR Nellore, A.P.	jasmine3508@gmail.com 9043734480
20.	Ms. S. Yasodha Teaching Assistant	Saveetha Institute of Medical and Technical Sciences, Naidupeta SPSR Nellore, A.P.	yasodha.bt@gmail.com 9629391458

Course Contents

The training modules and course contents and Training Curriculum are chalked out as per the standards existing in the areas of biotechnology. Theory and practical sessions in the areas of Secondary Metabolites, Mammalian Cell culture techniques, drug activity, Transcriptome sequencing and analysis, Genome Sequencing and Annotation are discussed.

DATE	TOPIC	SPEAKER
21-02-2022	Engineering of onion for the production of neutraceutical resveratrol and chemical synthesis of its bioactive analogs using green chemistry	Prof. V D Reddy, Former Director, CPMB, OU
22-02-2022	Functional and Biochemical studies on plant cell wall degrading enzymes secreted by the rice pathogen *Xanthomonas oryzae* pv.*oryzae*	Dr. T. Lavanya, DST Inspire Faculty, CPMB, OU
23-02-2022	Secondary Metabolites	Dr. Sandeepta Burgula, Associate Professor & Head, Dept. of Microbiology, OU
24-02-2022	Methods for understanding human disease pathogenesis	Dr. A. Sandhya Assistant Prof., Dept. of Genetics, OU
25-02-2022	Basic Molecular Biology	Dr. K. Rama Krishna, UGC-Asst. Prof., CPMB, OU
26-02-2022	Mammalian Cell culture techniques	Dr. K. Rama Krishna
28-02-2022	Methods for understanding drug activity	Dr. Hameeda Bee Asso. Prof., Dept. of Microbiology , OU
02-03-2022	Basic concepts of bioinformatics starting from various types of bioinformatics data and databases.	Prof. K. Ulaganathan Former Director, CPMB, OU
03-03-2022	Transcriptome sequencing and analysis	Dr. Divya Bhanu, DST- Women Scientist, CPMB,OU
04-03-2022	Homology based database searching	Prof. K.Ulaganathan Former Director, CPMB, OU
05-03-2022	Genome Sequencing and Annotation	Dr. Latha Bhattu, UGC-BSR Fellow

DATE	PRACTICALS
21-02-2022	Micro propagation of elite valuable medicinal plants, Development of different culture systems (callus, adventitious roots)
22-02-2022	Development of multiple shoots and biomass production, Elicitation of in vitro culture systems for secondary metabolite production.
23-02-2022	Isolation of DNA, RNA and Proteins from plants, Genetic transformation technology and development of transgenic plants.
24-02-2022	PCR and gel electrophoresis
25-02-2022	Mammalian cell culture, cell counting, cell maintenance and storage of
26-02-2022	cells, Drug preparations and cell proliferation assays, Cell transfection, protein isolation and quantification
28-02-2022	SDS-PAGE and staining
02-03-2022	Exploring databases (Genbank, Uniprot) and database searching (Key word, Accession number based)
03-03-2022	Global and local Alignment of DNA and protein sequences
04-03-2022	Homology based database searching
05-03-2022	Gene finding in bacterial and plant genomes, SSR finding from plant genomes

Valedictory program held on 5th March, 2022

Faculty/Experts/ Resource persons

S. No.	Resource persons associated with the Programme
1.	Prof. V D Reddy, Former Director, CPMB, OU
2.	Dr. T. Lavanya, DST Inspire Faculty, CPMB, OU
3.	Dr. Sandeepta Burgula, Associate Prof. & Head, Dept. of Microbiology, OU
4.	Dr. A. Sandhya Assistant Professor, Department of Genetics, OU
5.	Dr. K. Rama Krishna, UGC-Assistant Professor, CPMB, OU
6.	Dr. Hameeda Bee Associate Professor, Department of Microbiology , OU
7.	Prof. K. Ulaganathan Former Director, CPMB, OU
8.	Dr. Divya Bhanu, DST- Women Scientist, CPMB,OU
9.	Prof. K.Ulaganathan Former Director, CPMB, OU
10.	Dr. Latha Bhattu, UGC-BSR Fellow

Dr. Ahmed Kamal, Consultant, DBT project - Interacting with the participants

Group Photo

ANNEXURE III

CENTRE FOR PLANT MOLECULAR BIOLOGY
OSMANIA UNIVERSITY, HYDERABAD

DBT Skill Vigyan Program : Faculty Training Program
(Sponsored by DBT-TSCOST)

This is to certify that *Dr./Mr/Ms.* _____
participated in DBT-TSCOST Sponsored "Hands-on skill development training on advanced areas of life sciences and biotechnology for undergraduate and postgraduate faculty" during February 21 – March 05, 2022 at Centre for Plant Molecular Biology, Osmania University, Hyderabad

Date:05.03.2022

Dr. K. SRINIVAS NAIK
(DIRECTOR & PROGRAM CO-ORDINATOR)

Animal Cell Line technology

Course Coordinator:Dr.A.Uma and Dr.L.Saida
Jawaharlal Nehru Technological University, Hyderabad

Animal Cell line Technology is an indispensible tool in the area of life sciences research which supports 3R concept (reduce, refine, replace). Several biotechnological and pharmaceutical products are being produced at the commercial scale using animal cell lines. The objective of the program is to train the faculty in the area of Animal cell line technology. The Faculty are trained in the area of Animal cell line technology so that these trainers can train the other faculty and students in their respective institutions. The Layout of the cell culture laboratory, Designing mammalian cell culture medium, Routine maintenance of cell cultures, Separation of viable cells from explants culture, Cell counting & viability assay, Cryopreservation of cells were discussed. The program was conducted during March 7th-17th, 2022 and (14) faculty have participated. The applications received in response to the notification were screened and faculty applicants from various institutions in the relevant area of life sciences and chemistry were selected.

The sessions were divided into two portions. In the morning hours Class room theory teaching was conducted and in the afternoon sessions experimental work was conducted. Smart board teaching was carried out. The participants were advised to follow covid norms. The experts for lectures were drawn from various organisations in addition to the internal faculty. The study material/hand outs were provided to all the participants. Examination was conducted on the last day of the schedule and certificates were issued to the participants. Feedback was taken from the participants.

List of participants / Beneficiaries with qualifications

S.No	Name of the Faculty with Designation	Home Institute / Organization Name and Place	Phone No. & eMail Id
1	Dr. K. Ashwitha Lecturer	MNR Degree & PG College, Hyderabad	(M)9949092090 ashwithamnr@gmail.com
2	Syeda Sughra Mahjabeen Associate Professor	Nizam Institute of Pharmacy, Yadadri	(M)9703847329 ssmahj@gmail.com
3	Dr. Rambabu Gundla Professor	GITAM (deemed to be University),Rudraram(v)	(M)9849869933 rgundla@gitam.edu
4	Dr. BF Mathews Assistant Professor(c)	JNTUH, Hyderabad	(M)9885264740 mathewsmsc@gmail.com
5	Dr. Bijaya Ketan Sahoo Asst. Professor	GITAM (deemed to be University),Rudraram(v)	(M)9542302557 bsahoo@gitam.edu
6	Dr. P. Ranjit Assistant Professor(c)	JNTUH, Hyderabad	(M)9985289499 ranjit333@gmail.com
7	Mrs. R. Sheetal Lecturer	MNR Degree & PG College, Hyderabad	(M)8919653429 sheetal.rokandla@gmail.com
8	Mr. M.S. Sandeep Veda Narayana Assistant Professor(c)	JNTU, Kakinada	(M)7036789173 sandeep35startsnewlife@gmail.com
9	Dr. T. Jeevitha Lecturer	MNR Degree & PG College, Hyderabad	(M)9791759105 jeevithathangaraj@gmail.com

10	Dr. B.Suresh Babu Assistant Professor(c)	JNTUH, Hyderabad	(M)8074100513 bastipati@gmail.com
11	Mrs. T.Navya Kumari Lecturer	GITAM (deemed to be University),Rudraram(v)	(M)9703532931 ntenkaya@gitam.edu
12	Dr. K. Venkateswar Reddy Assistant Professor(c)	JNTUH, Hyderabad	(M)8977375801 vkvenkat07@gmail.com
13	Dr. B. Venkanna Assistant Professor(c)	JNTUH, Hyderabad	(M)9505459857 venky.bt@gmail.com
14	Dr. Sandhya Rani Assistant Professor(c)	CPS, IST, JNTUH	(M)9848061213 sandhyampharmphd@gmail.com

List of Faculty/Experts/ Resource persons associated with the program

S.No.	Name of the Faculty	Designation	Home Institute / Organization Name and Place	Email Id	Phone number
1.	Dr. A. Uma	Asso. Prof.	CBT, IST, JNTU	Vedavathi1@jntuh.ac.in	9848120819
2.	Dr. G. Madhavi	DST-INSPIRE FACULTY	CBT, IST, JNTU	Madhavigorla14@gmail.com	9347063301
3.	Dr. Sayed Sulthan Beevi	Principal Scientist	KFRC, KIMS	sayeedamaricar@gmail.com	9440761275
4.	Dr. Anjaneyulu Musini	Asst. Professor	CBT, IST, JNTUH	anjigen@gmail.com	8008415285
5.	Mrs. Suvarna Lakshmi	Sr. Manager	Procell Biologics	Suvarna.bio@gmail.com	7013312533
6.	Dr. L. Saida	Asst. Professor	CBT, IST, JNTUH	lavudisaida@jntuh.ac.in	9618528040
7.	Dr. Ch. Kalyani	Asst. Professor	CBT, IST, JNTUH	kalyanichepuri@gmail.com	9949234486
8.	Mr. D. Manikantha	Research Assistant	Sunshine Medical Academy	Dmanikanta0@gmail.com	9848164434

List of training modules and course contents (both lectures and hands on sessions) and Training Curriculum:

NO. OF DAYS: 2 weeks @ 5 working days per week
TOTAL NO. OF HOURS – 60 hours (2+4 hrs per day)

MODULE – I	**Basics of animal cell culture**	No. of days: 10 days Total no. of hours – 60 hrs
CHAPTER – 1	**Layout of the cell culture laboratory**	No. of days : 1
	• Standard Operating Procedures for preventing contamination • Biological safety cabinets: understanding the different classes • importance of Ultra-pure water, centrifugation and optimum cold storage in cell culture	Total no. of hours – 2 (theory)
	• Designing of animal cell culture lab • Standard Operating Procedures for equipment maintenance • Standard Operating Procedures for preventing contamination	Total no. of hours – 4 (lab)
CHAPTER – 2	**Choosing right surface for cell cultures**	No. of days: 1
•	• Selecting cell culture vessels, ; importance of treatment and feeder layers	• Total no. of hours – • 1 (theory)
	• Selecting cell culture vessels- types, treatment and usage	Total no. of hours – 2 (lab)
CHAPTER – 3	**Designing mammalian cell culture medium**	No. of days: 1
	• PBS and Media formulations • Understanding the basics of FBS	Total no. of hours – 1 (theory)
	• Media formulation and sterilization • PBS, Antibiotics preparation and sterilization	Total no. of hours – 2 (lab)
CHAPTER – 4	**Different cell culture types & Procurement of cells**	No. of days: 1
	• Monolayer, Suspension, Primary and established cell culture systems • Cell banks worldwide and the procurement processing	Total no. of hours – 2 (theory)
	• Cell line revival	Total no. of hours – 4 (lab)
CHAPTER – 5	**Critical consideration of incubation parameters**	No. of days: 1
	• Significance of pH, Temperature, Humidity, O_2 and CO_2 levels, Osmolarity and Viscosity	Total no. of hours – 2 (theory)

	• Optimisation of incubation parameters	Total no. of hours – 4 (lab)
CHAPTER – 6	**Checklist for ensuring cell health**	No. of days: 1
	• Sources, types (bacterial, fungal, mycoplasam), detection & eradication • Disposal of contaminated cultures • Cross contamination • Replacement of spent medium	Total no. of hours – 2 (theory)
	• Contamination detection • Containment of contaminated material • Cross contamination and prevention	Total no. of hours – 4 (lab)
CHAPTER – 7	**Routine maintenance of cell cultures**	No. of days: 1
	• Methods - usage and disadvantages • Precautions to be taken for handling of cell lines during disaggregation	Total no. of hours – 2 (theory)
	• Replacement of spent media • Morphological study and Microscopic observation of cells	Total no. of hours – 4 (lab)
CHAPTER – 8	**Passaging**	No. of days: 1
	• Measuring the Confluency & split ratio consideration for adherent and suspension culture • Cell disruption • Maintenance of records, for finite and continuous cell lines	Total no. of hours – 2 (theory)
	• Cell disruption techniques • Subculturing of cells	Total no. of hours – 4 (lab)
CHAPTER – 9	**Growth cycle**	No. of days: 1
	• Growth phases & growth cycle test	Total no. of hrs – 2(theory)
	• Growth cycle	Total no. of hours – 4 (lab)
CHAPTER– 10	**Cell counting & viability assay**	No. of days: 1
	• Haemocytometer • Trypan blue dye exclusion method	Total no. of hrs – 2(theory)
	• Cell counting • Cell viability Assay	Total no. of hours – 4 (lab)
CHAPTER– 11	**Cryopreservation best practices & Revival of cells**	No. of days: 1
	• Methods of preservation • Freezing medium & freezing rate. • Factors for consideration • Thawing • Transportation of frozen cells & revived culture • Revival procedure of cells	Total no. of hours – 2 (theory)
	• Cryopreservation of cell lines • Revival of preserved cell lines	Total no. of hours – 4 (lab)

Schedule of Training Program

Date	Title Name	Time	Name of the Speaker
07-03-2022	Introduction to animal cell line technology	**10.00-11.30 AM**	**Dr.A.Uma**
	Safety, Bioethics, and Validation	**11.45 am-1.15 PM**	**Dr.G.Madhavi**
	Designing of animal cell culture lab & SOPs	**2.00PM-3.30 PM**	**Dr.A.Uma**
	PBS and growth medium preparation	**3.45PM-5.15 PM**	**Dr.L.Saida**
08-3-2022	Choosing the right surface for cell culture	**10.00-11.30 AM**	**Dr.G.Madhavi**
	Designing cell culture medium; Preparation and sterilization	**11.45 am-1.15 PM**	**Dr. Anjaneyulu Musini**
	Revival of adherent cells	**2.00PM-3.30 PM**	**Dr.A.Uma**
	Counting and seeding the viable cells	**3.45PM-5.15 PM**	**Dr.Ch.Kalyani**
09-03-2022	Cell culture types; Organ culture, Organotypic cultures and histotypic cultures: Advantages and Limitations	**10.00-11.30 AM**	**Dr.G.Madhavi**
	Established cell lines; Immortalization techniques	**11.45 am-1.15 PM**	**Dr.G.Madhavi**
	Monitoring the adherent cells for contamination	**2.00PM-3.30 PM**	**Mrs.Suvarna Lakshmi**
	Washing cells and spent medium removal	**3.45PM-5.15 PM**	**Mrs.Suvarna Lakshmi**
10-03-2022	Layout of the cell culture laboratory	**10.00-11.30 AM**	**Dr. Sayed Sulthan Beevi**
	Critical considerations of incubation parameters; Contamination issues; Detection and evading contamination	**11.45 am-1.15 PM**	**Dr. Sayed Sulthan Beevi**
	Measuring Confluency and sub culturing cells; split ration calculations	**2.00PM-3.30 PM**	**Dr.Ch.Kalyani**
	Measuring Confluency and sub culturing cells; split ration calculations	**3.45PM-5.15 PM**	**Dr. Sayed Sulthan Beevi**
11-03-2022	Cytotoxicity and method to measure cytotoxicity	**10.00-11.30 AM**	**Dr. Anjaneyulu Musini**
	Bioreactor design for animal cells and types	**11.45 am-1.15 PM**	**Dr.Ch.Kalyani**

	Preservation of cells	**2.00PM-3.30 PM**	**Dr.G.Madhavi**
	Preservation of cells	**3.45PM-5.15 PM**	**Dr.A.Uma**
12-03-2022	Different cell culture types & Procurement of cells	**10.00-11.30 AM**	**Mrs.Suvarna Lakshmi**
	Primary culture	**11.45 am-1.15 PM**	**Mrs.Suvarna Lakshmi**
	Isolation of fresh blood lymphocytes & counting the viable cells	**2.00PM-3.30 PM**	**Dr.Ch.Kalyani**
	Isolation of fresh blood lymphocytes & counting the viable cells	**3.45PM-5.15 PM**	**Dr.A.Uma**
14-03-2022	Scale-Up	**10.00-11.30 AM**	**Dr.L.Saida**
	Seeding the cells onto 12 well plates for MTT assay	**11.45 am-1.15 PM**	**Dr.Ch.Kalyani**
	Seeding the cells onto 12 well plates for MTT assay	**2.00PM-3.30 PM**	**Dr.G.Madhavi**
	Seeding the cells onto 12 well plates for MTT assay	**3.45PM-5.15 PM**	**Dr. Anjaneyulu Musini**
15-03-2022	Treating the cells with drugs for evaluating the cytotoxicity	**10.00-11.30 AM**	**Dr. Anjaneyulu Musini**
	Treating the cells with drugs for evaluating the cytotoxicity	**11.45 am-1.15 PM**	**Dr.L.Saida**
	Treating the cells with drugs for evaluating the wound healing capacity	**2.00PM-3.30 PM**	**Dr.L.Saida**
	Treating the cells with drugs for evaluating the wound healing capacity	**3.45PM-5.15 PM**	**Dr. Anjaneyulu Musini**
16-03-2022	Evaluating the cytotoxicity by MTT assay	**10.00-11.30 AM**	**Dr.Ch.Kalyani**
	Evaluating the cytotoxicity by MTT assay	**11.45 am-1.15 PM**	**Dr. Anjaneyulu Musini**
	Evaluating the wound healing rate after 24 hrs of treatment	**2.00PM-3.30 PM**	**Dr.G.Madhavi**
	Evaluating the wound healing rate after 24 hrs of treatment	**3.45PM-5.15 PM**	**Dr.L.Saida**
17-03-2022	Percentage cell viability calculations; IC50 concentration; Calculating wound healing rate	**10.00-11.30 AM**	**Dr.A.Uma**
	Feedback	**11.45 am-1.15 PM**	**Dr.A.Uma**
	Exam & Certificate distribution	**2.00PM-3.30 PM**	**Dr.L.Saida**
	Valedictory	**3.45PM-5.15 PM**	**Dr.A.Uma & Dr.L.Saida**

Faculty Development program on Animal Cell Line technology

INDEX

1. Arrangement of Laminar air flow unit (LAFU)

- Wear lab-coat, gloves, haircap, show cover and mask
- Switch ON the UV for 15min prior to use
- Sterilize your hands with 70% IPA till elbow
- Open the laminar hood and sterilize the surface with IPA in top to bottom direction
- Arrange the laminar hood properly by placing discard items and routinely used items separately
- Wipe with IPA and keep growth medium, PBS and any other glass ware/tip boxes etc. into the LAFU

2. PBS preparation (For 250 ml)

- Weigh the following and add into 500ml beaker
    - Sodium Chloride (NaCl) – 2 grams
    - Potassium Chloride (KCl) – 50 mg
    - Sodium Hydrogen Phosphate ($Na_2HPO_4.2H_2O$) – 450 mg
    - Potassium dihydrogen Phosphate (KH_2PO_4) – 60 mg

- Make up the volume to 250ml with Autoclaved water
- Sterilize the prepared PBS using autoclave

3. Preparation of Growth medium (For 100 ml)

- Take a 100 ml Graduated bottle
- Add 10% Foetal Bovine Serum (i.e 10 ml for 100 ml)
- Add Penicillin & Streptomycin (1ml)
- Make up to the 100ml with medium (RPMI/DMEM)

Penicillin & Streptomycin

Penicillin G Potassium Salt	**Streptomycin Sulphate**
100mg ------- 10ml	250mg ------- 10ml
10mg/ml (15900 IU)- Stock	25mg/ml - Stock
6mg/ml – Working concentration	10mg/ml - Working

For 1 ml – 0.6 ml Pen. & 0.4 ml Stp.
For 20 ml – 120 mg (12 ml) Pen. & 200 mg (8 ml) Stp.
in autoclaved water and filter sterilize.

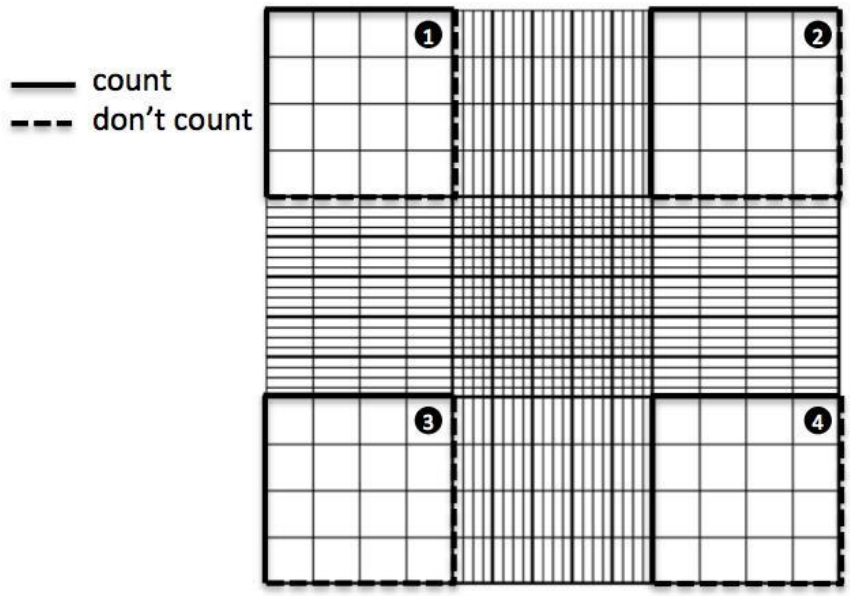
4. Revival of frozen cells (for adherent/suspension cultures)

- Arrange the LAFU
- Transfer 3 ml of Growth medium into a 15 ml centrifuge tube
- Remove ampule of cells from liquid nitrogen storage wearing appropriate protective equipment and transfer to laboratory work space in a sealed container
- Remove ampule from container and place in water bath at temperature appropriate for cell line (37°C) for about 1-2 minutes, immediate thawing is required
- Wipe ampule with 70% IPA and place in LAFU
- Transfer the content of the ampule into 15ml centrifuge tube containing growth medium in a drop wise manner to dilute out DMSO
- Centrifuge at 1000rpm for 5 min, decant the medium and suspend the pellet in 2 ml of fresh culture medium
- Flush out the cell aggregate by gentle repeated pipetting, transfer the content to a T_{25}-flask and add 5 ml of fresh medium.
- Check the viability of cells using trypan blue
- Observe the cells under microscope and place them in an incubator. (Incubator Conditions: T-37ºC, 5% CO2, 100% Relative Humidity)
- Examine the cells after 24 hours microscopically

5. Counting the Viable Cells

- Collect 100-200µl of culture sample to perform a cell count
- To 100 µl of cell suspension, add 900 µl of 0.4% trypan blue solution
- Mix the content gently and charge into the chambers of hemocytometer
- Count the cells under microscope
- The cell density was estimated by considering the formula.

$$Cells/ml = Average\ number\ of\ cells\ X\ Dilution\ factor X\ 10^4$$



6. Medium Change

Adherent culture:

- Observe the cells under microscope
- Arrange the LAFU
- Decant spent media into discard beaker
- Wash the cell layer two times with PBS and once with growth media
- Add required amount of fresh media into flask
- Incubate at an appropriate condition

Suspension culture:

- Observe the cells under microscope
- Arrange the LAFU
- Transfer the cells along with media into 15ml centrifuge tube
- Centrifuge for 5min at 1500rpm
- Discard the supernatant
- Add 2ml of PBS to the pellet and mix properly
- Centrifuge at 1500rpm for 5min
- Discard the supernatant
- Add 1ml of growth medium to the pellet and mix well
- Transfer the contents to the T25 flask and add remaining 4ml fresh growth medium

7. Subculture/Passaging

Adherent cultures:

- Observe the cells using inverted microscope to assess the degree of confluency and confirm the absence of bacterial and fungal contaminants
- Remove the spent media, wash with PBS twice, using a volume equivalent to half the volume of culture medium
- Ensure for proper wash with PBS to remove the components of media
- Add Trypsin-versene to the washed cell monolayer, rotate to cover the monolayer with trypsin (Take the volume to be sufficient to cover the bottom surface of the flask)
- Return the flask to the incubator for 2-5 minutes
- Examine the using microscope to ensure that all cells are detached and floating
- Resuspend cells in a small volume of fresh serum containing medium to inactivate the trypsin
- Collect 100-200µl of culture sample to perform a cell count
- Transfer required number of cells to a new labelled petri dish/flask containing growth medium
- Incubate as appropriate for the cell line (incubator conditions: T-37ºC, 5% CO_2, and 100% Relative Humidity)

Suspension cultures:

- Observe the cells using inverted microscope to assess the degree of confluency and confirm the absence of bacterial and fungal contaminants
- Remove the spent medium by centrifugation (1500rpm for 5 min)
- Wash the cells with PBS twice using centrifugation
- Resuspend cells in small volume of growth medium
- Collect 100-200µl of culture sample to perform a cell count

- Transfer required number of cells to a new labelled petri dish/flask containing growth medium
- Incubate as appropriate for the cell line (incubator conditions: T-37ºC, 5% CO2, and 100% Relative Humidity)

8. Cryopreservation

- Observe the cells using inverted microscope to assess the degree of confluency and confirm the absence of bacterial and fungal contaminants
- Perform as per sub culturing schedule (refer protocol 7)
- Remove small aliquot of cells and perform a cell count
- Ideally the cell viability should be in excess of 90% in order to achieve a good recovery after freezing
- Approximately calculate the volume of cellular content and add DMSO to the cell suspension at the concentration of 10%
- Pipette out 1 ml aliquots of cells into cryovials, labeled with cell line name, passage number and cell concentration and date
- Place the ampules inside a passive freezer, which is filled with isopropyl alcohol and placed at -70ºc overnight
    - Transfer the frozen ampules to the vapor phase of a liquid nitrogen storage vessel and record the locations

9. Isolation of Blood Lymphocytes

- Collect 2 ml of fresh human blood in EDTA coated tube
- Take 2 ml of histopaque in 15 ml centrifuge tube
- Layer 2 ml of blood on to histopaque carefully
- Centrifuge at 400g (1500 RPM) for 30 min
- Remove the upper transparent layer (plasma)
- Collect the precipitate layer (lymphocytes) slowly with pasteur pipette and add into new tube
- Add 10 ml PBS and mix it well
- Centrifuge at 1200 RPM for 10 minutes and discard the supernatant
- Wash the pellet again with 5 ml PBS
- Wash the pellet with 5 ml Growth medium
- Pellet resuspended in 5 ml Growth medium
- Transfer it into new flask
- Check the viability of cells using trypan blue (refer protocol 5)

10. Evaluation of Cytotoxicity by MTT (12 Well plate)

- Seed the adherent cells at a density of 2×10^4 cells/well into treated 12 well plates and incubate overnight (Cells to be detached from substratum using trypsin) (protocol 7)
- At 80% confluence, treat the cells with increasing concentrations of drugs/extracts
- Place the plates in the CO_2 incubator for specified time based on research plan (24h/48 h/72 h /96 h)
- After incubation period, discard the spent media from all the wells
- Wash all the wells with 500 µl PBS
- Add 500 µl of 0.1mg/ml MTT into each well
- Incubate it for 1-4 hours at 37ºC
- Discard MTT from all the wells
- Add 500 µl DMSO into each well

- Take the OD values at 540nm
- Represent the data as percent post treatment recovery (% live cells), whereas the absorbance from untreated control cells as 100% live cells.
- The general formula used for estimating the percentage viable cells

$$\%\ Cell\ Viability = O.D\ of\ \frac{treated\ cells}{untreated\ cells} X\ 100$$

- The IC_{50} concentrations can be interpolated from the graph by plotting % cell viability on Y axis against concentration on X axis.

11. Evaluation of Wound healing capacity (12 Well plate)

- Seed the adherent cells at a density of 2×10^4 cells/well into treated 12 well plates and incubate overnight (Cells to be detached from substratum using trypsin) (refer protocol 7)
- At 80% confluence, treat the cells with increasing concentrations of drugs/extracts
- Using 200µl tip create a wound by drawing a straight-line carefully.
- Observe the wounds in all wells including control under microscope and take the photomicrographs at 100X
- Place the plates in the CO_2 incubator for specified time based on research plan (24h/48 h /72 h /96 h)
- After incubation time, observe the wells under microscope and take the photomicrographs at 100X.
- Calculate the percentage wound healing rate by comparing with control


CENTRE FOR BIOTECHNOLOGY
INSTITUTE OF SCIENCE AND TECHNOLOGY
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
(Established by Govt. Act No. 30 of 2008)
Kukatpally, Hyderabad – 500 085, Telangana State (India)
TSCOST-DBT skill vigyan progam : Faculty Training Program (Sponsored by TSCOST)
This is to certify that .....participated in faculty training program sponsored under TSCOST-DBT skill vigyan progam on "Animal Cell Line Technology" during March 7th – 17th , 2022 at Centre for Biotechnology, IST, Jawaharlal Nehru Technological University Hyderabad.
Date: 17.03.2022
PROGRAM CO-ORDINATOR
PROGRAM CO-ORDINATOR & HEAD
DIRECTOR

Entrepreneurship Development Program
Course Coordinator : Prof. M Mamatha,
Forest College and Research Institute, Mulugu

Introduction

The aim of this program is to enhance the knowledge and entrepreneur skills on Nursery, Vermicompost and Honeybee production techniques. Following are the primary and secondary goals.

Primary Goals

- To help in the rapid growth of the Economy by Supplying Skilled Entrepreneurs.
- Aims at self-employment to the young generation.
- Develop and strengthen entrepreneurial quality in Nursery development.
- To analyze Environmental setup relating to small industry and promoting it.
- Removing Unemployment.

Advertisement and selection of students:

Advertisement for EDP student selection: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442/22

GOVERNMENT OF TELANGANA
TELANGANA SOCIAL WELFARE RESIDENTIAL EDUCATIONAL INSTITUTIONS SOCIETY, DSS Bhavan, Massabtank, Hyderabad.

ADMISSION NOTIFICATION - 2022-23
for ADMISSIONS INTO CLASS - VI & 1st YEAR INTERMEDIATE (MPC) IN TSWR SAINIK SCHOOL (CBSE:BOYS), RUKMAPUR, KARIMNAGAR DISTRICT

TSWREI Society invites online applications from candidates for admissions into Class - VI and 1st year Intermediate (MPC) in TSWR Sainik School (CBSE:BOYS) Rukmapur, Karimnagar District for the academic year 2022-23. Candidates can apply online through www.tswreis.ac.in from 03.03.2022 onwards. Last Date to apply: 21.03.2022. Candidates can download their Hall-Tickets from 23.03.2022 through www.tswreis.ac.in. Date of Entrance Examination: 27.03.2022. For further details please contact Society's Toll Free No.18004345678.

Sd/- D.Renald Rose, I.A.S.,
R.O. No. : 2769-PP/CL-AGENCY/ADVT/1/2021-22 Secretary, TSWREIS, Hyderabad.

GOVERNMENT OF TELANGANA
FOREST COLLEGE AND RESEARCH INSTITUTE
(Accredited by ICFRE with A+ Grade)
PROJECT:: ENTREPRENEURSHIP DEVELOPMENT PROGRAM

Hyderabad & Mulugu, Siddipet District, T.S.-502279. e-Mail: edpfcri@gmail.com, Website: www.fcrits.in

O/o the Forest College and Research Institute, Hyderabad at Mulugu, Siddipet District.
Rc.No. 133/EDP/A3/2022. NOTICE Dated:- 28-02-2022.

Online applications are invited from eligible candidates for Entrepreneurship Development Program Project at Forest College and Research Institute, Hyderabad at Mulugu. Website: www.fcrits.in, E-mail: edpfcri@gmail.com. Contact: 96888 29580. Date of Release Notification: 01-03-2022 at 10:00 A.M. Last date of Notification: 07-03-2022 at 05:00 P.M

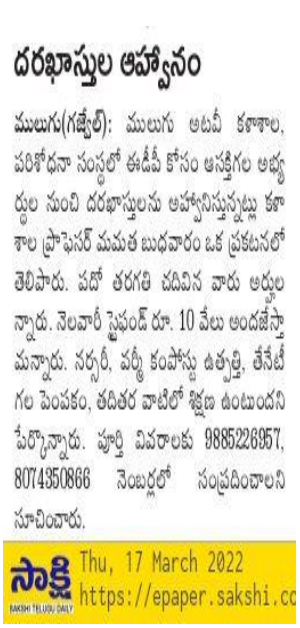
R.O. No. : 1135-DP/CL-AGENCY/ADVT/1/2021-22 Sd/- Deputy Director, FCRI, Hyderabad at Mulugu.

GOVERNMENT OF TELANGANA
PANCHAYAT RAJ ENGINEERING DEPARTMENT
Officer of the Superintending Engineer, P.R.Khammam.

e-Procurement Tender Notice

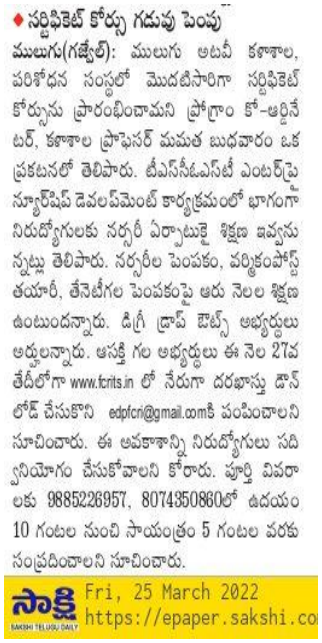
Online tenders are invited for the NIT No.18/E2021-22 (2nd Call) dt: 28-02-2022 from the eligible registered contractors for one work in Lavnidevipally Mandal of Bhadradri Kothagudem District sanctioned under CSR with an estimate cost Rs.200.00 Lakhs. Description of items, E.C.V, EMD, availability of tender documents, important dates, tender conditions, eligibility of tender and all other details are available from 03-03-2022 on https://tender.telangana.gov.in. The last date for online tender is 10-03-2022. Sd/- Superintending Engineer,

R.O. No. : 1133-DP/CL-AGENCY/ADVT/1/2021-22 P.R.Khammam


దరఖాస్తుల ఆహ్వానం

ములుగు(గజ్వేల్): ములుగు అటవీ కళాశాల, పరిశోధనా సంస్థలో ఈడీపీ కోసం ఆసక్తిగల అభ్యర్థుల నుంచి దరఖాస్తులను ఆహ్వానిస్తున్నట్లు కళాశాల ప్రొఫెసర్ మమత బుధవారం ఒక ప్రకటనలో తెలిపారు. పదో తరగతి చదివిన వారు అర్హులన్నారు. నెలవారీ స్టైపెండ్ రూ. 10 వేలు అందజేస్తామన్నారు. నర్సరీ, వర్మీ కంపోస్టు ఉత్పత్తి, తేనెటీగల పెంపకం, తదితర వాటిలో శిక్షణ ఉంటుందని పేర్కొన్నారు. పూర్తి వివరాలకు 9885226957, 8074350866 నెంబర్లలో సంప్రదించాలని సూచించారు.

సాక్షి Thu, 17 March 2022 https://epaper.sakshi.co


♦ సర్టిఫికెట్ కోర్సు గడువు పెంపు

ములుగు(గజ్వేల్): ములుగు అటవీ కళాశాల, పరిశోధన సంస్థలో మొదటిసారిగా సర్టిఫికెట్ కోర్సును ప్రారంభించామని ప్రోగ్రాం కో-ఆర్డినేటర్, కళాశాల ప్రొఫెసర్ మమత బుధవారం ఒక ప్రకటనలో తెలిపారు. టీఎస్‌సీఓఎస్‌టీ ఎంటర్‌ప్రెన్యూర్‌షిప్ డెవలప్‌మెంట్ కార్యక్రమంలో భాగంగా నిరుద్యోగులకు నర్సరీ ఏర్పాటుపై శిక్షణ ఇవ్వనున్నట్లు తెలిపారు. నర్సరీల పెంపకం, వర్మికంపోస్ట్ తయారీ, తేనెటీగల పెంపకంపై ఆరు నెలల శిక్షణ ఉంటుందన్నారు. డిగ్రీ డ్రాప్ ఔట్స్ అభ్యర్థులు అర్హులన్నారు. ఆసక్తి గల అభ్యర్థులు ఈ నెల 21వ తేదీలోగా www.fcrits.in లో నేరుగా దరఖాస్తు డౌన్‌లోడ్ చేసుకొని edpfcri@gmail.comకి పంపించాలని సూచించారు. ఈ అవకాశాన్ని నిరుద్యోగులు సద్వినియోగం చేసుకోవాలని కోరారు. పూర్తి వివరాలకు 9885226957, 8074350860లో ఉదయం 10 గంటల నుంచి సాయంత్రం 5 గంటల వరకు సంప్రదించాలని సూచించారు.

సాక్షి Fri, 25 March 2022 https://epaper.sakshi.co

Inauguration of EDP on 31-03-2022

Schedule of EDP Program: At Forest college and Research Institute (FCRI), Mulugu, Theory and Practical classes were conducted for 2 months i.e., form April 1st to May 31st (both Morning and Afternoon sessions).

Syllabus:

NURSERY TECHNOLOGY
(Gardner cum nursery trainer)

Day 1	**Topic: Scope of nursery raising (Total 4.5 hours)**	
	Theory (1.5 hours)	Introduction to nursery management, Role of a nursery mana ger, Kinds of nursery and their utility
	Practical (3 hours)	Field visit for tree nursery at Centre for agroforestry Research and Extension service, Mulugu.
Day 2	**Topic: Location and layout of nursery (Total 4.5 hours)**	
	Theory (1.5 hours)	Nursery location, Nursery layout, required nursery infrastructure
	Practical (3 hours)	preparing a check list for finalizing a location for nursery, preparing a layout with all required infrastructure
Day 3	**Topic: Introduction to various planting materials (Total 4.5 hours)**	
	Theory (1.5 hours)	Introduction seed, Vegetative propagation
	Practical (3 hours)	Cleaning of seed, Grading of seed, Storage of seed in different containers
Day 4	**Topic: Tools and implements used in Nursery raising (Total 4.5 hours)**	

	Theory (1.5 hours)	Introducing basic hand tools, introducing power tools, implements and machinery used in nursery raising
	Practical (3 hours)	Use of tools and implements in nursery practice.
Day 5	**Topic: Nursery primary bed preparation (Total 4.5 hours)**	
	Theory (1.5 hours)	Kinds of nursery beds, Preparation of nursery beds, Sterilization and maintenance of primary beds
	Practical (3 hours)	Preparation of potting mixture for nursery primary bed, Preparation of nursery bed
Day 6	**Topic: Containers (Total 4.5 hours)**	
	Theory (1.5 hours)	Introduction to various kinds of plant containers, Estimation of quantity of ploy bags required.
	Practical (3 hours)	To be familiarized with various nursery containers, calculating quantity of ploy bags pertaining to different sizes for raising one lakh seedlings nursery
Day 7	**Topic: Plant propagation through seed (Total 4.5 hours)**	
	Theory (1.5 hours)	Seed purity, Seed viability
	Practical (3 hours)	Assessment of seed purity, Assessment of seed viability using TZT (Tetrazolium test)
Day 8	**Topic: Seed germination (Total 4.5 hours)**	
	Theory (1.5 hours)	Factors effecting seed germination, Seed dormancy
	Practical (3 hours)	Pre-sowing treatment using soaking in water at room temperature, Pre-sowing treatment using GA3
Day 9	**Topic: Seed Dormancy (Total 4.5 hours)**	
	Theory (1.5 hours)	Kinds of seed dormancy, Methods of breaking seed dormancy
	Practical (3 hours)	Pre-sowing treatment of seeds using Conc. H2SO4, Pre-sowing treatment using boiling water
Day 10	**Topic: Vegetative propagation (Total 4.5 hours)**	
	Theory (1.5 hours)	Cuttings, Grafting, Budding
	Practical (3 hours)	Preparation of stem cuttings, Preparation of leaf cuttings
Day 11	**Topic: Grafting techniques (Total 4.5 hours)**	
	Theory (1.5 hours)	Approach grafting, Whip and Tongue grafting, Saddle grafting, Side-Veneer grafting, Splice grafting
	Practical (3 hours)	Practicing different grafting techniques
Day 12	**Topic: Bud grafting techniques (Total 4.5 hours)**	
	Theory (1.5 hours)	Chip budding, T budding, Inverted T budding, Patch budding, Flute and ring budding, I budding
	Practical (3 hours)	Practicing different bud grafting techniques
Day 13	**Topic: Sowing techniques (Total 4.5 hours)**	
	Theory (1.5 hours)	Seed sowing in primary beds, Types of sowing
	Practical (3 hours)	Sowing of seeds in primary beds after treatment, Watering of primary beds
Day 14	**Topic: Growth hormones used in plant propagation (Total 4.5 hours)**	
	Theory (1.5 hours)	Auxins, Cytokinins, Ethylene, Abscisic acid
	Practical (3 hours)	Preparation of various growth hormones
Day 15	**Topic: Irrigation (Total 4.5 hours)**	
	Theory (1.5 hours)	Different kinds of irrigation, Irrigation schedule
	Practical (3 hours)	Assembling drip irrigation, Irrigation by sprinklers, Irrigation by rose cans
Day 16	**Topic: Fertilization (Total 4.5 hours)**	

	Theory (1.5 hours)	Organic fertilizers, Inorganic fertilizers, Fertilization schedule
	Practical (3 hours)	Application of organic fertilizers, Application of inorganic fertilizers
Day 17	**Topic: Bio fertilizers (Total 4.5 hours)**	
	Theory (1.5 hours)	Introduction to bio fertilizers
	Practical (3 hours)	Visit to vermin compost unit, Preparation of compost, Propagation of Azolla
Day 18	**Topic: Post seed germination care and maintained (Total 4.5 hours)**	
	Theory (1.5 hours)	Care for new germinants in primary beds
	Practical (3 hours)	Pricking out activity from nursery beds, Transplanting in 6 x 8 poly bags, Watering newly transplanted plants
Day 19	**Topic: Nursery maintenance (Total 4.5 hours)**	
	Theory (1.5 hours)	Weeding activity, Disease management, Pest management
	Practical (3 hours)	Weeding activity in nursery, Application various organic and in organic pesticides, Application of various techniques for disease management
Day 20	**Topic: Shifting and grading of seedlings (Total 4.5 hours)**	
	Theory (1.5 hours)	Importance of shifting and grading in nursery management, Techniques of shifting and grading, tall seedling production technology
	Practical (3 hours)	Shifting and grading activity in nursery, Staking activity in tall seedling nursery
Day 21	**Topic: Transportation and marketing (Total 4.5 hours)**	
	Theory (1.5 hours)	Various techniques required for transportation of seedlings to short and long distances, Assessment of various marketing channels
	Practical (3 hours)	Preparing seedlings for transportation, Loading of seedlings into vehicles
Day 22	**Topic: Economic analysis (1) (Total 4.5 hours)**	
	Theory (1.5 hours)	Various tools for assessing economics of the nursery raising
	Practical (3 hours)	Calculating benefit cost ration (B:C Ratio, Calculating IRR, Calculating NPV
Day 23	**Topic: Economic analysis (2) (Total 4.5 hours)**	
	Theory (1.5 hours)	Various tools for assessing economics of the nursery raising
	Practical (3 hours)	Calculating benefit cost ration (B:C Ratio, Calculating IRR, Calculating NPV
Day 24	**Topic: Hitech nursery (Total 4.5 hours)**	
	Theory (1.5 hours)	Importance of technology in nursery management, Different modern nursery infrastructure
	Practical (3 hours)	Preparing a checklist of equipment and facilities for modern nursery
Day 25	**Topic: Preparation of estimates for poly bag nursery raising (1) (4.5 hours)**	
	Theory (1.5 hours)	Preparation of estimates for nursery raising
	Practical (3 hours)	Preparation of estimates for nursery raising
Day 26	**Topic: Preparation of estimates for root trainer nursery raising (2) (4.5 hrs)**	
	Theory (1.5 hours)	Preparation of estimates for nursery raising
	Practical (3 hours)	Preparation of estimates for nursery raising

Day 27	**Topic: Visit to Nearby horticulture nursery (Total 4.5 hours)**	
	Theory (1.5 hours)	Visit to Nearby horticulture nursery
	Practical (3 hours)	Visit to Nearby horticulture nursery
Day 28	**Topic: Visit to Nearby forest nursery (Total 4.5 hours)**	
	Theory (1.5 hours)	Visit to Nearby forest nursery
	Practical (3 hours)	Visit to Nearby forest nursery
Day 29	**Topic: Visit to nearby medicinal garden (Total 4.5 hours)**	
	Theory (1.5 hours)	Visit to nearby medicinal garden
	Practical (3 hours)	Visit to nearby medicinal garden
Day 30	**Topic: Visit to manufacturing unit of coco pit and poly bags (Total 4.5 hours)**	
	Theory (1.5 hours)	Visit to manufacturing unit of coco pit and poly bags
	Practical (3 hours)	Visit to manufacturing unit of coco pit and poly bags

VERMICOMPOST:

Vermicompost is a process in which the earthworms convert the organic waste into manure rich in high nutritional content. It can be done for self-use, alternate income or commercial purpose. Vermicompost is the scientific method of making compost by using Earthworms. They are commonly found in soil, feeding on biomass & excreting it in a digested form.

Vermiculture means “worm farming.” Earth worms feed on the organic materials and give out excreta in the form of “vermicosts” that are rich in nitrates and minerals such as phosphorous, magnesium, calcium, potassium, nitrogen which are used as ‘fertilizers’ and entrance soil quality.

Why earthworm and its secret:

Earth worms feed on the decaying organic matter and survive in soil. During digestion in the alimertoryconal, all the organic waste gets transformed into natural fertilizer. The PH is natural and it is an odourless organic matter. After digestion, the undigested food is excreted, which is a thin oil layer on the excreted material or easting which takes as much as two months to exode.

Types of earthworms and classification:

Earthworms are broadly classified into 3 categories. They are: **Epigic, Endegeic & Diageic**. This classification is based on their feeding habits, habitat in soil strata. According to the soil conditions and defection activities.

Area or location for vermicomposting unit:

For arranging a large-scale unit or planning for a commercial, the appropriate location for the vermicomposting units are the sub-urban areas of cities and villages that have a major population that depends on agriculture, the areas where the fruits and vegetables, floriculture division, farms are present. Establishing these units near the dairy farms will be an advantage, to procure the cheap raw material i.e., cow dung.

Vermicompost production requirements:

cow dung, organic sludge, tree leaves, crop residues, vegetables waste, earthworms, water, shed, land, fencing for protecting, machinery, hotel refuse, waste from agro industries.

PHASES OF VERMICOMPOSTING:

Phase 1	The process of collecting wastes and separation of the metal, glass, ceramics & plastics and storage of organic wastes.
Phase 2	Pre duration of organic waste for twenty days by heaping the material along with cow dung (wet) slurry. This process partially digests the materials and fit for earthworm consumption.
Phase 3	Preparation of earthworm bed (Vermicompost bed). Loose soil is required, so that, while watering the worms and dissolvable nutrients go into soil.
Phase 4	Collection of earth worms after vermicompost collection, separation of partial and fully composed material. The partially composting material will be again put into vermicompost bed.
Phase 5	String the vermicompost in proper place to maintain moisture and allow the microorganisms to grow.

VERMICOMPOST PRODUCTION METHOD:

Selection of site: Any place with shade, high humidity and cool preferably open area with cattle poultry shed is selected.

Preparation of shed: This is a crucial unit for vermicomposting. This can be changed by using rooting constituents of the HDPE sheet and the poles with bamboo and purlins of

wooden or steel trusses and stone of even the RCC pillars. This is critical to stop the bed wetting due to rain and protect from sunlight. Basically the shed length is 100 feet and 30 feet with and the height is 15 feet at the middle of height with 7 feet height side poles. The direction of shed should be in North, south sides because to minimize the sunlight exposure.

Vermicompost Bed: There are 2 types of bed cultivations: (i) Ground level bed cultivation, and (ii) Tub level bed cultivation. For the best result of vermicompost, ground level bed cultivation is good and better choice.

Worm food selection for vermicompost:

Cow dung (dried), crop residues, vegetables market waste, flowers and fruits market waste are suitable for vermicomposting production.

FENCING FOR PROTECTING VERMICOMPOST UNIT:

The land must be protected to prevent by unwanted animals or other creature.

PRECAUTIONARY MEASURES IN VERMICOMPOSTING:

During vermicomposting there are certain points that must be take care of. This is especially because the earthworms are highly sensitive organise any smell change in the thriving conditions would affect their conversion ability. The caution points are: Compost materials, Drainage channel, Addition of acidic substance, Water stress, Covering the beds, Protection from pest.

ADVANTAGES OF USING VERMICOMPOST:

1. Soil biological compost is favorably influenced by the addition of vermicompost.
2. Make the soil loose and porous.
3. It contains earthworm's cocoons which increases its population.
4. Vermicompost enhances the process of decomposing the organic matter in soil.
5. Percentage of N:P:K content is more in vermicompost it bears N(2.5-3.0%), P(1.8-2.9%), K (1.5-2.0%) which is rich in nutrients and provides excellent plant growth.
6. Earth worms can also be used as protein sources for poultry, fishery, pigs, and pets.

Apiculture (Bee keeping):

Apiculture is the scientific method of rearing honeybees. The word "apiculture" comes from the latin word "Apis" meaning Bee. So, Apiculture or Bee keeping is the care & management of honey bees for the production of honey, wax & other products. Different species of Honey bees in the world are: (i) Asian bee (Apiscerena), (ii) Rock bee (Apisdorsata), (iii) European bee (Apis mellifera), (iv) Little bee (Apishorea). The characteristics of honey bees are:

	Apiscerena	**Apisdorsata**	**Apis mellifera**	**Apishorea**
Nesting	Cavity nesting	Open nesting	Cavity nesting	Open nesting
Size	Medium size (14-15mm)	Biggest honey (16-18mm)	Medium size (14-16mm)	Smallest bee (9-10mm)
Swarming/ Absconding	Strong tendency	Strong tendency	Strong tendency	Strong tendency
temperature	furious	furious	Gentle	mild
Average honey yield	5kg hive-bees	40kg wild bees	15kg hive bees	500gms wild bees
colony	can be domesticated	can't be domesticated	can be domesticated	can't be domesticated
Method of honey extraction	By centrifugal honey estractor from the hived bees (hygienic)	By squeezing (unhygienic)	By centrifugal honey extractor from the hived bees(hygienic)	By squeezing (un hygienic)
No. of cells /10cm comb	21-25	18-19	17-19	32-36

In honey bees, body parts are modified as per their food habits and social life. The body of honey bee can be distinguished into 3 parts they are: Head, Thorax, Abdomen.

DIFFERENT COSTS OF HONEY BEES: A normal colony have 3 kinds of individuals bees. They are: (i) Queen bee, (ii) Worker bee & (iii) Drone bee

(i) A Queen bee is typically an adult, mated female (gene), a longest bee, golden in color, with fully developed reproductive organs. Its life span is 8 years. The queen bee is usually the mother of most and only one queen is found in a colony. The Queen bee lays around 1500-2000 eggs per day. The feeding of queen bee is highly nutritious known as "ROYAL JELLY". The queen lays both fertilized and unfertilized eggs. Fertilized eggs produce worker & queen bees and Unfertilized eggs produce drones. Queen bee releases queen substance PHEROMONE which helps in the colony organization. It acts as worker attractant and inhabits ovary development in worker bees as well as raising new queens.

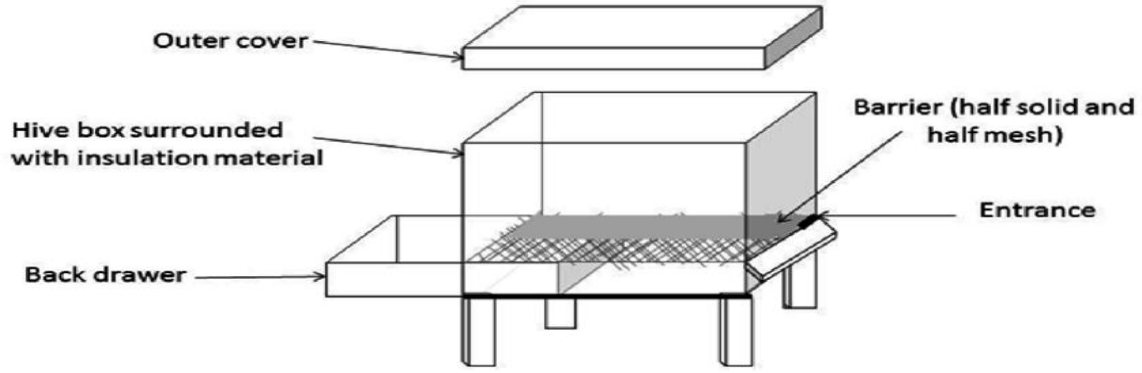
(ii) Worker bees are females, but are not capable of reproducing. They do all the work in the hive, which includes housekeeping, feeding the queen, drones and larvae, collecting the pollen and nectar, and making the wax. Worker bees are imperfect females. The working time of worker bee is 6am – 6pm and their life span is an average of 40 - 60 days.

(iii) Drone Bees are produced from unfertilized eggs. Its function is to mate once in their life. The life span of drone is 45 days.

The developmental stages of honey bees are: Egg, larva, puppa, adult

	Egg period(days)	Larvae(days)	Pupa(days)
Queen	1-3	4-9	10-16
Worker	1-3	4-10	11-21
Drone	1-3	4-10	11-24

BEE KEEPING EQUIPMENT:



BEE HIVE: We need a bee hive for protecting bees in this bee hives the bee space measures 9.52 mm for epis mellifera and these was modified for epis serena Indica to be between 7-9 mm.

PROPER MANAGEMENT: Examination of a bee colony, Handing of bee colonies & Precautions, Collection and preservation of Bee flora, SUPPLEMENTARY FEEDING (Feeding methods includes 2 types: Sugar feeding, Pollen feeding)

SEASONAL MANAGEMENT OF HONEY BEE COLONIE: It includes Spring management, Summery management, Winter management.

Dividing of colonies / colony multiplication: It includes Uniting of bee colonies or mergin, Shifting of bee colonies. Catching and hiving a swarm includes prevent and control of swarming. Honey extraction, producer, PRECAUTIONS DURING EXTRACTION, BY PRODUCTS includes Royal jelly, Bee venom, Propolis, Pollen, Bee wax.

BEE DISEASES & THEIR CONTROL: Wax moth (Galleria Mellonella).

ECTOPARASTIC MITES: Tropopilaelapsclare, Varroa mite, Bee larve , Bravlacoeca and Other enemies like Birds, Berated king crow. Bears and pine martins are the mammals which attack the bees for honey and bees.

Methods /Techniques learned (Duration and Dates Conducted) / List of Visited places by EDP Students:

S.No.	Places
1	Mulukunur Dairyform
2	Medicinal & Herbal Plants at Forest Collage @ Dulpalli
3	Kondalakoya Oxygen Park & Aviary- Medchal
4	Delta Agrigenetic Pvt Ltd. Seed Processing Unit
5	Centre of Excellence
6	Apiary Unit (Bee Keeping)
7	Skill Development Programme at Centurion University at Odisha

Mulukunur Dairyform

Production, Distribution & Transportation of milk, Management of milk supply, Labour enforcement and other business activities is learnt through this trip.

Visit to TSFA

Varieties of medicinal plants and their uses, various nursery management practices, plant and pest identification have been studied.

Kondalakoya Oxygen Park & Aviary- Medchal

Miyawaki planting methods, how this plantation is different from other forests and plantations, and how it is helping urban areas have been studied.

Delta Agrigenetic Pvt Ltd. Seed Processing Unit

Seed processing mechanism and its practical benefits in raising samplings have studied in this visit. How seeds collected, stored, by using various mechanism and equipments. Also different methods for seed dormancy breaking have been studied.

Centre Of Excellence:

Practically involved in casuarina plantation and also carried various silvicultural methods like thinning, pruning, shifting of nursery beds, weeding etc. Preparation of cocopeat was done practically. Jiva-amrutham preparation was practically carried .

APIARY Unit(Bee keeping) :

Selection of bees and area of apiculture was studied, different types of bee keeping boxes and its importance, methods of collection of honey and its biproducts, safety measures in honey collection and its maintenance was studied. TSCOST Member Secretary Sri. Marupaka Nagesh Garu visited apiculture unit.

Skill Development Programme at Centurion University at Odisha

Preparation of vermicompost, fungal and algal biofertilizers, its marketing methods & Different varieties of honey bee culturing methods was studied.

Gromor Nursery

Preparation of vermicompost and commercial nursery, its techniques and marketing. One month training has undergone at Gromor.

Agroforestry (Cares)

Various Nursery management practices, seed collection and storage methods, propagation strategies on forest species have been learnt.

The following three students placed under Gromor Food Nursery

1. M Soundarya
2. Arikitota Dhanunjaya Rao
3. Nishad

List of Participants / Beneficiaries with Qualification:

Earlier program started with 10 students, 1 student has dropped out and continued with 9 students.

S.No.	Name of beneficiary	Address	Contact No.
1	Dabbeta Mahesh	H.No.2-123 ,Venkatapoor(V), Siddipet(D) - 502114	9701434729
2	M. Soundarya	H.No.3-76/A, Mamidial(V), Mulugu(M), Siddipet(D) - 502279	9542186723 9182432990
3	P. Rajakomuraiah	H.No.20-793, Madharam Colony, Parkal(M), Hanmakonda(D) - 506164	9533296555
4	R. Prabhakar	H.No.3-7, Rollopahad(V), Rebbena(M), Asifabad(D) - 504292	7660944329
5	J. Manohar	H.No.1-2, Mutheraopally(V), Chennur(M), Mancherial(D) - 504201	6305700725
6	Arikitota Dhanunjaya Rao	H.No.1-336, Antipeta(V), Seethanagaram(M), Parvathipuram Manyam - 535546	8555867881
7	Vodnala Ravi Kumar	H.No.1-135, Ram Nagar, Tandur (V/M), Mancheria(D) - 504272	9989509502
8	Nishad	H.No.6-96, Telkapally(M), Nagarkurnool(D) - 509412	7680967840
9	D. Anjaneyulu	H.No.3-15, Didugupadu, Madhira, Khammam(D) - 507203	7893075771

Entrepreneurship Development Program

Course Coordinator: Dr. B. Lakshmi
National Institute of Pharmaceutical Education and Research (NIPER), Hyderabad

To support the Skill India Initiative and Make in India initiative of Government of India, the Department of Biotechnology has designed the Entrepreneurship Development Programs to encourage Indian youth to become Entrepreneurs and lead India into Self Sustainable role model across sectors. The Entrepreneurship Development Program was sanctioned to NIPER Hyderabad to encourage students with science and technology background to get trained to set up their own firms in the areas of identified gaps in the respective sectors.

The program extends financial support to the enrolled participants for the duration of six months. The objectives of the program are to impart Entrepreneurship Development Training. The participants enrolled into the program have a sound technical knowledge but need to be trained in the management and practical aspects. Hence the program is designed for six months with one month on-campus training followed by five months industrial training. The duration of the program was (6) months from 28th March – 28th October 2022.

The applications were called from interested candidates through an advertisement in leading local newspapers and also through websites of NIPER Hyderabad and TSCOST. The selection criteria is at least Graduation in any of the Sciences and Technology disciplines like Pharmaceutical, Chemical and Biological Sciences, including Engineering disciplines etc. Candidates with higher qualification in above disciplines are also eligible. (Applicants should not be pursuing any full-time course currently). The applications received were screened and those found eligible were called for an online interview with a Selection panel constituted with members from NIPER Hyderabad and TSCOST. The shortlisted candidates were then intimated to report to NIPER Hyderabad on 28th March 2022. The methodology followed for conducting the program was 1st month – On campus training at NIPER and 2nd to 6th months - Industrial Training in Company from the area of interest of the candidate.

The first month of training is imparted in the Partner Institution on the entrepreneurial aspects of organization set up, registration as MSMEs in the government portals, administrative and managerial requirements, financial estimates (demand, raw materials, sales, human resources etc), marketing requirements, statutory filings etc.

The next five months (2nd – 6th month) the participants should be trained in the industry in cross functional areas for a practical exposure to the industry. The program also compensates the companies where these participants are sent for industrial training for five months. Participants have to submit a detailed project report which they seek to carry forward as their entrepreneurial venture.

The participants are also mapped to different qualification packs offered by Life Sciences Sector Skill Development Corporation (LSSSDC) for evaluation. The participants who clear the examination conducted by the LSSSDC are issued certificates on successful completion by LSSSDC in addition to a course completion certificate issued by the Partnering Institution.

The following are the Participant/Beneficiaries have Entrepreneurship Development Program provided by NIPER under DBT support.

1.	Kirtan Solanki, Gurudev Nagar, CDO Jain School Road ,Beside Jain Temple , Gadag, Karnataka -582101, 8792445070, kirtansolanki789@gmail.com
2.	Tadela Deepika, Flat no 302 Jayadurga Residency , Sudharshan Reddy nagar , Chintal, 7995496170, deepikachandra1725@gmail.com
3.	Mohammed Mustaneer Akmal, 1-3-90, Flat no.305, Darul Abideen Apts., Happy Homes Colony, Upperpally, Rajendranagar, Hyderabad, 9393-283-483, akmal.pharmd@gmail.com
4.	Mounika Kumari, 8-1-206/9/3, mailardevpally kattedan, Hyderabad. 500077, 8019781759, kumarimounika97@gmail.com
5.	Likan Jyoti Mund, Bhainri (bhirkapada), Kalahandi, Odisha, 7978601257, likanjyotimund50@gmail.com
6.	Kunal Babbar, H. No. 60/3, Gopal Pura, Hisar Road, Rohtak, Haryana, 8607289601, babbar.kunal1702@gmail.com
7.	Suhel Khan, Ta 222 gali no.2 Tughlakabad Extn New Delhi 110019, 9354114090, suhelkhan680@gmail.com
8.	Sudha Diddi, H. No: 18-343/1/1 Mallikarjuna nagar, Malkajgiri, Pin :500 047, 7680964596, sudhamani628@gmail.com
9.	Somireddy Ramya, Athmakur S, District Suryapet Pin code 508212, 7416518343, somireddyramya2000.gmail com.
10.	Neha Saharsh, 8-1-332/3/A/177/1, Lane no:11, Arvind Nagar, Aziz Bagh, Tolichowki, Hyderabad-500008, 8074779207, mnmujeeb@gmail.com

List of training modules and course contents and Training Curriculum

Date & Day	Title Name	Time	Name of the Speaker
28-03-2022 (Monday)	Introduction to the course & Course outline	10am - 11am	Dr. B. Lakshmi
	Introduction to entrepreneurship	11am - 1pm	Dr. A. Mary Francina
	Types of Business (Sole Proprietorship /Partnership etc.) and Structure of Management	2pm - 5pm	Dr. A. Mary Francina
	Basics of entrepreneurship	5pm - 6pm	Ms Ranjitha
29-03-2022 (Tuesday)	Start-up Vs Small Business	10am - 1pm	Prof. Vandana Samba
	Start-up / Business Terminology (e.g. incubator, accelerator, angel, mentor etc.)	2pm - 5pm	Dr.Deepika Ch
	Start-up ecosystem in India	5pm - 6pm	Ms Ranjitha
30-03-2022 (Wednesday)	Sources of Capital - Small Business / Legal formalities of an enterprise (Factory Act, PF, Labour Laws etc.)	10am - 1pm	Dr.BNV Parthasarathi
	Start-up / Business Terminology (e.g. disruption, freemium, unicorn etc.)	2pm - 5pm	Dr.Deepika Ch
	Start-up ecosystem outside India	5pm - 6pm	Ms Ranjitha
31-03-2022 (Thursday)	Sources of Capital - Start-ups (Venture Capital, Angels)	10am - 1pm	Dr. B. Lakshmi
	VC / Angel funding process	2pm - 4pm	Dr. Deepika Ch
	Sources of funds / loans	4pm - 6pm	Mr Pradeep
01-04-2022 (Friday)	Business Idea Presentation	10am -11am	Dr. B. Lakshmi
	Orientation Session	11am - 1pm	Mrs N Sumathi
	Types of business models (types of service, technology platforms,	2pm - 5pm	Dr. BNV Parthasarathi
	Business model examples	5pm - 6pm	Mrs Ranjitha
04-04-2022 (Monday)	How to identify business opportunities? (Business description)	10am - 1pm	Dr. E. Vijaya
	How to identify business opportunities? (Product/Service)	2pm - 4pm	Dr. E. Vijaya
	Business ideation	4pm - 5pm	Ms Ranjitha
	Ideation to execution challenges	5pm - 6pm	Ms Ranjitha
05-04-2022 (Tuesday)	Leadership and entrepreneurial thinking	10am - 1pm	Dr. C Kavitha
	Importance of Business Communication, CSR, Ethics	2pm - 4pm	Dr. C Kavitha
	Challenges in entrepreneurship	4pm-5pm	Mr Pradeep
	Entrepreneurship psychology	5pm - 6pm	Mr. Pradeep
06-04-2022 (Wednesday)	Marketing Plan - Product Strategies	10am -1pm	Dr. Balaji Abraham
	Marketing Plan - Pricing Strategies	2pm - 4pm	Dr. Balaji Abraham
	MC Lab Training	4pm - 6pm	Dr. N. Shankaraiah

07-04-2022 (Thursday)	Financial Analysis - Projected Financial Statements - I	10am - 1pm	Ms. Patricia Albert
	Financial Analysis - Projected Financial Statements - I	2pm - 4pm	Ms. Patricia Albert
	PC/RT Lab Training	4pm - 6pm	Dr. Khatri/ Dr. Manoj
08-04-2022 (Friday)	Financial Analysis - Projected Financial Statements - II	10am -1pm	Ms. Patricia Albert
	Financial Analysis - Projected Financial Statements - II	2pm - 4pm	Ms. Patricia Albert
	PC/RT Lab Training	4pm - 6pm	Dr. Chandraiah/ Dr.Nitin
11-04-2022 (Monday)	Business Idea Challenges	10am -11am	Dr. B. Lakshmi
	Indian Drug Regulation	11am - 1pm	Dr. Sandeep
	Taxation applicable to MSMEs	2pm - 4pm	Dr. E. Vijaya
	PA/NMR Lab Training	4pm - 5pm	Dr. Rajesh Sonti
	Business Ideas Presentation and Review	5pm - 6pm	Ms Ranjitha
12-04-2022 (Tuesday)	Marketing Plan - Promotional Strategies	10am - 1pm	Dr. Sapna Singh
	Competitor Analysis (SWOT)	2pm - 4pm	Dr. Sapna Singh
	PA Lab Training	4pm - 6pm	Dr. Amol G. D.
13-04-2022 (Wednesday)	Going international: Export orientation	10am - 1pm	Dr. Sapna Singh
	Going international: Export orientation	2pm - 4pm	Dr. Sapna Singh
	Networking with other vendors/suppliers	4pm - 5pm	Mr Pradeep
	Case Study	5pm - 6pm	
18-04-2022 (Monday)	Business Idea Competitors	10am - 11am	Dr. B. Lakshmi
	Government schemes for MSMEs	11am - 1pm	Mrs. N Sumathi
	Time and Stress Management/Goal Orientation	2pm - 4pm	Dr. A. Mary Francina
	PTPC Lab Training	4pm - 6pm	Dr. YV Madhavi
19-04-2022 (Tuesday)	Digital Marketing and Social Media presence	10am - 1pm	Mr G. Uday, Pulse Pharmaceuticals
	Digital Marketing and Social Media presence	2pm - 4pm	Mr G. Uday, Pulse Pharmaceuticals
	Organic business growth - case studies	4pm - 6pm	Dr. B. Lakshmi
20-04-2022 (Wednesday)	Management of Patents, Copyrights, Trademarks etc.	10am - 1pm	Dr. Neeraj Kumar
	Negotiation and Networking	2pm - 4pm	Dr. Tirumal Reddy

	Medical Devices	4pm - 6pm	Dr. Vivek Borse
21-04-2022 (Thursday)	Market Analysis	10am - 1pm	Dr. Balaji Abraham
	Market Analysis tools	2pm - 4pm	Dr. Balaji Abraham
	Market Research via Google forms and social media	4pm - 5pm	Mr Pradeep
	Market Survey dos and don'ts	5pm - 6pm	
22-04-2022 (Friday)	Break-even Analysis and ROI/Sources and Uses of funds/investment/loans	10am - 1pm	Dr. B. N. V. Parthasarathi
	Pitch Deck	2pm - 4pm	Dr. M. Himabindu
	Effective elevator pitch presentations	4pm - 6pm	Ms. G Mounika
25-04-2022 (Monday)	Entrepreneurial Mindset / Think like an entrepreneur case studies	10am - 1pm	Dr. M. Himabindu
	Need for a Business Plan/Project Cost Report– Scope, Significance and Format	2pm - 4pm	Dr. M. Himabindu
	Business Canvas	4pm - 6pm	Ms. G Mounika
26-04-2022 (Tuesday)	Presenting and writing the business plan - Business Aspects (Market Analysis)	10am - 1pm	Dr.M Himabindu
	Presenting and writing the business plan - Business Aspects (Competitor Analysis)	2pm - 4pm	Dr.M Himabindu
	Business Idea Assessment - SWOT	4pm - 6pm	Ms. G. Mounika
27-04-2022 (Wednesday)	Presenting and writing the business plan - Financial Aspects	10am - 1pm	Dr.Ch Kavitha
	Presenting and writing the business plan - Funding Aspects	2pm - 4pm	Dr.Ch Kavitha
	Customer Validation	4pm - 6pm	Ms. G Mounika
28-04-2022 (Thursday)	Preparation of Business Plan/Project Cost Report	10am - 1pm	Dr.Ch Kavitha
	Preparation of Business Plan/Project Cost Report (Full Report)	2pm - 4pm	Mr Pradeep
	Business Plan presentation from a corporate perspective	4pm - 6pm	Ms. G. Mounika
29-04-2022 (Friday)	Project cost/ B-plan canvas evaluation & review	10am - 11am	Dr. B. Lakshmi
	Project cost/ B-plan canvas evaluation & review	11am - 1pm	Dr.Deepika Ch
	Internship interview and interaction preparation	2pm - 4pm	Dr.Deepika Ch
	Orientation towards Internship	4pm - 6pm	Dr. B. Lakshmi

2 May - 30 September 2022	**INDUSTRIAL TRAINING (5 months)**		
3-7 October 2022	Final Submission of the Business Plan/ Project Cost Report & Presentation by Participants- to NIPER Faculty & TSCOST		
	Closing Ceremony - Award of certificates		

List of Faculty/Experts/ Resource persons associated with the programme

S No.	Faculty Name	Affiliation
1	Dr A Mary Francina	Associate Professor, St Anns College, Hyderabad
2	Ms Ranjitha	Head HR, M & As, Tech Mahindra
3	Dr Vandana Samba	Professor, St Josephs PG College, Hyderabad
4	Dr BNV Parthasarathi	Former Vice President, Bank of Bahrain
5	Mrs N Sumathi	Assistant Director, MSME-DI, Balanagar
6	Dr. E. Vijaya	Faculty, NiMSME, Yousufguda
7	Dr C Kavitha	Associate Professor, RBVRR College, Hyderabad
8	Dr Balaji Abraham	Marketing Manager, Dr Reddy Labs
9	Dr N Shankaraiah	Associate Professor, NIPER Hyderabad
10	Ms Patricia Albert	Manager, Berkadia Financial Services
11	Dr Dharmendra Khatri	Assistant Professor, NIPER Hyderabad
12	Dr Manoj Dandekar	Assistant Professor, NIPER Hyderabad
13	Dr G Chandraiah	Assistant Professor, NIPER Hyderabad
14	Dr Nitil Pal Kalia	Assistant Professor, NIPER Hyderabad
15	Dr Sandeep K	Assistant Professor, NIPER Hyderabad
16	Dr Rajesh Sonti	Assistant Professor, NIPER Hyderabad
17	Dr Sapna Singh	Associate Professor, School of Management Studies, University of Hyderabad
18	Mr Pradeep	Regional Head-South, ICICI Lombard
19	Dr Amol GD	Assistant Professor, NIPER Hyderabad
20	Dr M Himabindu	Associate Professor, Amjad Ali Khan School of Business Management, Hyderabad
21	Dr YV Madhavi	Assistant Professor, NIPER Hyderabad
22	Mr Uday Kumar Reddy	Marketing Manager, PULSE Pharmaceuticals
23	Dr Neeraj Kumar	Assistant Professor, NIPER Hyderabad
24	Dr Tirmal Reddy	L & D Consultant
25	Dr Vivek Borse	Assistant Professor, NIPER Hyderabad
26	Ms G Mounika	Business Consultant
27	Dr Deepika Ch	Assistant Professor, NIPER Hyderabad
28	Dr B Lakshmi	Assistant Professor, NIPER Hyderabad

Industrial training / internship details

Sl.No.01 (Name: Kunal)

Name	Kunal
State	New Delhi
Contact No	8607289601
Email ID	babbar.kunal1702@gmail.com
Qualification	B. Pharmacy
Area of Entrepreneurial Interest	Cosmetics
Internship Company	Belora Cosmetics
Location	Gurgaon
Company POC & Designation	Ms. Meenakshi Thakran - HR
POC Contact	9958109916
POC Email ID	meenakshi@beloracosmetics.com
LSSSDC Mapping as discussed with Dr. Anshul	Chemist-Production Pharmaceutical Cosmetics & Biologics, Non Sterile Product Manufacturing, Entrepreneurship

Sl.No.02 (Name: Suhel Khan)

Name	Suhel Khan
State	New Delhi
Contact No	9354113090
Email ID	suhelkhan680@gmail.com
Qualification	B.Sc (Hotel Management)
Area of Entrepreneurial Interest	Event Management
Internship Company	Xeel Events
Location	New Delhi
Company POC & Designation	Mr. Vicky Kumar - Founder
POC Contact	7827826107
POC Email ID	xeelevents@gmail.com
LSSSDC Mapping as discussed with Dr. Anshul	MSR(CMEs/New Product Launch), Entrepreneurship

Sl.No.03 (Name: Likan Jyot Mund)

Name	Likan Jyot Mund
State	Orissa
Contact No	7978601257
Email ID	likanjyotimund50@gmail.com
Qualification	M.Pharmacy

Area of Entrepreneurial Interest	Nutraceuticals
Internship Company	Voll Sante
Location	Mumbai
Company POC & Designation	Mr. Harsh Tiwari - GM Operations
POC Contact	9321509292
POC Email ID	harsh.tiwari@vollsante.com
LSSSDC Mapping as discussed with Dr. Anshul	Chemist-Production Pharmaceutical Cosmetics & Biologics, Non Sterile Product Manufacturing, Entrepreneurship

Sl.No.04 (Name: Md. Akmal Mustaneer)

Name	Md. Akmal Mustaneer
State	Telangana
Contact No	9393283483
Email ID	akmal.pharmd@gmail.com
Qualification	Pharm.D
Area of Entrepreneurial Interest	Pharmaceuticals
Internship Company	Pulse Pharma
Location	Hyderabad
Company POC & Designation	Mr. Krishna Mohan - AGM HR
POC Contact	9912288444
POC Email ID	krishnamohant@pulsepharma.net
LSSSDC Mapping as discussed with Dr. Anshul	Chemist-Retail Pharmacies, Entrepreneurship

Sl.No.05 (Name: Mounika Kumari)

Name	Mounika Kumari
State	Telangana
Contact No	8019781759
Email ID	kumarimounika97@gmail.com
Qualification	Pharm.D
Area of Entrepreneurial Interest	Pharmaceuticals
Internship Company	Pulse Pharma
Location	Hyderabad
Company POC & Designation	Mr. Krishna Mohan - AGM HR
POC Contact	9912288444
POC Email ID	krishnamohant@pulsepharma.net
LSSSDC Mapping as discussed with Dr. Anshul	Chemist-Production Pharmaceutical Cosmetics & Biologics, Sanitary & Personal Hygiene Product Manufacturing, Entrepreneurship

Sl.No.06 (Name: Tadela Deepika)

Name	Tadela Deepika
State	Telangana
Contact No	7995496170
Email ID	deepikachandra1725@gmail.com
Qualification	B.Pharmacy
Area of Entrepreneurial Interest	Event Management
Internship Company	Divyam Elite Celebrations
Location	Hyderabad
Company POC & Designation	Mr. Praneeth Adevelly - Manager
POC Contact	9912851515
POC Email ID	praneeth.adevelly@gmail.com
LSSSDC Mapping as discussed with Dr. Anshul	MSR(CMEs/New Product Launch), Entrepreneurship

Sl.No.07 (Name: Sudha Diddi)

Name	Sudha Diddi
State	Telangana
Contact No	7680964596
Email ID	sudhamani628@gmail.com
Qualification	M.Pharmacy
Area of Entrepreneurial Interest	Pharmaceuticals
Internship Company	Sherwyn Pharma
Location	Hyderabad
Company POC & Designation	Mr. Ibrahim Shaikh - Manager
POC Contact	9441746686
POC Email ID	sherwynpharma@gmail.com
LSSSDC Mapping as discussed with Dr. Anshul	Chemist-Retail Pharmacies, Entrepreneurship

Sl.No.08 (Name: Somireddy Ramya)

Name	Somireddy Ramya
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Contact No	7416518343
Email ID	somireddyramya2000@gmail.com
Qualification	MSc (Chemistry)
Area of Entrepreneurial Interest	Pharmaceuticals
Internship Company	Aizant Pharma
Location	Hyderabad
Company POC & Designation	Ms. Vasanthi B - Director HR

POC Contact	9000008289
POC Email ID	vasanthi.b@aizant.com
LSSSDC Mapping as discussed with Dr. Anshul	Chemist-Production Non-sterile Formulations, Entrepreneurship

Sl.No.09 (Name: Kirtan Solanki)

Name	Kirtan Solanki
State	Karnataka
Contact No	8792445070
Email ID	kirtansolanki789@gmail.com
Qualification	B.Pharmacy
Area of Entrepreneurial Interest	Nutraceuticals
Internship Company	Voll Sante
Location	Mumbai
Company POC & Designation	Mr. Harsh Tiwari - GM Operations
POC Contact	9321509292
POC Email ID	harsh.tiwari@vollsante.com
LSSSDC Mapping as discussed with Dr. Anshul	Chemist-Retail Pharmacies, Entrepreneurship

Sl.No.10 (Name: Neha Saharsh)

Name	Neha Saharsh
State	Telangana
Contact No	9967879695
Email ID	mnmujeeb15@gmail.com
Qualification	B.Tech (Biotechnology)
Area of Entrepreneurial Interest	Business Solutions
Internship Company	Rova Business Solutions
Location	Hyderabad
Company POC & Designation	Mr. Pradeep Malladi - Manager
POC Contact	9703571306
POC Email ID	info@rovabusinesssolutions.com
LSSSDC Mapping as discussed with Dr. Anshul	MSR(CMEs/New Product Launch), Entrepreneurship

EDP Inaugural & Interactive Session - Mrs N Sumathi, Addl. Director, MSME-DI, Hyderabad

EDP – Session by Dr Tirmal Reddy, L & D Consultant

EDP – Valedictory Session

TRAINING OF TRAINERS

Course Coordinator : Dr.A.Uma and Dr.L.Saida
Jawaharlal Nehru Technological University, Hyderabad

DBT Skill Vigyan Initiative of TSCOST has planned to conduct the training of trainers Program to all the coordinators/Principal investigators of Grantee institutes (NIPER,CCMB, PJTSAU, Forest College and Research Institute, CPMB) so as to update them with the latest advances in the areas of funded training. In this connection, the program was initiated at Jawaharlal Nehru technological university Hyderabad(JNTUH). The oral talks were arranged in a hybrid online and offline mode. Animal Cell line Technology is an indispensible tool in the area of life sciences research that supports 3R concept (reduce, refine, replace). Several biotechnological and pharmaceutical products are being produced at the commercial scale using animal cell lines.

The objective is to train the faculty in the area of life sciences and biotechnology. Faculty are trained in so that these trainers can train the other faculty and students in their respective institutions. The Layout of the cell culture laboratory, Designing mammalian cell culture medium, Routine maintenance of cell cultures, Separation of viable cells from explants culture, Cell counting & viability assay, Cryopreservation of cells were discussed. It is a 4 day program conducted during October 17th-20th, 2022. All the selected Principal Investigators from other programs of TSCOST-DBT skill vigyan Initiative were invited to attend the program along with their team of trainers. The methodology followed for conducting the program is through lecture sessions by experts in various fields of science and industry were conducted followed by lab visits established in institutes like ICRISAT,

HCU were taken. A total of 20 participated in the program. The list of participants is given below:

Sl No.	Name of the participant	Institute	Email Id	Phone no	No. of Trainers attended (PI+)
1	Dr.S. Gananadhamu	National Institute of Pharmaceutical Education & Research (NIPER), Hyderabad	gana.niperhyd@gov.in	9866906386	3
2	Dr.Ch.V.Durga Rani	Professor Jayashankar Telangana State Agricultural University (PJTSAU), Hyderabad	ranivenkata2@gmail.com	9885483252 / 8328538684	3
3	Dr.Archana B.Siva	CSIR – Centre for Cellular & Molecular Biology (CCMB), Hyderabad	abs@ccmb.res.in	9441233938	2
4	Dr. Santosh Kumar Guru	National Institute of Pharmaceutical Education & Research (NIPER), Hyderabad	santoshkumar.guru@niperhyd.ac.in	7745359784	2
5	Dr.K.Venkat Rao	National Institute of Pharmaceutical Education & Research (NIPER), Hyderabad	kvenkata.rao@nic.in	9779183370	2
6	Dr.Srinivas Naik	Centre for Plant Molecular Biology (CPMB), Osmania University, Hyderabad	srinivasnaik.cpmb@gmail.com	9849107810	2
8	Prof. M.Mamatha	Forest College and Research Institute, Hyderabad.	m.mamatha111@gmail.com	9885226957	3
9	Dr.B.Lakshmi	National Institute of Pharmaceutical Education & Research (NIPER), Hyderabad.	lakshmi.niperhyd@gov.in	9885154574	3

List of Faculty/Experts/ Resource persons associated with the programme:

Name of the Faculty	Designation	Home Institute / Organization Name and Place	Email Id
Prof. P.Reddanna	Emeritus Prof.	SLS,UoH	preddanna@gmail.com
Dr.B.M.Rao	Partner & CEO,	QDOT Associates	drbmrao@gmail.com
Vinod Gopishetty	HR,	Biological E Ltd.	
Dr. Kalpana Sastry Regulagadda	Agricultural hub foundation,	PJTSAU	kalpanasregulagedda@gmail.com

Prof.V.Kamakshi Prasad	Professor,	CSE Dept., JNTUH UCEH	kamakshiprasad@jntuh.ac.in
Dr.Raveendra Dayam	Assoc. vice president,	Excelra Knowledge Solutions	raveendra.dayam@excelra.com
Dr.Saikat Datta Mazumdar	Professor,	ICRISAT	s.dattamazumdar@cgiar.org
Dr.Punam Nagvenkar	Scientist E,	NCCS pune	punam@nccs.res.in
Dr. Krishna Mohan	Founder,	KRIMSO Biosciences.	drgkmohan@gmail.com

The day-wise details of the training program are:

1. **On Day 1-** 17th October. Inauguration of 4-day Training program (17-20 October) has been launched by the administration of JNTUH-The Hon'ble Vice-Chancellor Prof. Katta Narsimha Reddy (in absence), Rector- Prof.A.Govardhan, The Registrar-Prof.ManzoorHussain,Prof.Ch.Sasikala-Director IST, and Dr.L.Saida, Head Dept of Biotechnology; The chief guest Dr.Deepanwita Chattopadhyay,Chairman and CEO, IKP knowledge park; Sri. M. Nagesh, Member secretary TSCOST and Dr. Ahmed Kamal, advisor TSCOST. The inauguration event was attended by the coordinators of the TSCOST DBT skill Vigyan initiative program, the executives of Indian women scientist association, the Organization for women in science for the developing world, Fellows of Telangana academy of sciences and the staff of JNTUH. The dignitaries of the event emphasized the need for the Development of skilled manpower to promote Science and technology and industrial needs. Soon after the Inauguration Dr.Vinod Gopishetty DGM& Head, Talent Acquisition, Biological E Ltd. delivered a talk on "Skilled manpower in Biopharma industry –Expected Traits" Which gave insights into Employability skills for the said sector. In the afternoon, Dr.Kalpana Sastry, M.D. of Agri hub foundation, PJTSAU, and former Joint Director, ICAR-NAARM Hyderabad gave a talk on Patent Laws in the Life sciences industry. She talked about the steps involved in filing the patent with an emphasis on its need for start-ups. It was followed by lab visits to Various centers like Pharmacy, Chemistry, and nanotechnology.

2. On Day2- 18th October.

Prof.Kamakshi Prasad from Dept of Computer sciences delivered a talk on the "Role of Artificial intelligence in the life sciences industry" and explained online tools available for designing some of the research areas like drug design, genome editing, etc.. Dr.Raveendra Dayam Addl Vice president from Excelra Knowledge Solutions of GVK Biosciences has delivered a talk on "In silico approaches in the preparation of biologics/drug design" explained the stepwise approach to the development of drugs or biologics and the various free online tools available and the various paid software. Soon after the laboratory session on plant tissue culture, a visit was taken up to the Agribusiness and Innovation Platform (AIP)]Global Research Program on Enabling Systems Transformation of ICRISAT headed by Dr.Saikat Datta Mazumdar and explained how Agri hubs are paving way for business development and women empowerment. He explained various training programs being taken up to train the women on various machines available in the center with emphasis on selected crops like millets, groundnut and Bengal gram.

On Day3-19th October

Dr. Punam Nagvenkar, Heading the animal cell Repository from National centre for cell science, Pune which is the national repository in the country on maintenance and supply of animal cell lines gave a talk on the Maintenance of animal cell lines and laboratory maintenance. The talk was followed by Recent advances in QC and QA in the Life sciences industry by Dr.M.Srinivasa Reddy QMS Lead from Dr. Reddy's Laboratories Limited gave insights into the actual system of QC and QA in the industry with emphasis on modern technologies and how stringent QA norms have to be followed for various Drug approvals from various regulatory authorities After a laboratory session on animal cell lines, a visit was taken up to the Bionest incubation center of Hyderabad central university. Prof.P. Reddanna has shown all the startups, the common instrumentation facility for the start-ups, and how the system guidelines are set up to seek incubation facility, various funding for starts up and gave a detailed talk on this right from the inception of Bionest to till date.

On Day4- 20th October

An extended session was taken up by Dr.B.Krishna Mohan, founder Krispo Bioscinces and consultant for Regulatory certification in biopharma industry on various regulatory aspects related to biotech and pharma products. Later it was followed by interaction among PIs and a valedictory.

Training of Trainers (ToT)

Course Coordinator: Dr. K. Rama Krishna
Centre for Plant Molecular Biology, Osmania University, Hyderabad

The DBT, GoI has initiated programs for up-skilling of scientific manpower and Six (6) Institutes of Telangana State were selected as Partner Institutes to conduct the training programs. Under Faculty Development Program (FDP), the DBT has sanctioned a program entitled " Hands-on skill development training on advanced areas of life science and biotechnology for undergraduate and postgraduate faculty" to Centre for Plant Molecular Biology, Osmania University, Hyderabad. Additionally, the CPMB is chosen for conducting Training of Trainer (ToT) program.

The main objective of the program is to improve the quality of trainers by strengthening skills in the advanced area of Plant Biotechnology, Bioinformatics and Medical Biotechnology besides updating the participants with the latest developments in the field. Scientific sessions in the frontier areas of life sciences were conducted with several researchers presenting their latest data utilising cutting edge technologies. This helped the trainers to plan their upcoming DBT-TSCOST sponsored training programs. The program was of 4 days duration and conducted during November, 23-26, 2022. A total of 18 faculty members have participated in the program and list is provided below

List of Participants

S. No.	Participant Name & Designation	Address	Mail ID	Mobile No.
1.	Dr. D. Venkat Rao Kaki Assistant Professor	NIPER Hyderabad	kvenkata.rao@niperhyd.ac.in	9779183370
2.	Dr. Pankaj Kumar Singh Assistant Professor	NIPER Hyderabad	drpankajk.niperhyd@nic.in	7669294102
3.	Dr. Ch. V. Durga Rani Director	PJTS Agriculture University, Hyderabad	ranivenkata2@gmail.com	9849107810
4.	Dr. S. Vanisri Professor	PJTS Agriculture University, Hyderabad	vanisree_dhar@yahoo.com	8186945838
5.	Dr. M. Mamatha Professor	Forest Botany, Forest College and Research Institute, Mulugu	m.mamatha111@gmail.com	9885226957
6.	Dr. Archana B Siva Principal Scientist,	Innovation Hub, CCMB, Hyderabad	abs@ccmb.res.in	9441233938
7.	Ms. Leela Kumar	Innovation Hub, CCMB, Hyderabad	leela@ccmb.res.in	9394824180
8.	Ms. Ekta Dagar	Innovation Hub, CCMB, Hyderabad	ektadagar@ccmb.res.in	8890119447
9.	Dr. K. Srinivas Naik Associate Professor	Centre for Plant Molecular Biology, OU, Hyderabad	srinivasnaik.cpmb@gmail.com	9849107810
10.	Dr. Lavanya Tayi Inspire Faculty	Centre for Plant Molecular Biology, OU, Hyderabad	tayi.lavanya3@gmail.com	8106092737
11.	Dr. Uma Associate Professor & Head	Centre for Biotechnology, UPGCST, JNTUH, Hyd	vedavathi1@jntuh.ac.in	9848120819
12.	Dr. L. Saida, Associate Professor	Centre for Biotechnology, UPGCST, JNTUH, Hyd	lavudisaida@jntuh.ac.in	9618528040
13.	Dr Madavi Gorla Inspire Faculty	Centre for Biotechnology, UPGCST, JNTUH, Hyd	madhavigorla14@gmail.com	9347063301
14.	Dr Anjaneyulu Musini Assistant Professor	Centre for Biotechnology, UPGCST, JNTUH, Hyd	manjaneyulu@jntuh.ac.in	8008415285
15.	Dr. Venkkana Banothu Assistant Professor	Centre for Biotechnology, UPGCST, JNTUH, Hyd	venky.bt@gmail.com	9505459857
16.	Dr . P. Ranjit Assistant Professor	Centre for Biotechnology, UPGCST, JNTUH, Hyd	ranjit333@gmail.com	9985289499
17.	Dr. Ch. Kalyani Assistant Professor	Centre for Biotechnology, UPGCST, JNTUH, Hyd	kalyanichepuri@gmail.com	9949234486
18.	Dr. K. Venkateswar reddy Assistant Professor	Centre for Biotechnology, UPGCST, JNTUH, Hyd	vkvenkat07@gmail.com	8977375801

Course Contents:

The List of training modules and course contents (both lectures and hands on sessions) and Training Curriculum are chalked out as per the standards.

Time	Speaker	Title
Day 1 (23.11.2022) Wednesday		
10:00 – 11:45	Inaugural program	
11:45 – 12:00	Tea	
12:00 – 13:15	Dr. K. Rama Krishna	Introduction to Program
13:15 – 13:45	Lunch	
13:45 – 17:00	**Bioinformatics**	**Chair: Dr. K. Srinivas Naik, CPMB, OU**
13:45 – 15:15	Dr. K. Ulaganathan, OU	Future of Biological Research, a genomics perspective
15:15 – 15:30	Tea	
15:30 – 17:00	Dr. Someshwar Rao Sagurthi, OU	Applications of Bioinformatics in advanced research
Day 2 (24.11.2022) Thursday		
10:00 – 13:15	**Plant Biotechnology**	**Dr. Ch. V. Durga Rani**
10:00 – 11:30	Dr. P. Ananda Kumar, ICAR-IIRR	Genetically engineered crops and food security
11:30 – 11:45	Tea	
11:45 – 13:15	Dr. Satendra Mangrauthia, ICAR-IIRR	Genome editing: Basics and applications
13:15 – 13:45	Lunch	
13:45 – 17:00	**Animal Biotechnology**	**Chair: Dr. Pankaj Kumar Singh, NIPER**
13:45 – 15:15	Dr. Andugulapati Sai Balaji, CSIR-IICT	AMP-Activated protein kinase signalling promotes breast cancer stemness and drug resistance
15:15 – 15:30	Tea	
15:30 – 17:00	Dr. Santosh Kumar Guru, NIPER	TOR: Behind the scene
Day 3 (25.11.2022) Friday		
10:00 – 13:15	**Pharmacology**	**Chair: Dr. Sandhya Annamaneni**
10:00 – 11:30	Dr. Rama Krishna Sistla	Pharmacological interventions against ARDS: Relevance to COVID pandemic
11:30 – 11:45	Tea	
11:45 – 13:15	Dr. Narendra Kumar Talluri	Modern Analytical Techniques and Trends in Regulated Pharmaceutical Analysis
13:15 – 13:45	Lunch	
13:45 – 17:00	**Molecular Medicine**	**Chair: Dr. Sandeeptha Burgula**
13:45 – 15:15	Dr. Bindu Madhava Reddy Aramati, UoH	What do a diabetic drug does in cancer
15:15 – 15:30	Tea	
15:30 – 17:00	Dr. Prasad Tammineni, UoH	How neurons tackle the damage: Role of transport in autophagy
Day 4 (26.11.2022) Saturday		
10:00 – 13:15	**Host-microbe interactions**	**Chair: Dr. Srinivas Naik, OU**
10:00 – 11:30	Dr. Lavanya Tayi, OU	Understanding the elicitor activity of a cellulase protein secreted by the pathogen Xanthomonas oryzae pv.

		oryzae in the induction of rice immune responses.
11:30 – 11:45	Tea	
11:45 – 13:15	Dr. Hameeda Bee, OU	Signalling molecules of beneficial and pathogenic interactions
13:15 – 13:45	Lunch	
13:45 – 17:00	**Final Session**	
13:45 – 15:15	Dr. Satya Dattatreya, Renova Hospitals	The Battle to beat Cancer : A review and overview
15:15 – 15:30	Tea	
15:30 – 17:00	**Valedictory Program**	

Experts:

S. No.	Faculty/Experts/ Resource persons
1.	Dr. K. Rama Krishna, UGC Assistant Professor & I/c. Director, Centre for Plant Molecular Biology, Osmania University, Hyderabad – 500 007
2.	Prof. K. Ulaganathan, Centre for Plant Molecular Biology, Osmania University, Hyderabad – 500 007
3.	Dr. Someshwar Rao Sagurthi, Assistant Professor, Department of Genetics, Osmania University
4.	Dr. P. Ananda Kumar, Senior Scientist, ICAR-Indian Institute of Rice Research, Rajendranagar, Hyderabad – 500030
5.	Dr. Satendra Kumar Mangrauthia, Senior Scientist, ICAR-Indian Institute of Rice Research, Rajendranagar, Hyderabad - 500030
6.	Dr. Andugulapati Sai Balaji, Scientist, CSIR-IICT, Tarnaka, Hyderabad – 500 007
7.	Dr. Santosh Kumar Guru, Assistant Professor, Department of Biological Sciences, Room No: 64, NIPER Hyderabad, Balanagar, Hyderabad - 500037
8.	Dr. Sistla Ramakrishna, Chief Scientist, CSIR-IICT, Tarnaka, Hyderabad – 500 007
9.	Dr. M.V.Narendra Kumar Talluri, Head, Technical and Knowledge Management, Daicel Knowledge Centre, IKP Knowledge Park, Shameerpet, Hyderabad-500078
10.	Dr. Bindu Madhava Reddy Aramati, Assistant Professor, Department of Animal Biology, University of Hyderabad, Prof. C.R. Rao Road, Gachibowli, Hyderabad
11.	Dr. Prasad Tammineni, Assistant Professor, Department of Animal Biology, University of Hyderabad, Prof. C.R. Rao Road, Gachibowli, Hyderabad, 500046
12.	Dr. Lavanya Tayi, Centre for Plant Molecular Biology, Osmania University, Hyd
13.	Dr. Hameeda Bee, Associate Professor, Department of Microbiology, O.U
14.	Dr. Palanki Satya Dattatreya, Director and Chief of Medical Oncology Services, Renova Hospitals, Hyderabad
15.	Dr. K. Srinivas Naik, Associate Professor, Centre for Plant Molecular Biology, OU
16.	Dr. Ch. V. Durga Rani, Director, Institute of Biotechnology, Prof. Jayashankar Telangana State Agriculture University, Rajendranagar, Hyderabad – 500030
17.	Dr. Pankaj Kumar Singh, Assistant Professor, NIPER Hyderabad, Hyderabad
18.	Dr. Sandhya Annamaneni, Assistant Professor, Department of Genetics, Osmania University, Hyderabad – 500007
19.	Dr. Sandeeptha Burgula, Associate Professor, Department of Microbiology, Osmania University, Hyderabad – 500007


Centre for Plant