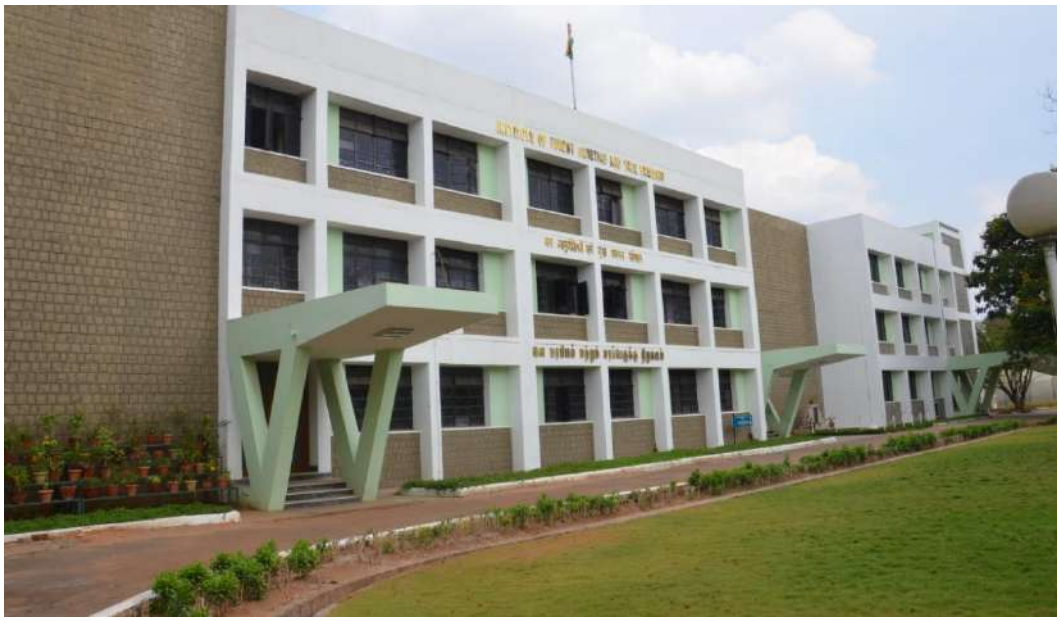
Green Skill Development Programme (GSDP)
On

Plant Tissue Culture Techniques and its Applications

Course Completion Report



Organized from 22.02.2021 to 26.03.2021
by

ENVIS Resource Partner
on
Forest Genetic Resources and Tree Improvement
Institute of Forest Genetics and Tree Breeding
(Indian Council of Forestry Research and Education)
Coimbatore

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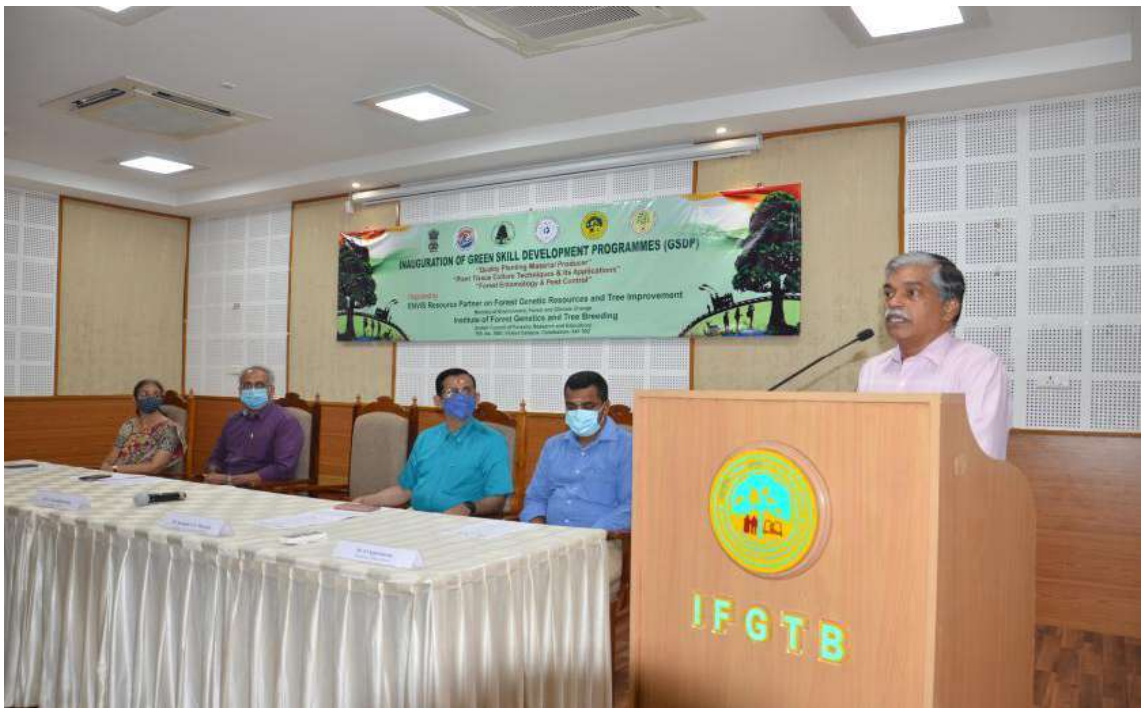
Course Completion Report

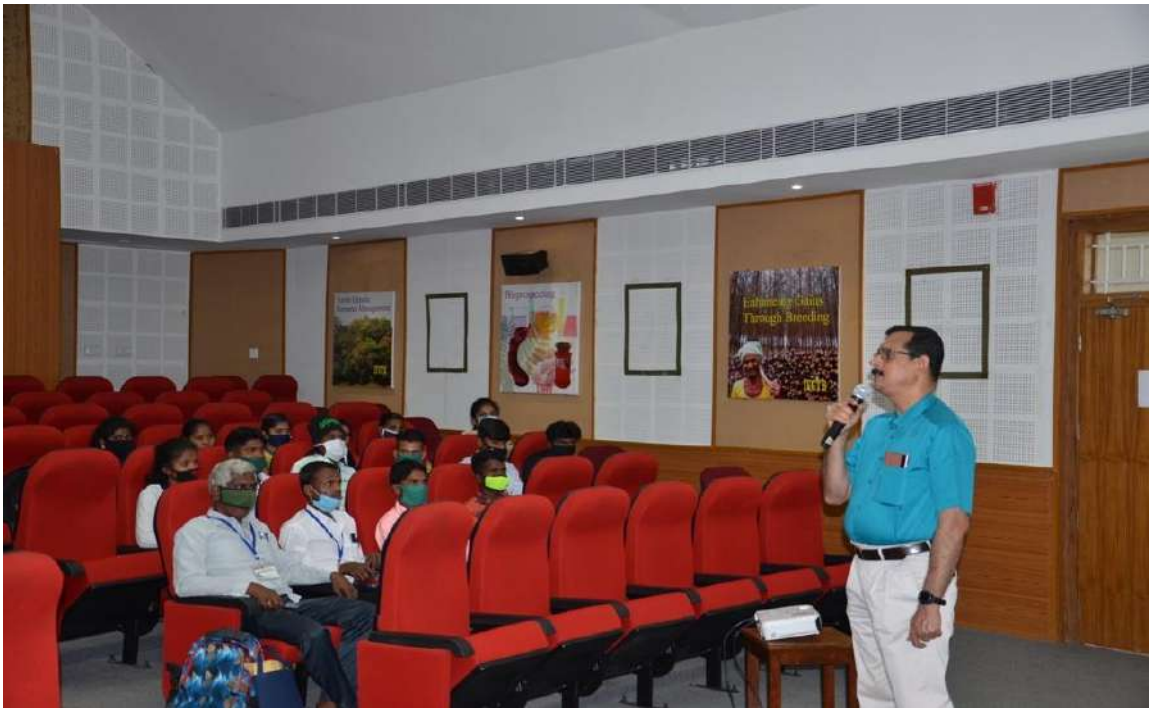
Inaugural Session

A Green Skill Development Programme (GSDP) on **"Plant Tissue Culture Techniques and its Applications" (**level-6) was conducted by the ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement at the Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore from 22.02.2021 to 26.03.2021. The training module included theory, field visits, field exercises and assignments. Dr C. Kunhikannan, Director, IFGTB inaugurated the training programme.



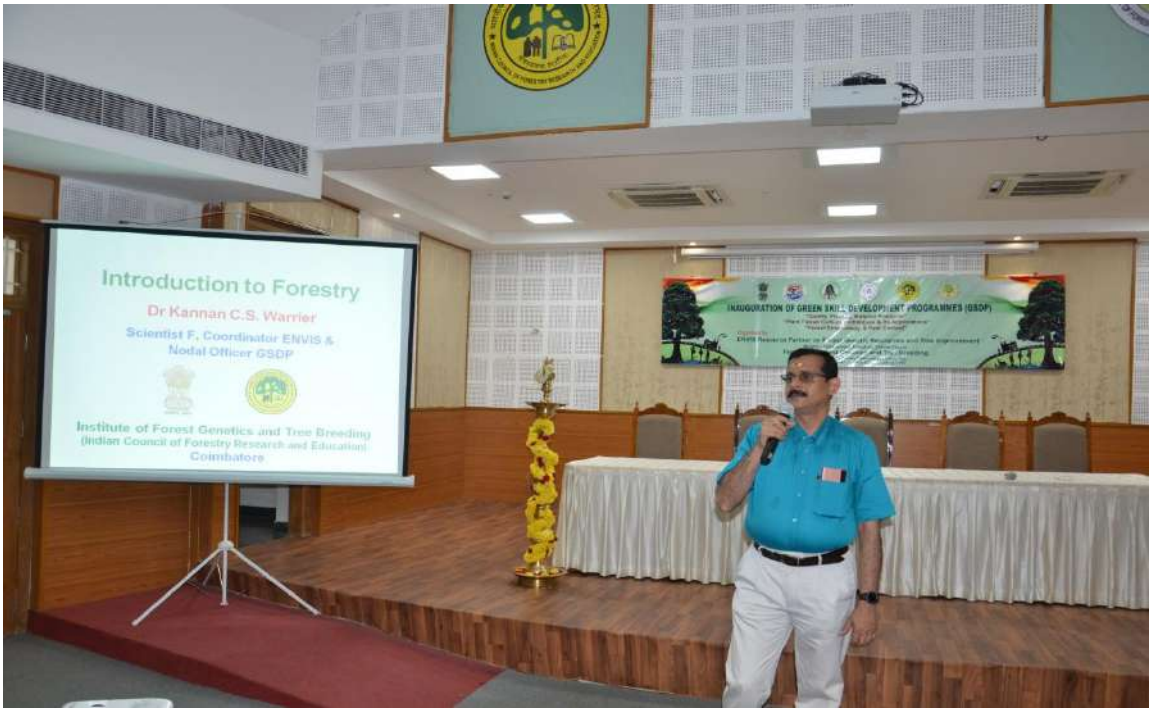
Introductory Session

An introductory session about the Institute was taken by Dr Kannan C.S. Warrier, Scientist F, Coordinator ENVIS, Nodal officer GSDP and Training in-charge. During his presentation Dr Kannan deliberated about IFGTB and various institutes with the Indian Council of Forestry Research & Education (ICFRE). He also briefed about the mandate and activities carried out by ENVIS RP at IFGTB.



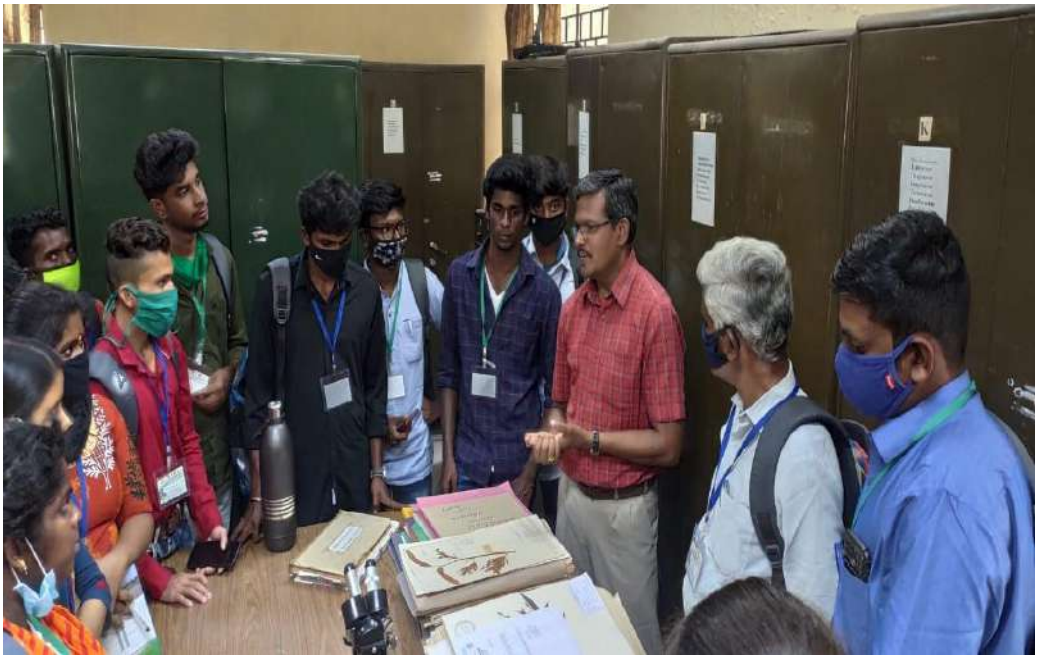
Introduction to Forestry

After the introductory session, a lecture on "Introduction to Forestry" was delivered by Dr Kannan C.S. Warrier, Scientist F, Coordinator ENVIS, Nodal officer GSDP and Training in-charge. In his lecture, Dr Warrier explained the need for quality planting stocks and covered the basic details on forestry. He also gave an idea about various techniques used in selecting Candidate Plus Trees (CPTs), Plus Trees and Elite Trees. He also detailed on techniques to induce juvenility and briefed the process of selection of tree cuttings and the procedures followed in the nursery for selection of cuttings. He also covered the basics of the clonal forestry, vegetative propagation and benefits & risks of using clones in forestry.



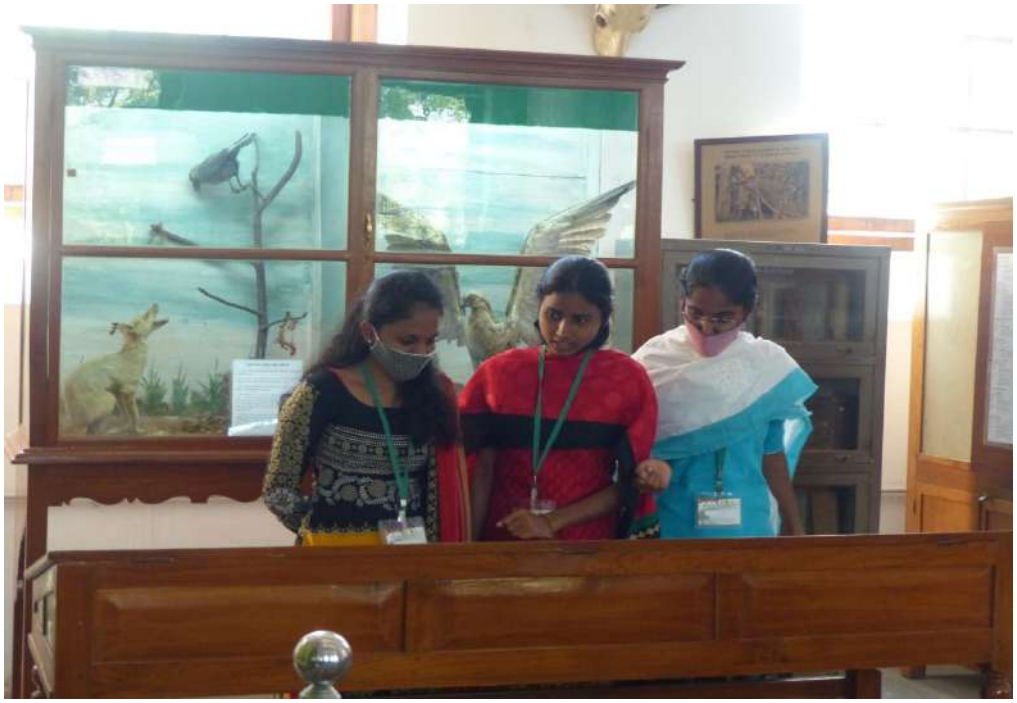
Fischer Herbarium (FRC) Visit

The Trainees were taken to Fischer Herbarium, which is recognized as a National Repository by Government of India. Dr S.P Subramani, Chief Technical Officer welcomed the trainees and explained that the herbarium was established in 1911 and houses very valuable collections of officials like C.E.C. Fischer, T.F.Bourdillon and M. Rama Rao from Andhra Pradesh, Karnataka and Tamil Nadu and Kerala. Presently, the herbarium has a collection of 15881 specimens of 3259 species with 1329 genera belonging to 172 families including thousands of recent collections with isotypes. Several stakeholders, students and research workers from different universities and R&D organizations in the country are utilizing these facilities, Dr Subramani added. Basics of Taxonomy, the use of Herbarium for Researchers and the steps in creating the herbarium sheets were also explained to the trainees by showing the sample herbaria sheets.



Gass Museum Visit

The trainees visited the Gass museum, which was established by Horace Archibald Gass, a British Forest Officer. Ms D. Sunita, Chief Technical Officer explained the history of the museum. The entomology section which has over 1,000 insects, with a significant part of the collection being butterflies attracts the trainees. The trainees also experienced the exhibits viz Timber, Non-Timber Forest Products, Wood Crafts, Wildlife, Entomology Mycology, Geology, Ethnology, Arms, Forest Engineering, Environment etc. This visit has enriched the candidate's knowledge and learning experience.

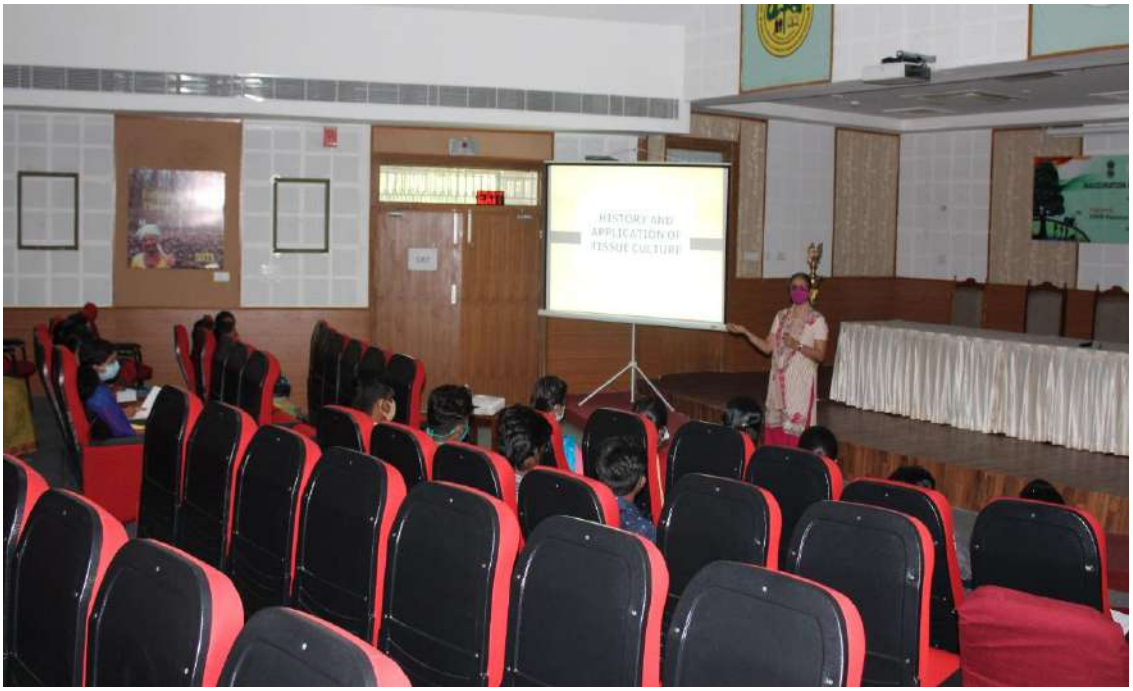


23.02.2021: - History of Plant Tissue Culture

A lecture on "History of Plant Tissue Culture" was delivered by Dr Rekha R. Warrier, Scientist F & Training in-charge. The following topics were covered in her lecture:

- Importance of tissue culture
- Various applications of tissue culture
- Contributors of tissue culture
- Types of cultures
- Synthetic seeds
- Metabolite production
- Hybridization

She elaborated on the importance of certification of Micropropagated plants and also explained the financial assistance provided by the Government.



Applications of Tissue Culture

Dr R. Yasodha, Scientist G delivered a lecture on basics of tissue culture. The following topics were covered in her lecture:

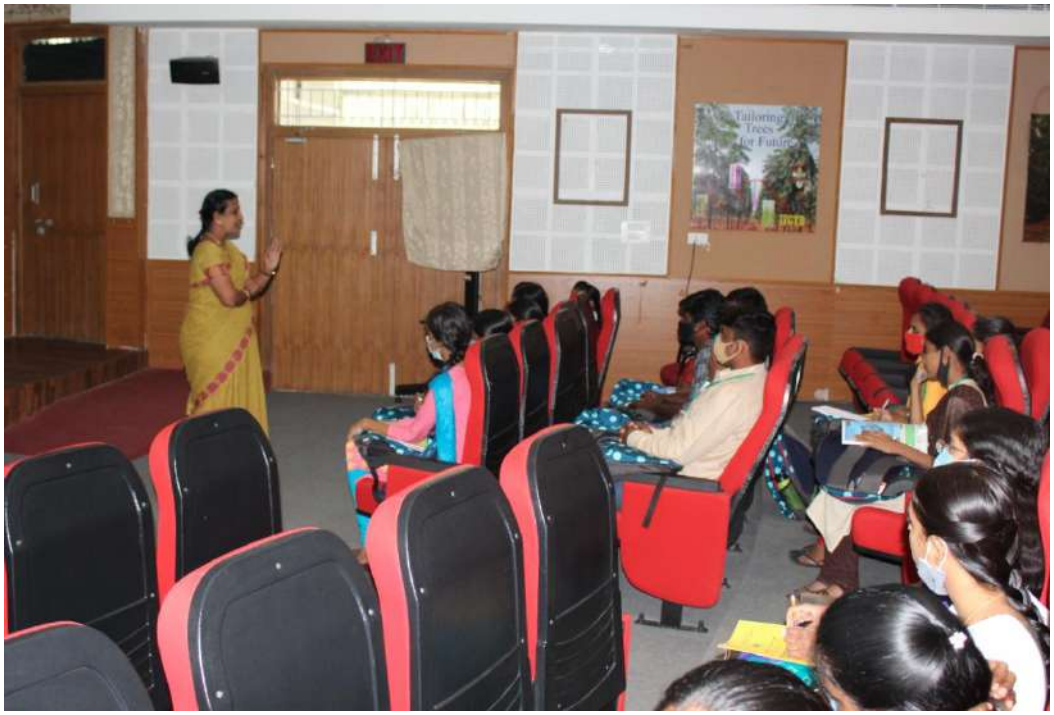
- Principles of tissue culture
- Tissue culture of forest trees
- Standard methods used for producing tissue culture material
- Pros and cons of tissue cultured plants and its applications

She also highlighted various schemes and financial assistances provided by Union and State Governments for establishing tissue culture labs. Success stories of the previous batch trainees were also shared in order to motivate the trainees.

Familiarization of Tissue Culture Lab

In order to familiarize with the equipment in the tissue culture lab, an introductory session on standard procedures to operate different equipments in the lab was taken by Mrs. R. Mahalakshmi, Technical Officer, Plant Biotechnology and Cytogenetics Division. She gave an overall idea about the following procedures:

- Autoclaving Glassware
- Explants collections
- Different types of media
- Various Culture conditions
- Basic method of washing

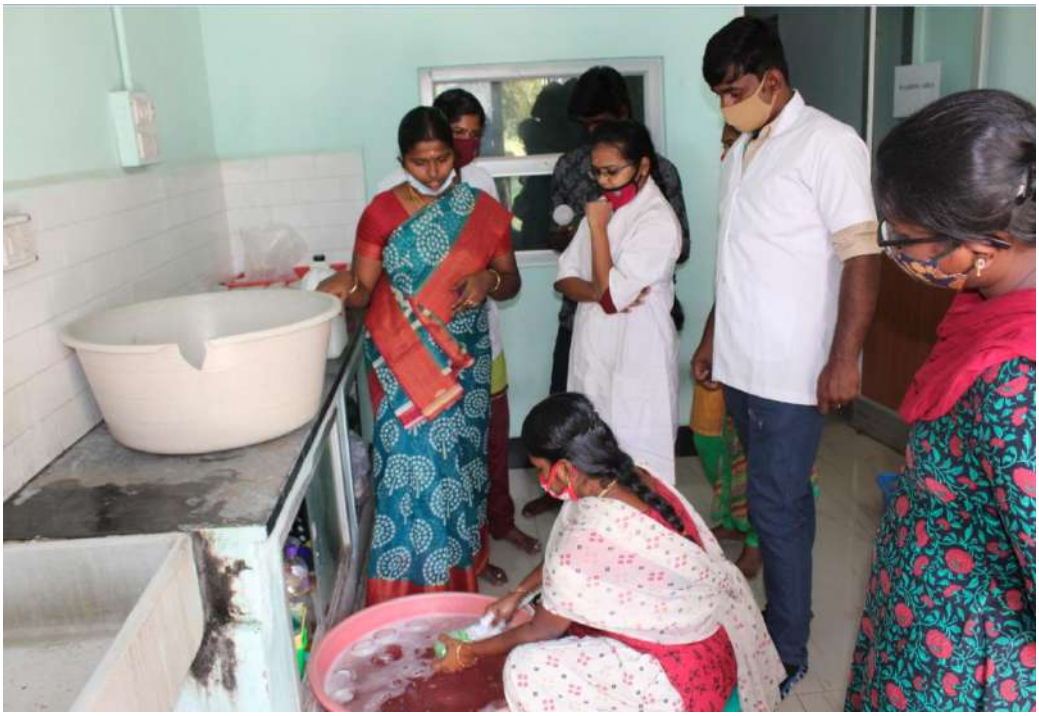


Good Laboratory practices

A lecture on “Good Laboratory Practices” was delivered by Mrs. R. Kalaiselvi, JPF, Plant Biotechnology and Cytogenetics Division. She explained the following topics briefly:

- Dos and Don’ts followed in the lab
- Personal safety and hygiene
- Standard procedures for handling the chemicals and instruments
- Types of sterilization
- Process of acclimatization
- Procedure for fumigation

After the lecture, the trainees were taken to the lab to familiarize with different equipment.



24.02.2021: - Introduction to Aseptic Techniques

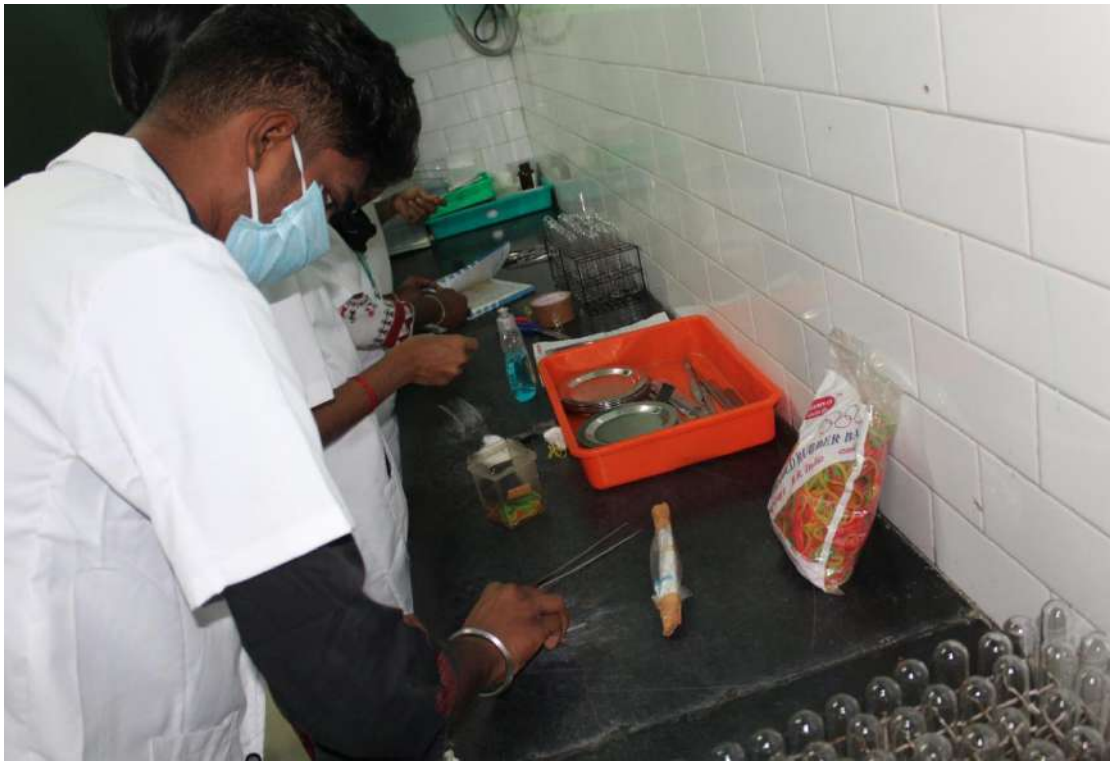
A lecture on “Introduction to Aseptic Techniques” was delivered by Ms A. Sathiya, Field Assistant. She explained how aseptic technique helps to prevent the spread of pathogens that cause infections. Various aseptic techniques for tissue culture experimentation along with the pros and cons were explained to the trainees.

Laboratory Session

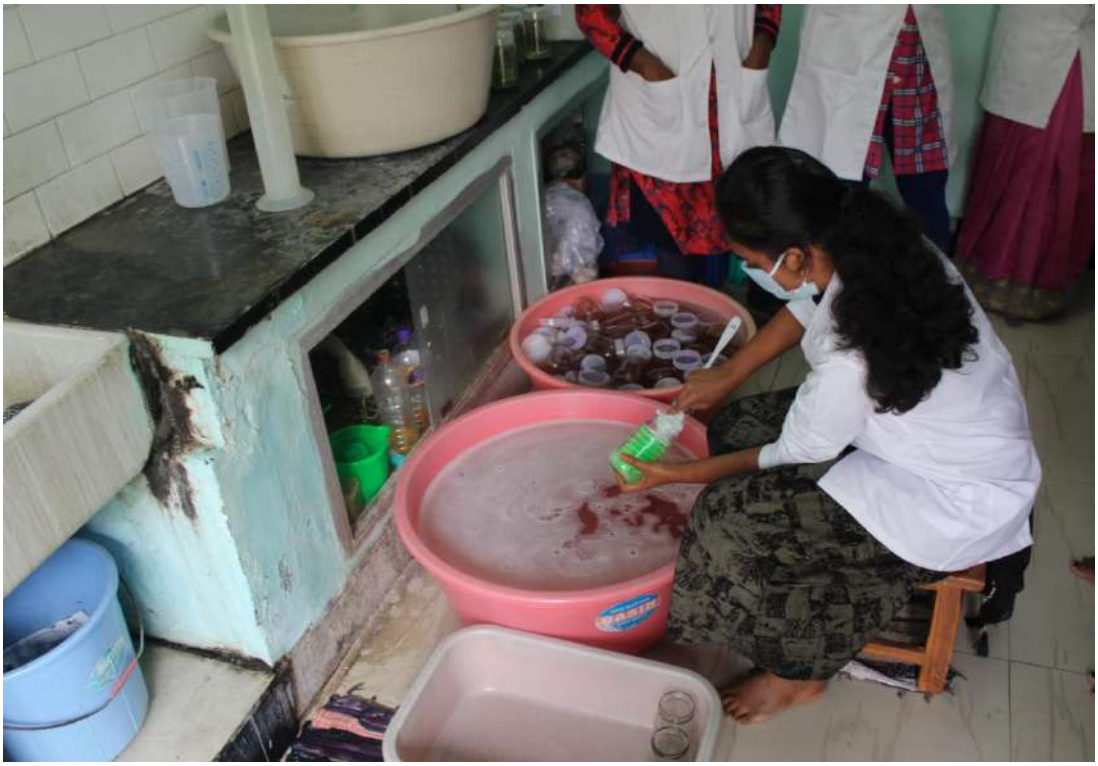
The trainees were taken to tissue culture lab for providing practical training. Ms. K. Chitra, Technician, Plant Biotechnology and Cytogenetics Division and her team taught the following:

- Categories of glassware
- Basic steps in cleaning equipment
- General Methods of cleaning glassware
- Common Lab Chemicals used for cleaning Glassware
- Process of decontaminating glassware

They also gave an overall idea about the procedures and special precautions to be followed for handling the glassware in the laboratory.



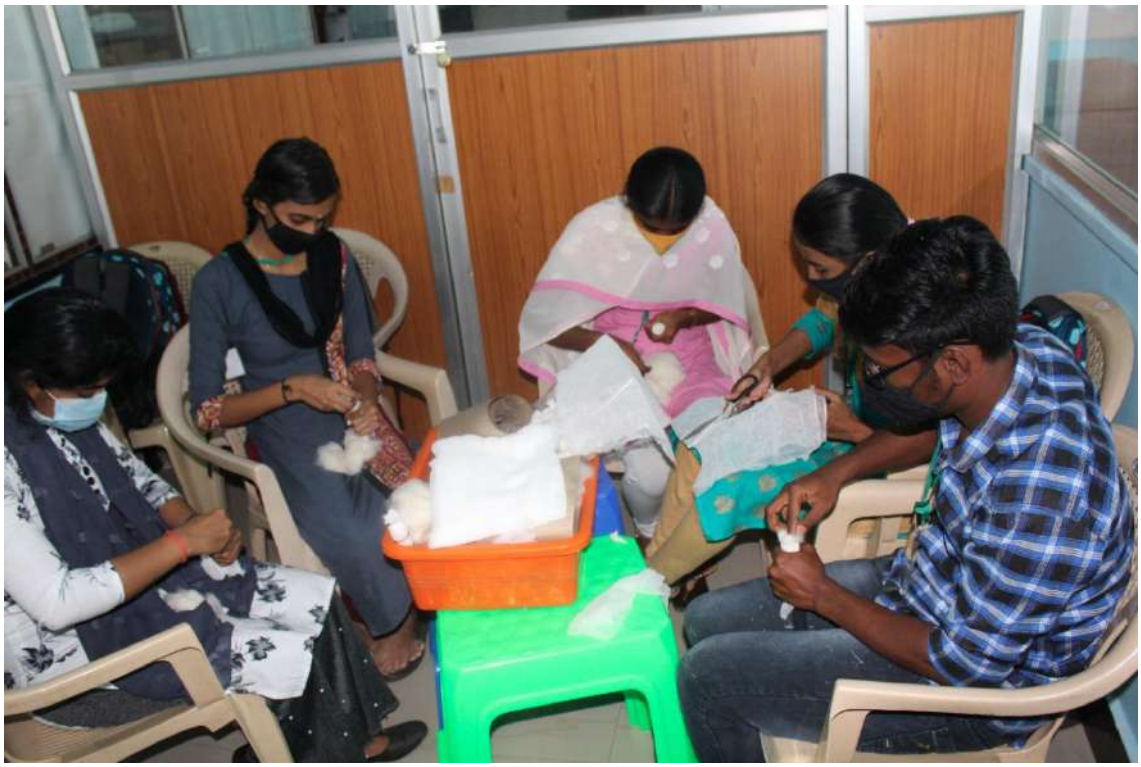
Hands on training were given to the trainees and they were taught how to properly clean various glassware in the laboratory. Trainees were given guidance and support throughout their practical session.



Ms. R. Kalaiselvi, JPF and Ms. S. Arathi Plant Biotechnology and Cytogenetics Division taught about the following:

- Basics of contamination
- Categories of cell culture Contaminants
- Types of bacterial and fungal contamination in cultures
- Major contaminating agents
- Procedure for Identifying Cell Culture Contaminations
- Procedures to reduce contaminations
- General idea about Laminar air flow
- Horizontal and vertical Laminar flow
- Various sterilization procedures

They practically briefed how cultures can become contaminated and explained procedures to detect it.

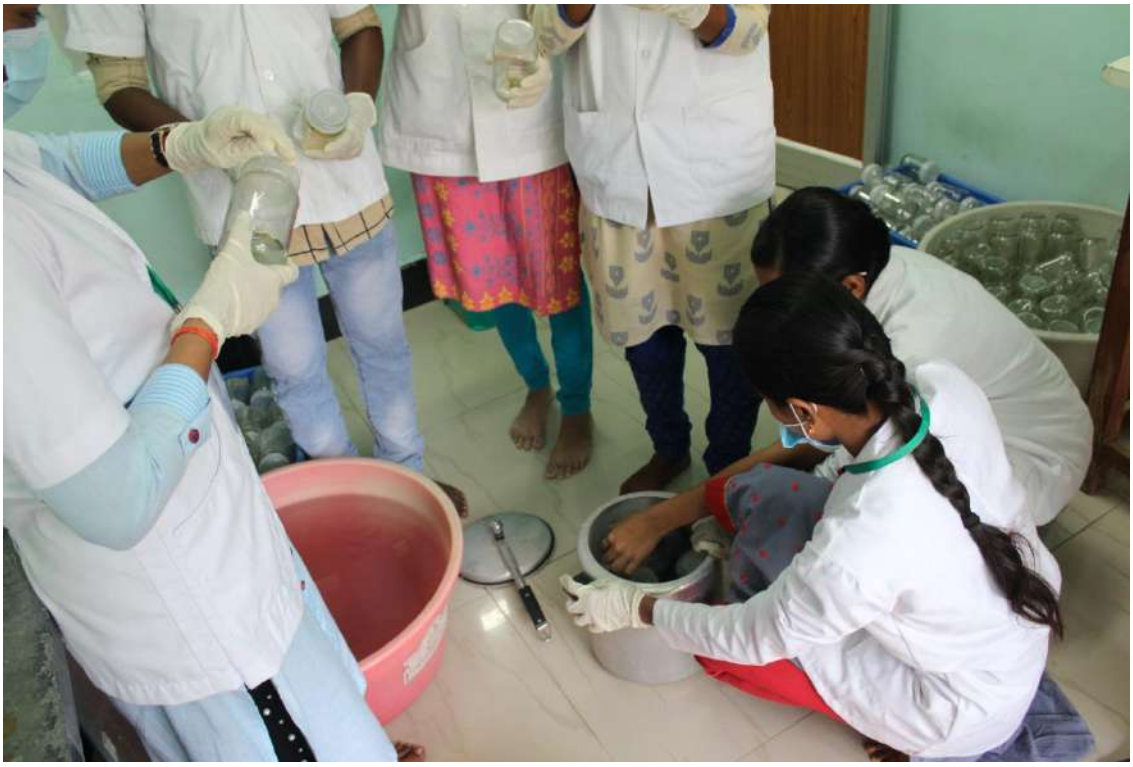


The importance of the use of Cotton plugs in lab was explained to the trainees. How cotton plugs acts as best filters of microbes was also explained. The procedure for preparing cotton plugs were taught to trainees and they also trained to prepare cotton plugs.

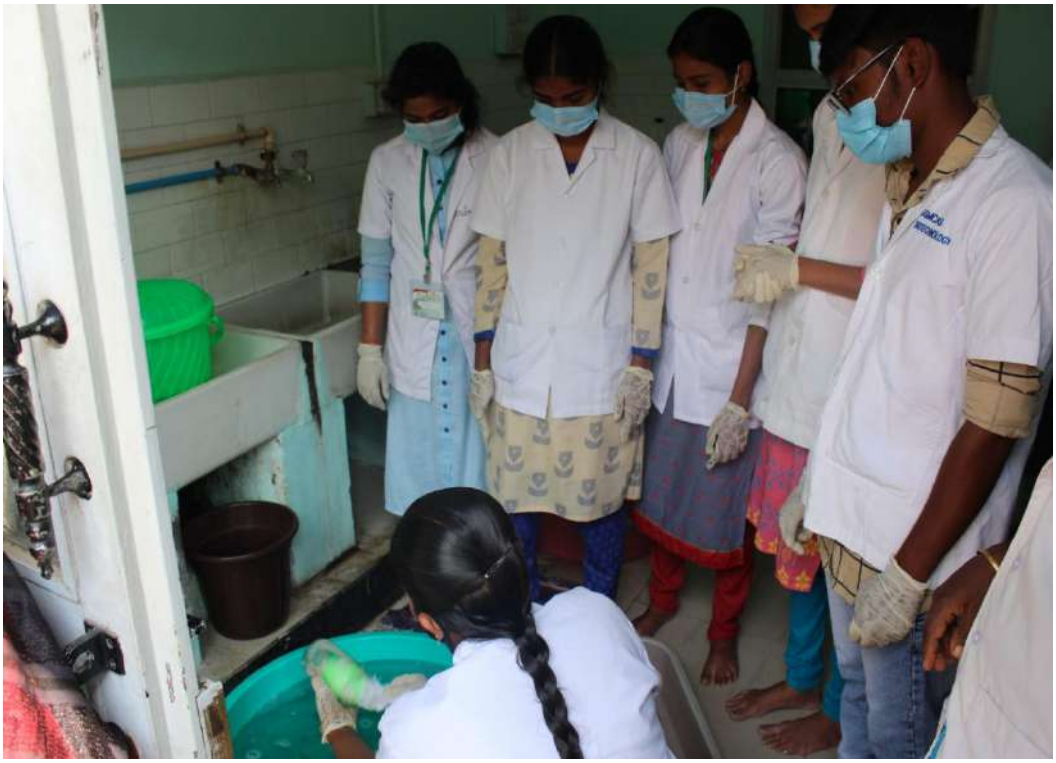
25.02.2021:- Laboratory Session

Ms. K. Chitra, Technician and Ms. A. Sathya, Field Assistant Plant Biotechnology and Cytogenetics Division gave the following hands on training to the trainees in tissue culture lab:

- Washing various equipment
- Rinsing and cleaning of instruments (physically and Chemically)
- Steps followed prior to sterilization
- Handling of various equipment
- How to handle chemicals while cleaning



After the practical session, the trainees were taken to wash area. Ms. R. Kalaiselvi, JPF and Ms. S. Arathi, JPF, Plant Biotechnology and Cytogenetics Division gave a demo on washing procedures. They demonstrated how to handle chemicals while washing and gave tips for cleaning laboratory instruments. Finally, the trainees practically trained on washing and cleaning of bottles, test tubes, forceps and scalpel. The trainees were also given hands on training on how to clean and pack plates, forceps, scalpel, test tubes and Petri plates prior to sterilization.

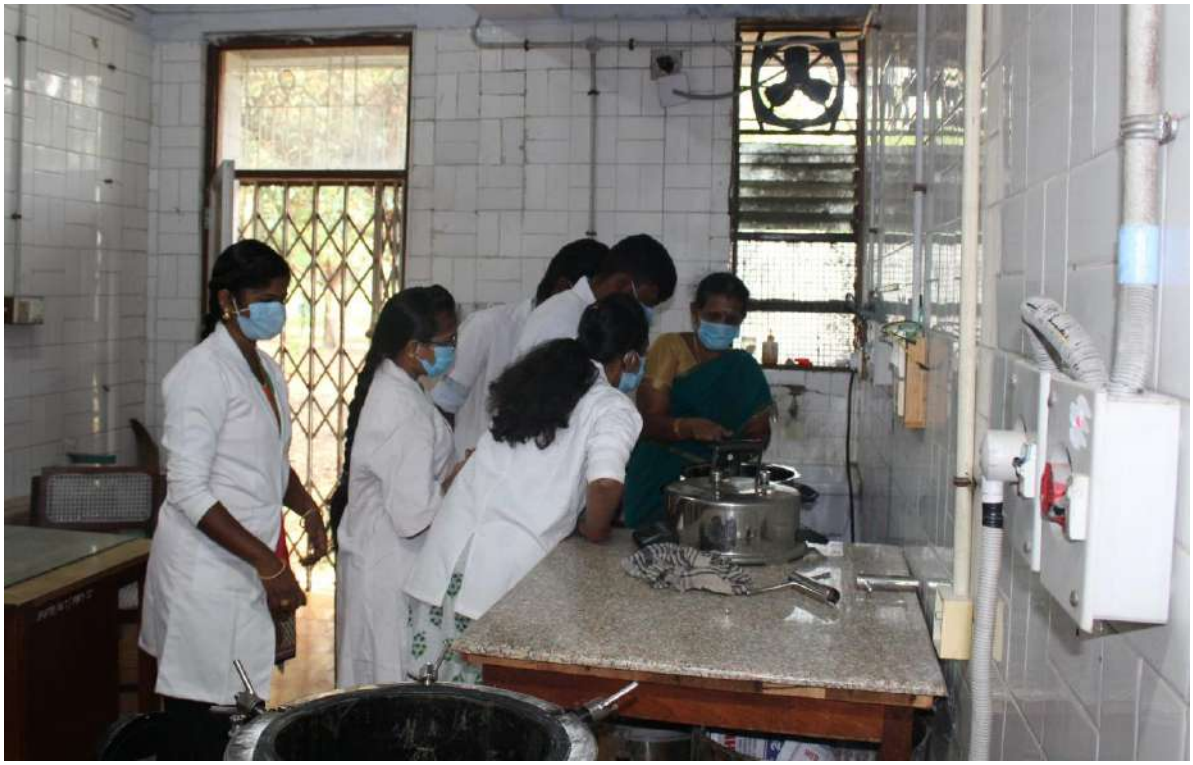


Lab exercises to prepare cotton plugs were given to the trainees. The preparation of cotton plugs was monitored by Ms.R. Kalaiselvi, JPF and her team. The trainees successfully prepared the cotton plugs. The entire session was carried out under the supervision of Ms. R. Mahalakshimi, Technical Officer, Plant Biotechnology and Cytogenetics Division

26.02.2021:-Laboratory Session

Standard operating procedures to be followed in the tissue culture lab and the importance of following safety measures like wearing appropriate gloves, lab coat and eye protection whenever using chemical disinfectants were explained by Ms.R. Mahalakshimi, Technical Officer, Plant Biotechnology and Cytogenetics Division. Ms. K. Chitra, Technician and Ms. A. Sathya, Field Assistant Plant Biotechnology and Cytogenetics Division gave the following hands on training to the trainees:

- Decontaminating bottles and petri plates
- Sterilisation
- Autoclaving using pressure cooker
- How to store the media
- Bleaching of cultures



The trainees were taken to Autoclave room. Ms. R. Kalaiselvi, JPF and Ms. S. Arathi, JPF, Plant Biotechnology and Cytogenetics explained how Autoclaves use pressurized steam to destroy microorganisms. Decontamination of laboratory waste and the sterilization of laboratory glassware, media, and reagents using autoclave were also taught.

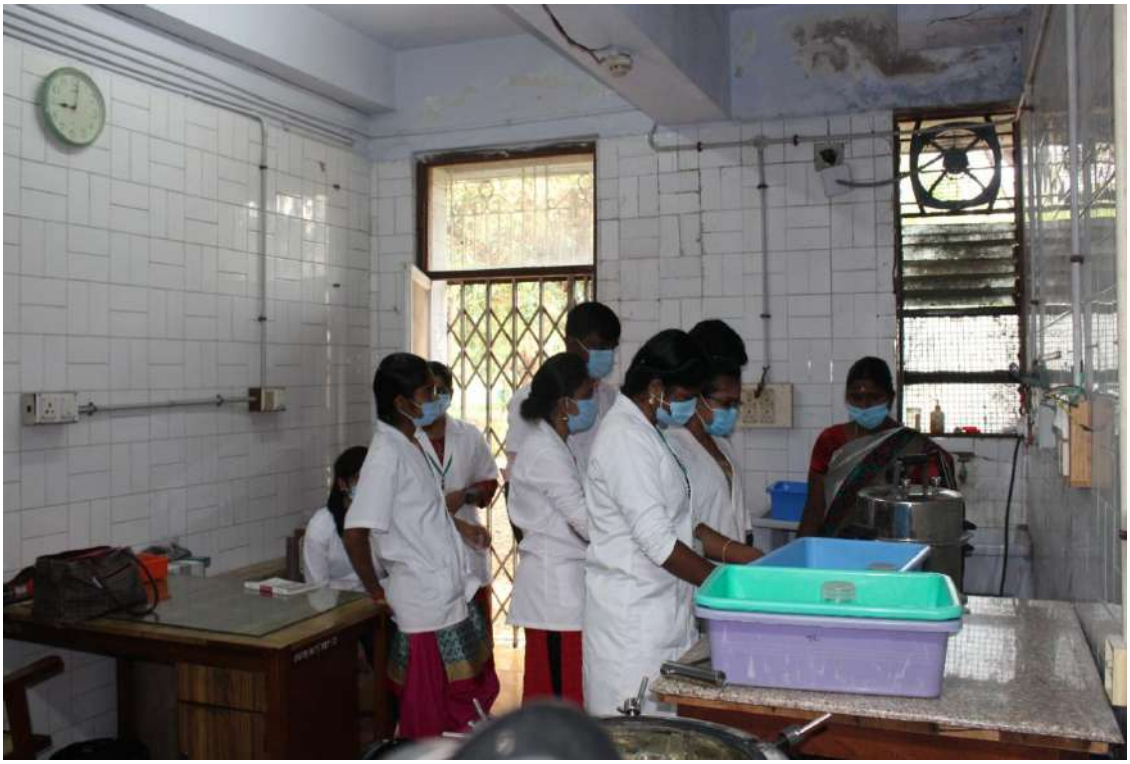
Trainees washed the media bottles required for autoclaving and kept them for drying.

27.02.2021:-Laboratory Session

The trainees were split into three groups and exercises to sterilize tissue culture bottles were given. The instruments were sterilized using autoclave method under the supervision of Ms. R. Mahalakshimi, Technical Officer, Plant Biotechnology and Cytogenetics Division. The basic concept of sterilizing different materials using direct contact with steam at specific temperatures & pressures were taught to the trainees. The processes of setting temperature, pressure and time etc in autoclave were taught to the trainees practically. The importances of wearing appropriate protective equipment while unloading the autoclave were also discussed.

Evaluation

A written exam was conducted to evaluate the trainees. Ms. S. Arathi, Junior Project Fellow, Plant Biotechnology and Cytogenetics Division tested the trainees upon how much they had understood and retained from the previous sessions.



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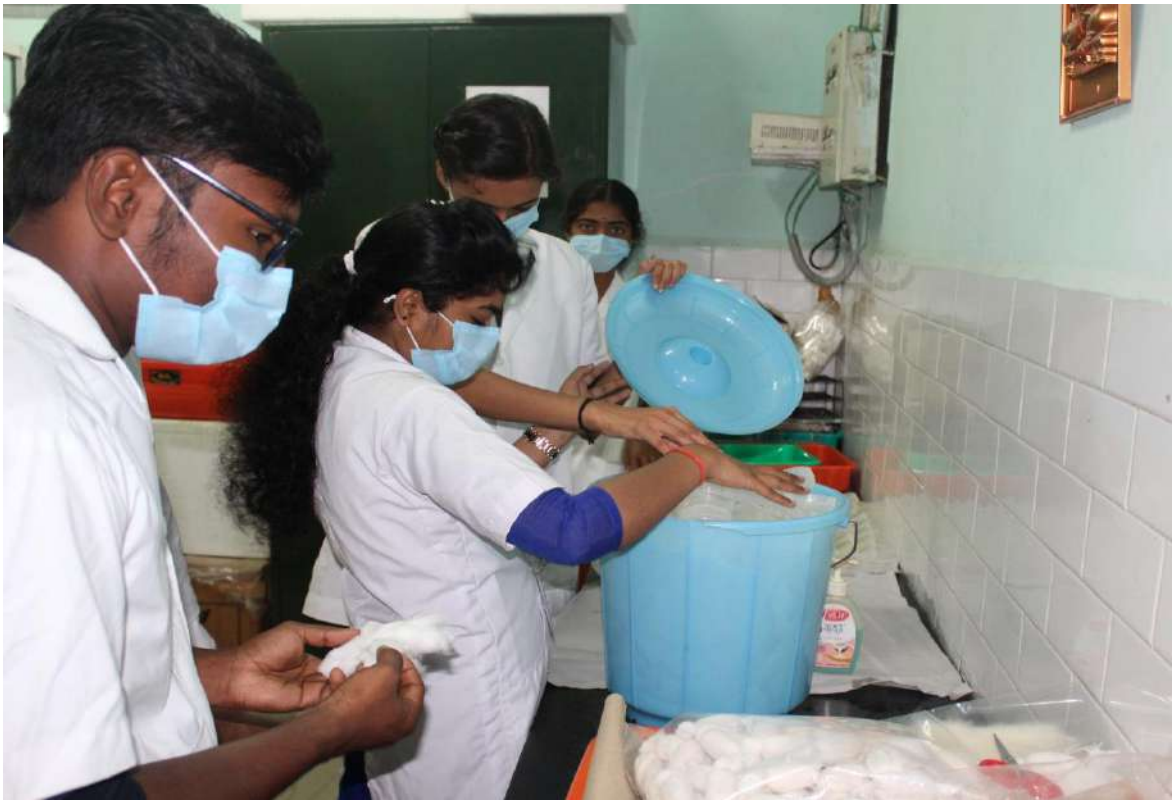
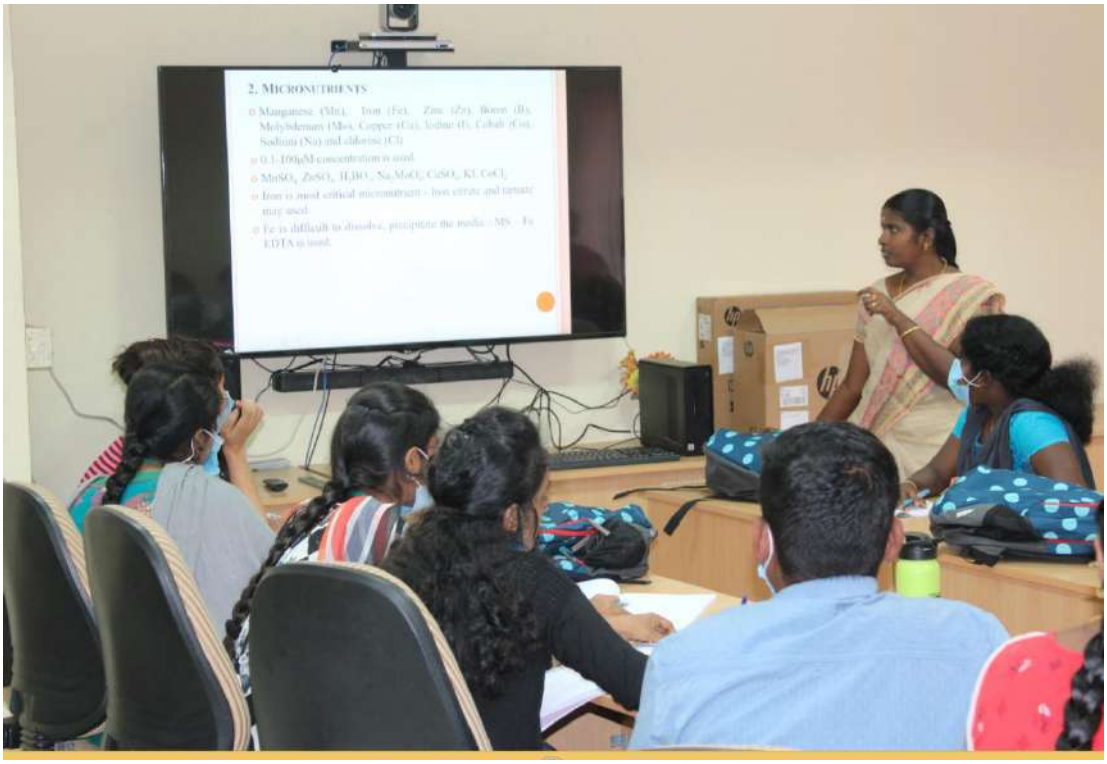


01.03.2021:- Lecture on Media Components

Feedback for 1st week was obtained from trainees. A lecture on media components was delivered to the trainees by Ms R. Kalaiselvi, Junior Project Fellow, Plant Biotechnology and Cytogenetics Division. The following topics were covered in her lecture:

- Composition of culture media
- Types of media
- How medias are classified based on consistency of nutritional component
- functional use of media



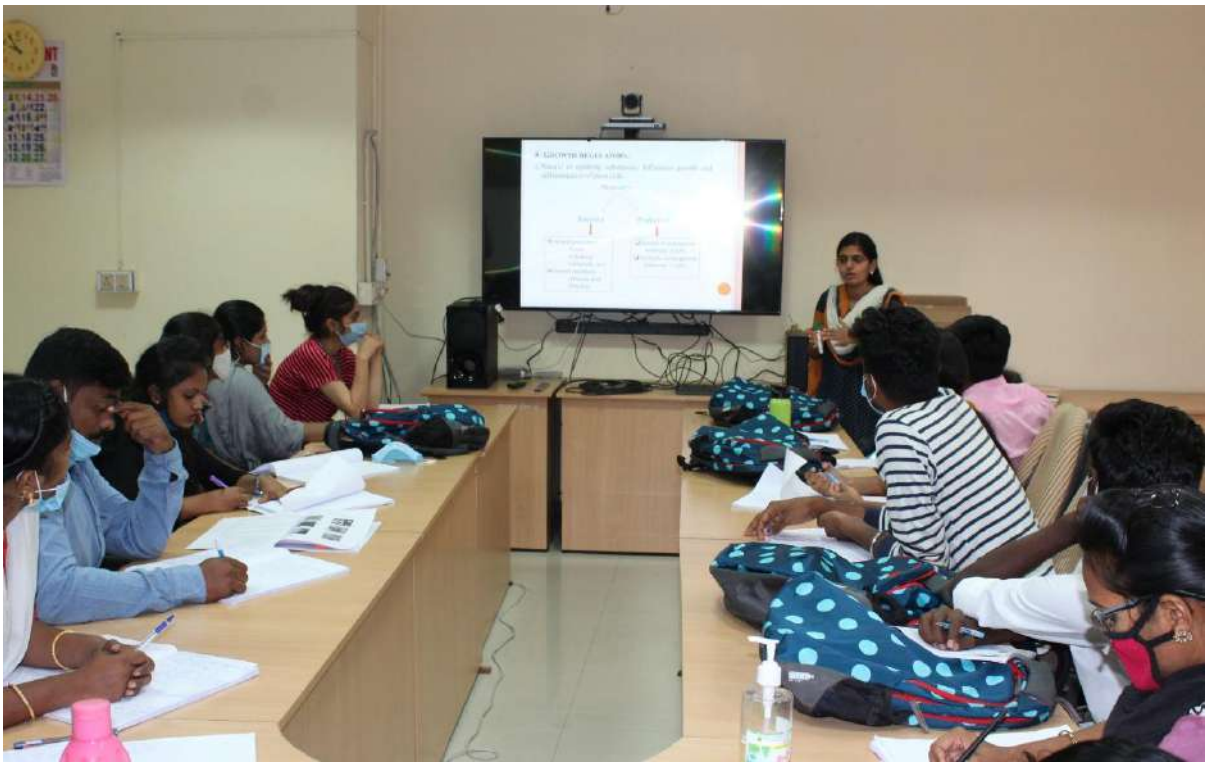
She also briefed about the usage of macronutrients, micronutrients, vitamins, amino acids/nitrogen supplements, source(s) of carbon, undefined organic supplements, growth regulators and solidifying agents. The trainees got an overall idea about the quantity and types of different components that are added into the media.

Lecture on Plant Hormones

Ms S. Arathi, Junior Project Fellow, Plant Biotechnology and Cytogenetics Division gave a lecture on the role of plant hormones in tissue culture. The following topics were covered in her lecture:

- Recognized groups of plant hormones
- How they hormones work together in coordinating the growth and development of cells
- The role of hormones in intercellular communication

In addition, she also explained the role of auxins, gibberellins, cytokinins, abscisic acid (ABA) and ethylene in tissue culture.



Lecture on Types of Media

Ms S. Mohana Priya, Field Assistant, Plant Biotechnology and Cytogenetics Division gave a lecture on functions of media. She highlighted the different types of media and how media provides water and nutritional needs.

Hands on Training on calculations

Dr Rekha R.Warrier, Scientist-F & Training in-charge gave an introduction about calculating the normality of a solution and steps involved in calculating the normality. Ms R. Kalaiselvi, JPF and Ms S. Arathi, JPF gave hands on training on calculations of normality of various solutions. The trainees were taught how to find Normality with Molarity and Calculating Normality with Equivalent Weight. Assignment on morality calculations were given to the trainees.

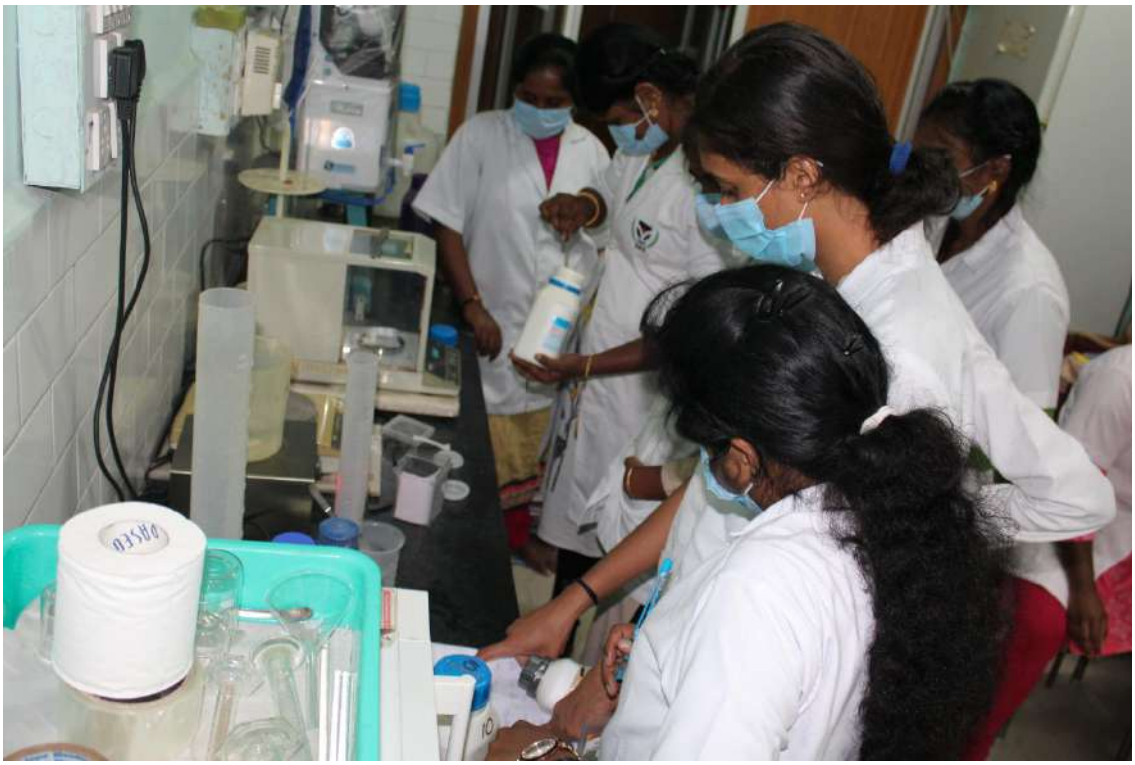
02.03.2021- Lecture on Preparation of Stock Solution

The assignments given to the trainees were evaluated. Trainees presented their calculations one by one. Ms. R. Kalaiselvi, JPF, gave a lecture on the preparation of stock solutions using MS medium and PGR. The following topics were covered in her lecture:

- The role of MS medium
- Major nutrients required for the preparation
- Steps involved in the preparation
- Materials and methods used
- How to improve the preparation of stock solutions for MS culture medium
- How to improve and calculate quantities of chemicals needed for given concentrations and stock volumes

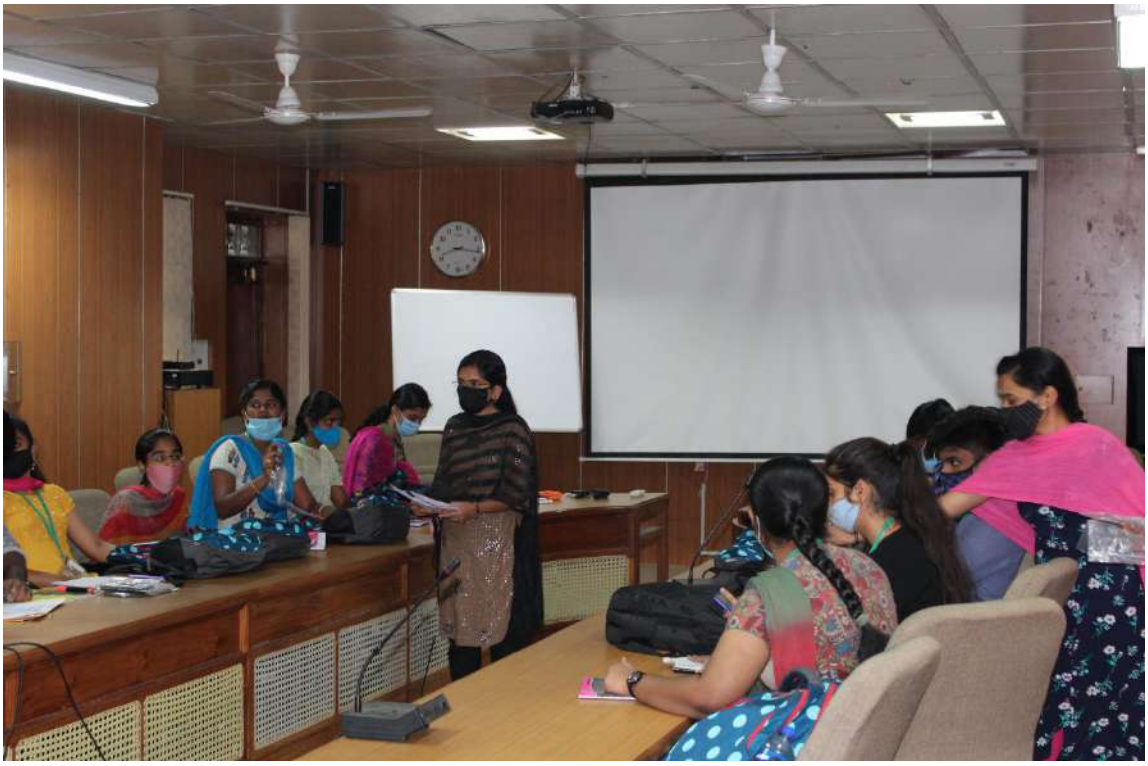
Training on the Preparation of Stock Solution

Hands on training to prepare the stock solutions were given to the trainees by Ms R. Kalaiselvi, JPF and Ms. S. Arathi, JPF under the guidance of Dr Rekha R.Warrier, Scientist F & Training in-charge. The trainees were trained on the usage of macronutrients, micronutrients, vitamins, amino acids, pH solutions, growth regulators and solidifying agents etc.



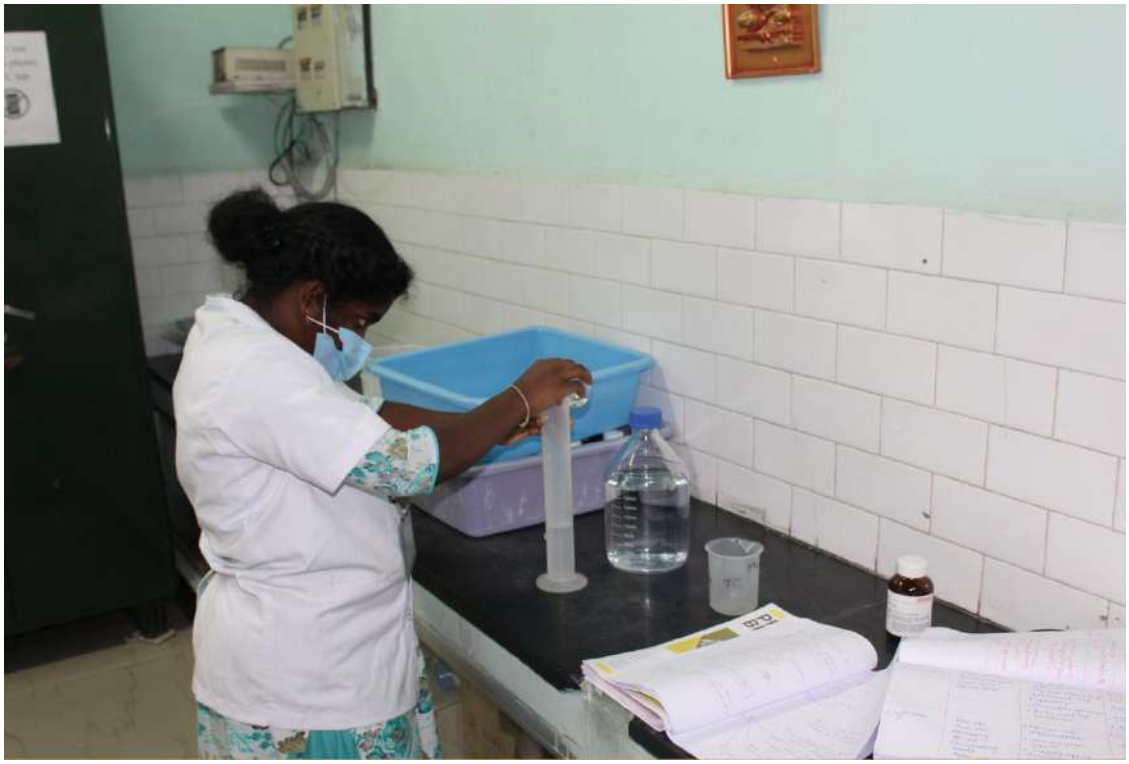
03.03.2021:- Presentation by Trainees

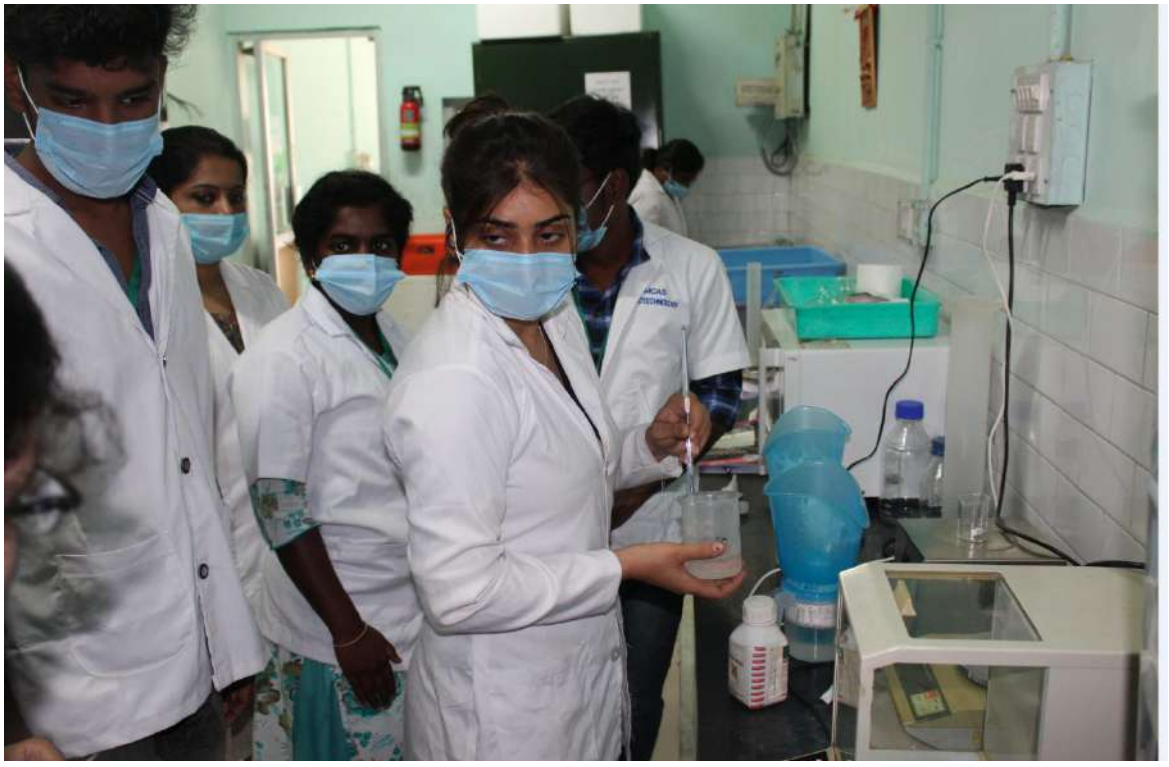
The pitfalls in molarity and normality calculations presented by the trainees were rectified by Ms. S. Arathi, JPF , Plant Biotechnology and Cytogenetics Division. Tips were given to the trainees to analyze problems, identify problem severity and assess the impact of alternative calculations. The process of calculating the requirements was also taught to the trainees and they were instructed to solve sample problems.



Preparation of Media

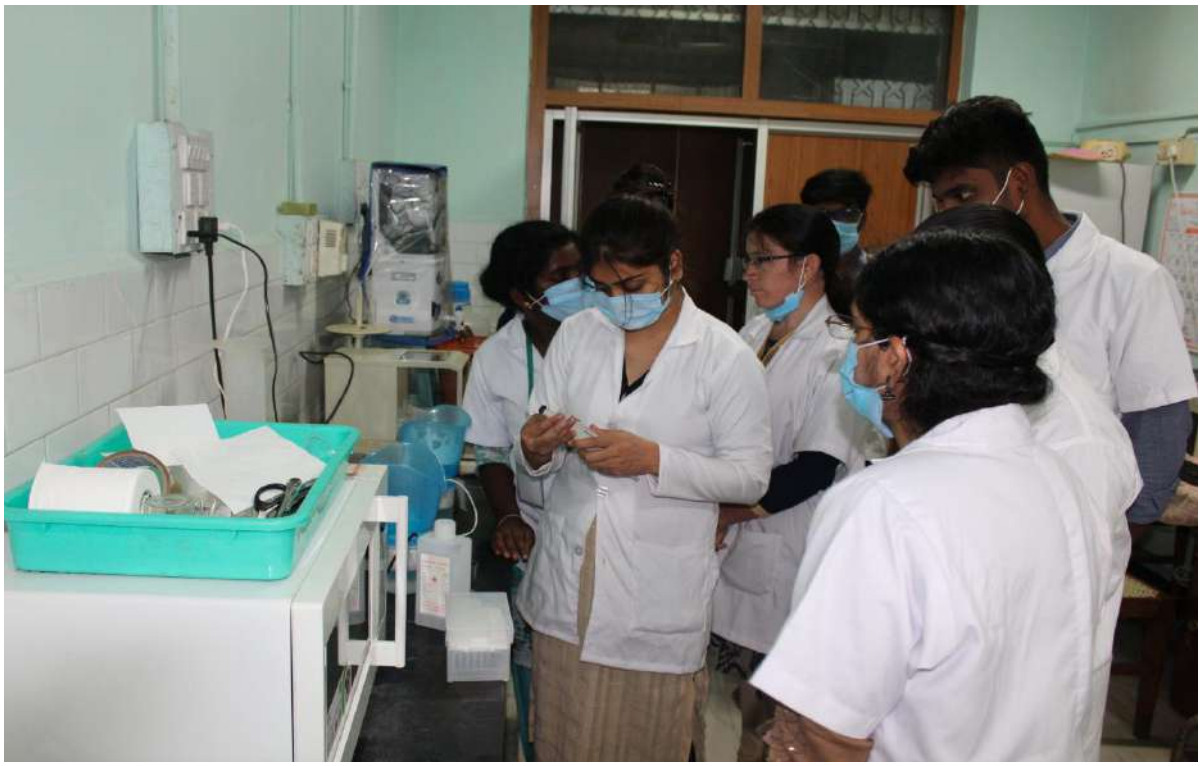
The trainees were split into 03 groups and individually prepared MS media from the stock solutions under the supervision of Dr Rekha R.Warrier, Scientist F & Training in-charge. Each group prepared about 01 litre media and the prepared media was poured into 20 bottles. The trainees individually autoclaved the prepared media under the guidance and support of Ms. Mahalakshimi, Technical officer, Ms. Kalaiselvi, JPF and Ms. Arathi, JPF, Plant Biotechnology and Cytogenetics Division, later the autoclaved media were stored in the new tissue culture lab.

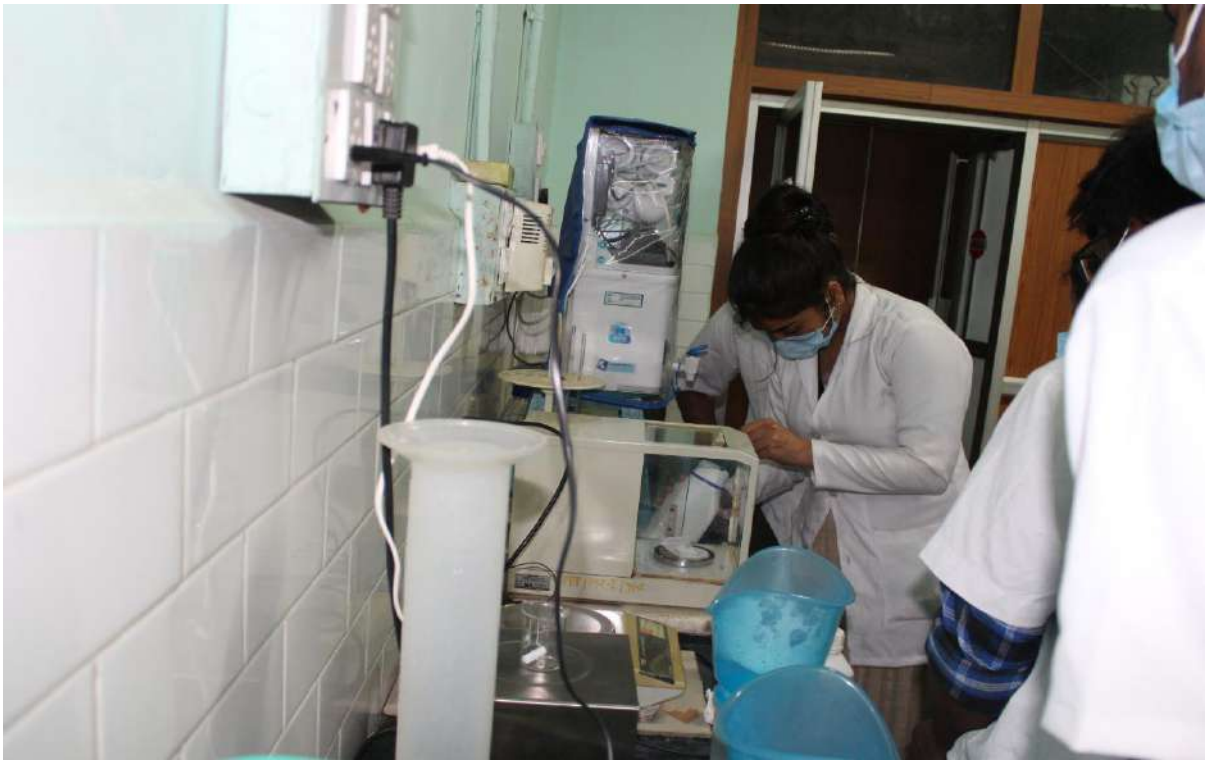




Preparation of Stock Solution

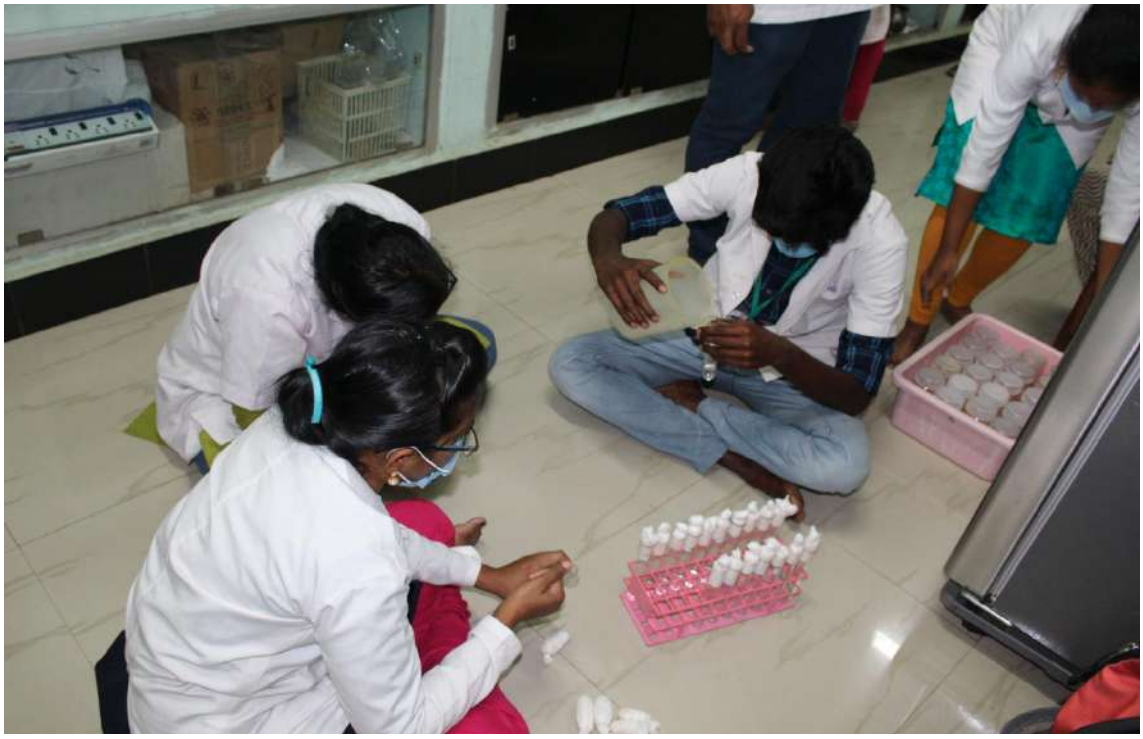
The test tubes and water required for the future lab exercises were autoclaved and stored by the trainees. The preparation was monitored by Ms. Mahalakshimi, Technical officer, Plant Biotechnology and Cytogenetics Division.





04.03.2021:- Preparation of Media

The trainees individually prepared 500 ml MS media from the stock solutions for Teak initiation and autoclaved the prepared media and stored them Ms. Mahalakshimi, Technical officer, Plant Biotechnology and Cytogenetics Division. An introductory session on explants preparation was also given to the trainees. The trainees prepared initiation and subculture media for bamboo. The prepared media were autoclaved and stored for the future use.

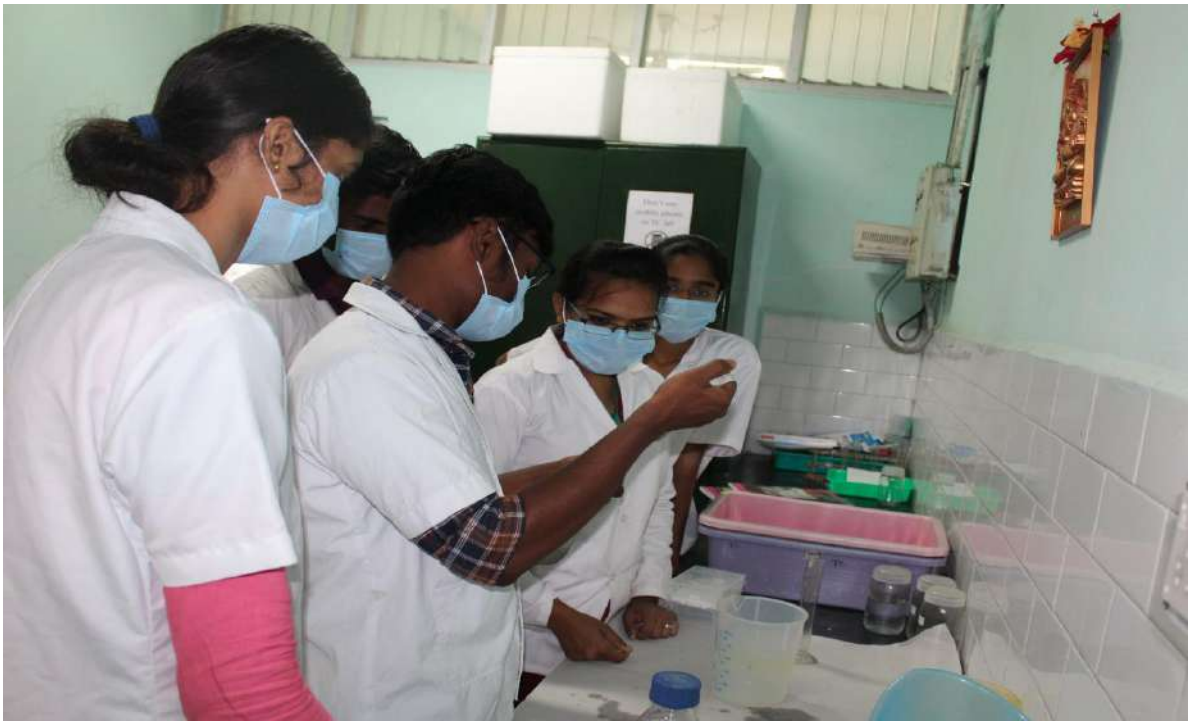


One group of the trainees broke teak seeds in order to remove the seed coat and stored them. The other group were taken to PBT nursery and trained to spray bavastin.

A group photo of the GSDP team was captured

05.03.2021:-Preparation of callus indication

The methodology for the preparation of callus induction was taught by Ms. R. Kalaiselvi, Junior Project Fellow and Ms. S. Arathi, Junior Project Fellow, Plant Biotechnology and Cytogenetics Division. They explained how the callus formation is induced from plant tissue samples (explants) after surface sterilization and plating onto tissue culture medium and also explained the role of callus cells in covering the plant wound.



Hands on Training

After the lecture the trainees were taken to the tissue culture lab, Dr Rekha R.Warrier, Scientist-F & Training in-charge gave an overall idea about the methodologies to prepare callus induction and practically trained the trainees to prepare callus induction medium. The trainees prepared 250 ml callus induction medium with two different concentrations of three hormones. The trainees individually autoclaved the prepared media and poured them into Petri plates. The prepared media were stored inside the Laminar Air Flow for UV sterilization. The entire training session was carried out by the trainees under the guidance of Ms R. Mahalakshimi, Technical Officer, Plant Biotechnology and Cytogenetics Division.

06.03.2021:- Practical session

The general methodology for the B5 medium preparation which involves the preparation of stock solutions using high purity chemicals and demineralized water were practically taught to the trainees. Trainees were trained to store stock solutions in glass/plastic containers and how to froze and use them when required. As most of the growth regulators are not soluble in water, the

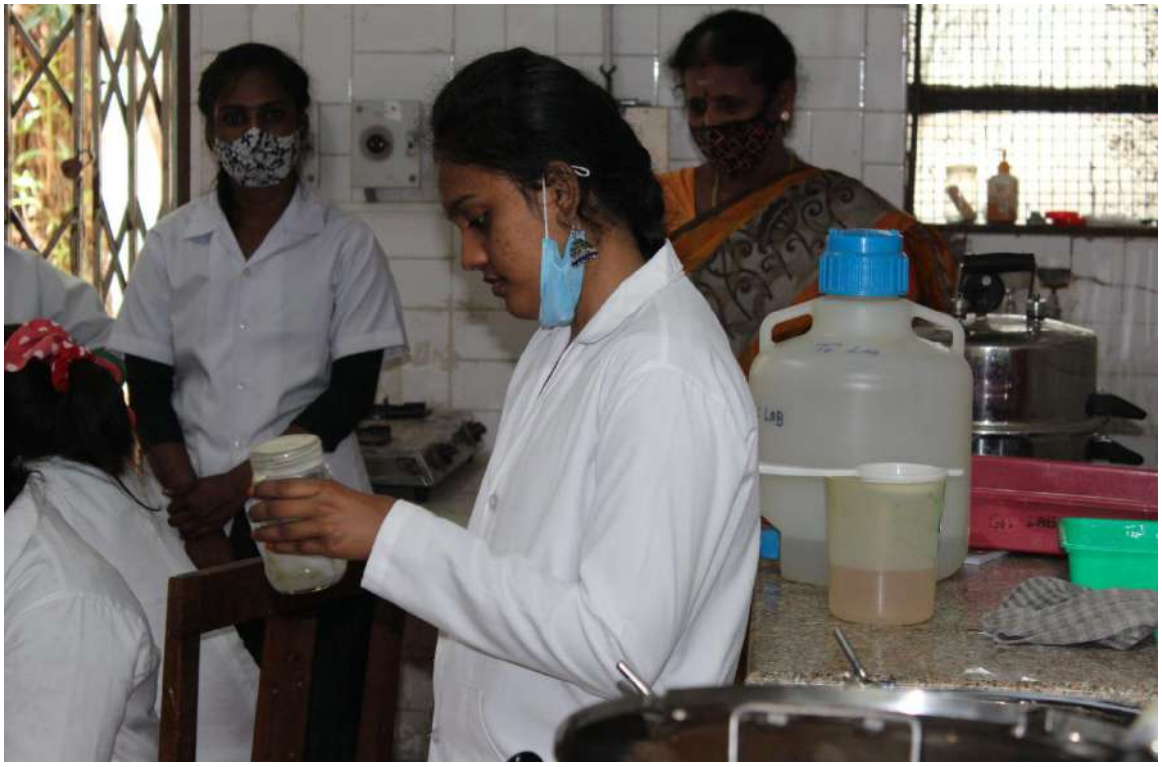
trainees were taught to dissolve them in NaOH (Sodium hydroxide) or alcohol. After the training, the trainees kept Laboratory Chemicals Safe and Secure for later use. The entire session was monitored by Ms R. Mahalakshimi, Technical officer, Plant Biotechnology and Cytogenetics Division and her team.

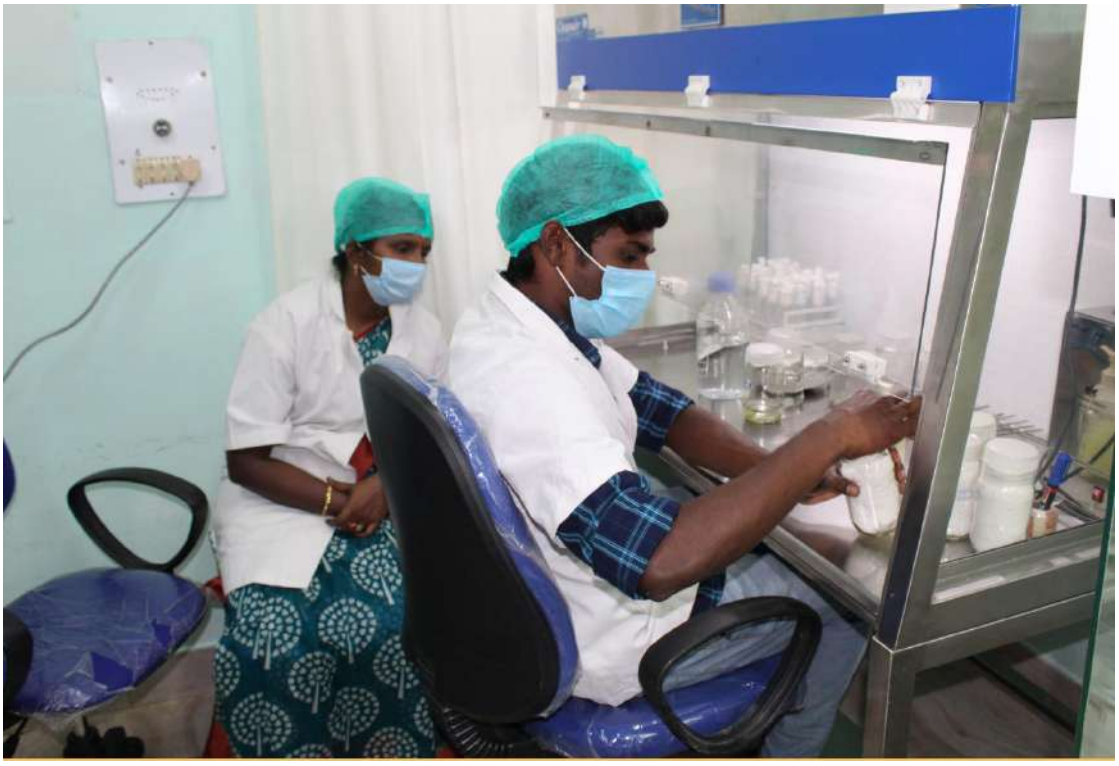
Visit to Vegetative Propagation Complex

The trainees were taken to Vegetative propagation complex in the institute, Ms.K. Chitra, Technician practically explained the procedure and importance of spraying bavistin to teak clones. As a pre-preparatory work before collecting explants, the trainees sprayed bavistin to the teak clones. An evaluation was conducted to examine the trainees performance.

08.03.2021:- Visit to vegetative propagation complex

Trainees were taken to vegetative propagation complex by Ms R. Mahalakshimi, Technical Officer, Ms. Kalaiselvi, JPF and Ms. S. Arathi, JPF, Plant Biotechnology and Cytogenetics Division. Demonstrations on collection of nodal explants were given to the trainees. Process of collecting explants, use of proper equipment during collection and storage were demonstrated to the trainees





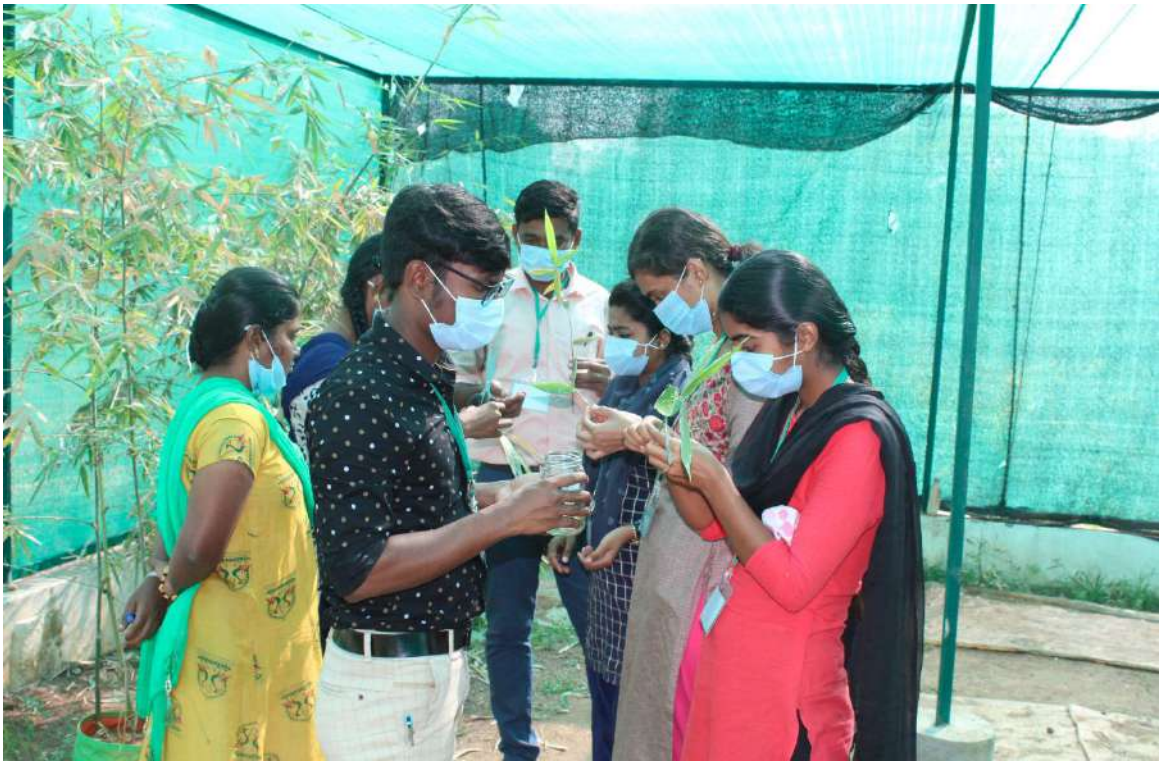
After the demo, trainees individually collected 10 nodal explants from 2 teak clones.

Surface Sterilization

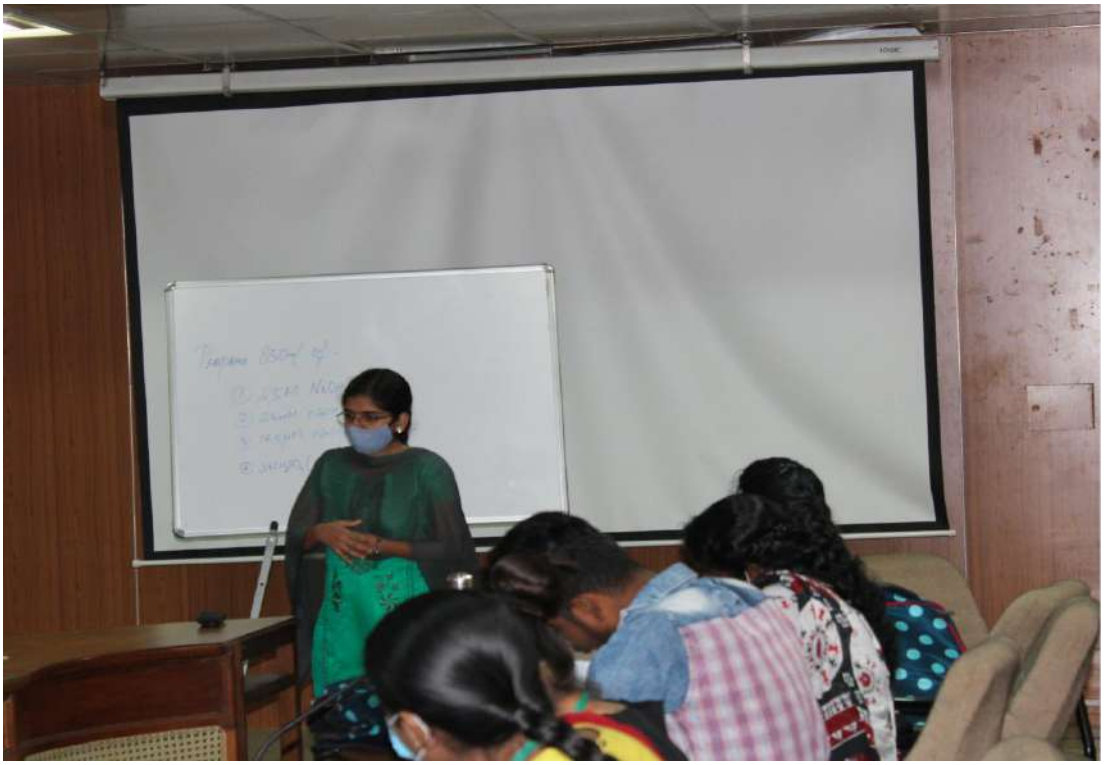
The trainees processed the collected explants which involved the immersion of explants into appropriate concentration of chemical sterilant(s)/ disinfectant(s) for a specified time resulting in the establishment of a contamination-free culture and inoculated them.

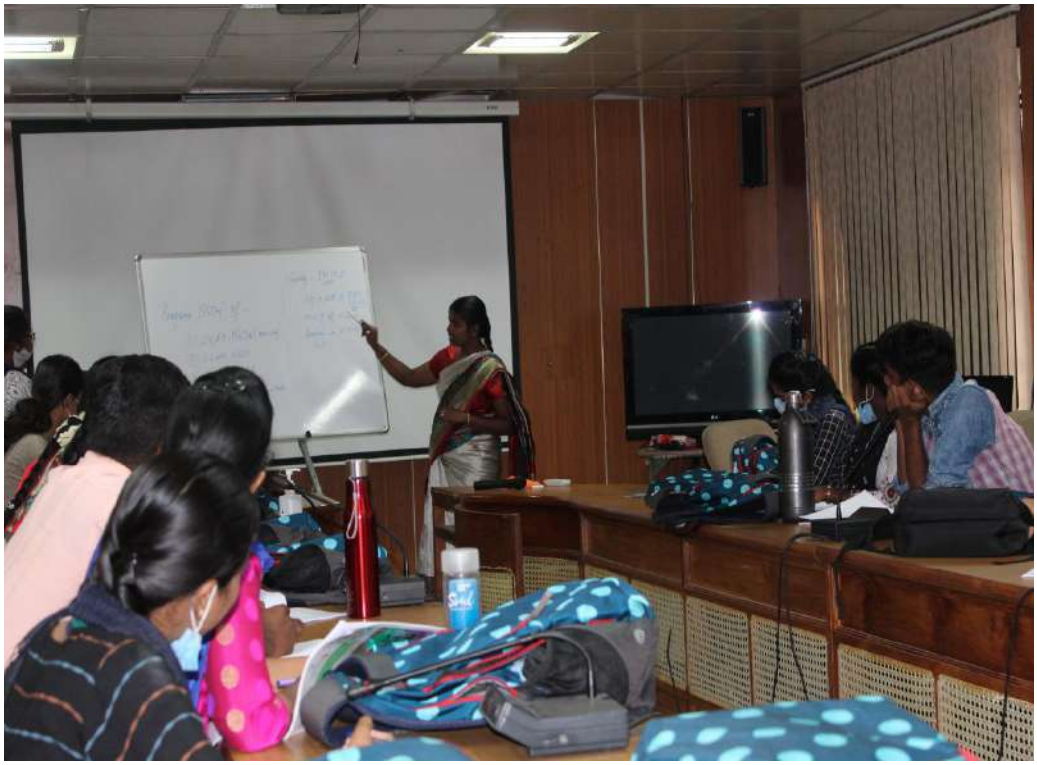
09.03.2021:- Visit to vegetative propagation complex

Trainees were taken to vegetative propagation complex, Ms A. Sathya, Field Assistant and Jeyachitra, Plant Biotechnology and Cytogenetics Division demonstrated the process of collecting bamboo explants. Later, the trainees were split into 03 groups and collected the explants from bamboo and processed the collected explants which involved the immersion of explants into appropriate concentration of chemical sterilant(s)/ disinfectant(s) for a specified time resulting in the establishment of a contamination-free culture and inoculated them.



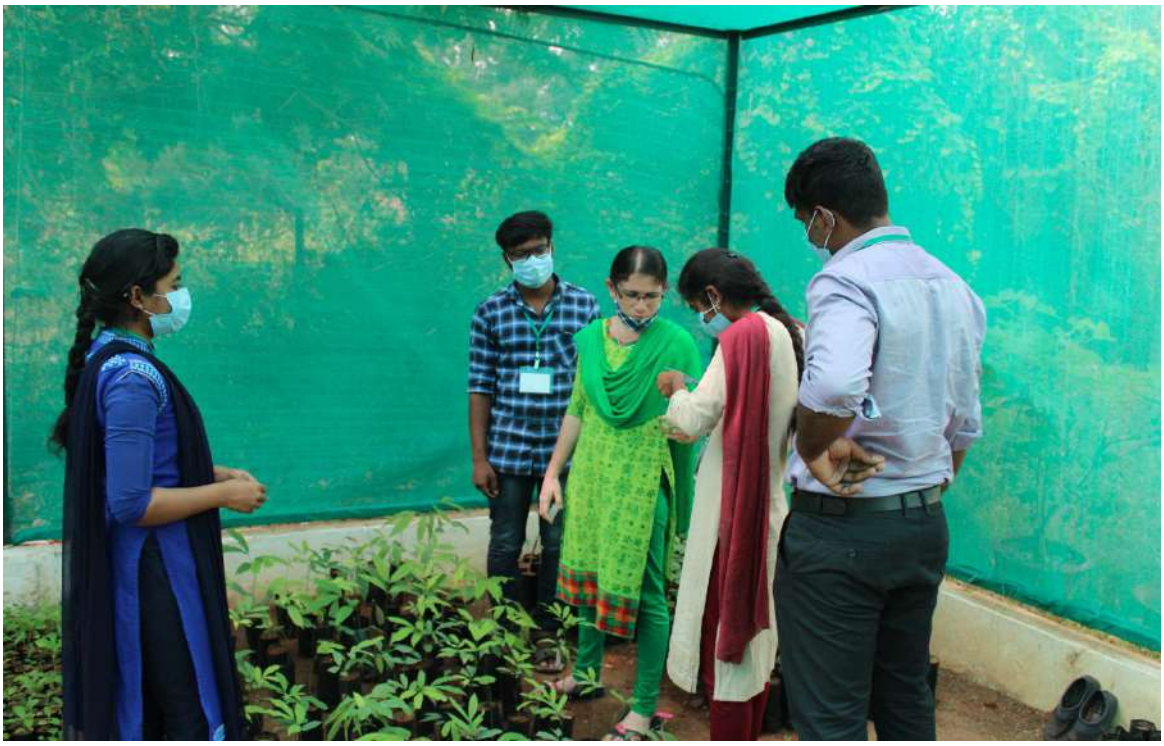
A exercise to calculate molarity and normality were given to the trainees. They have calculated the molarity and normality by considering various parameters.

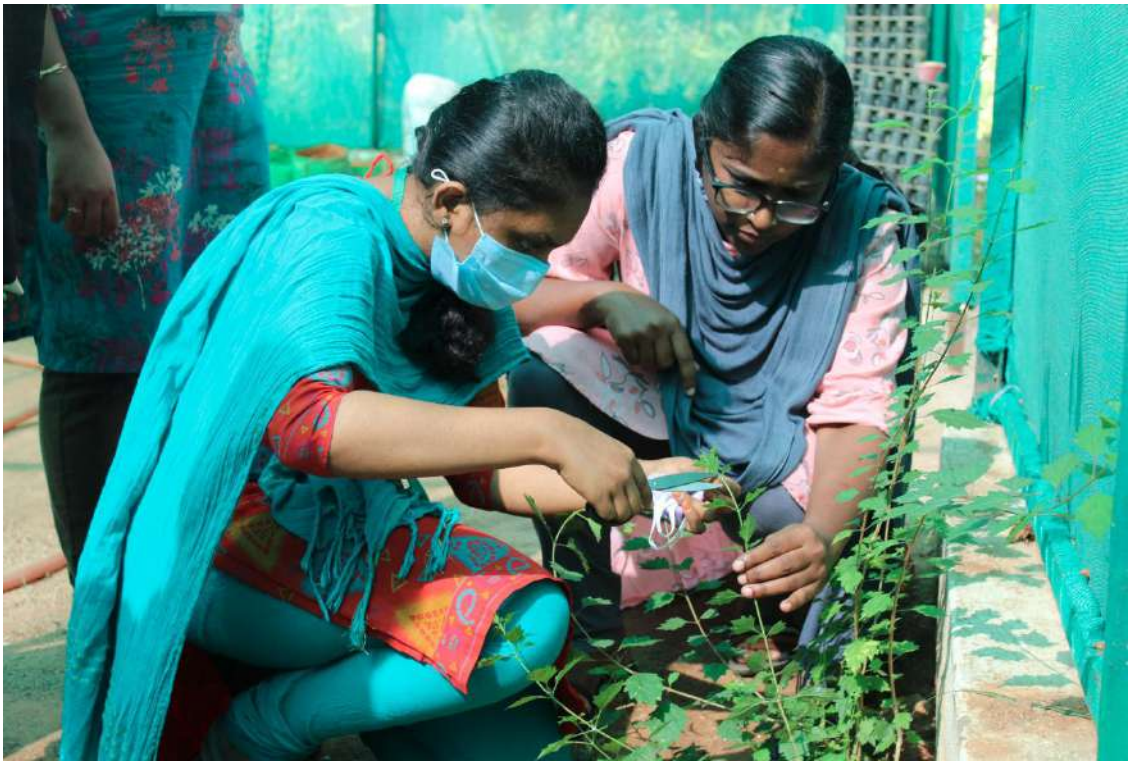




10.03.2021:- Visit to vegetative propagation complex

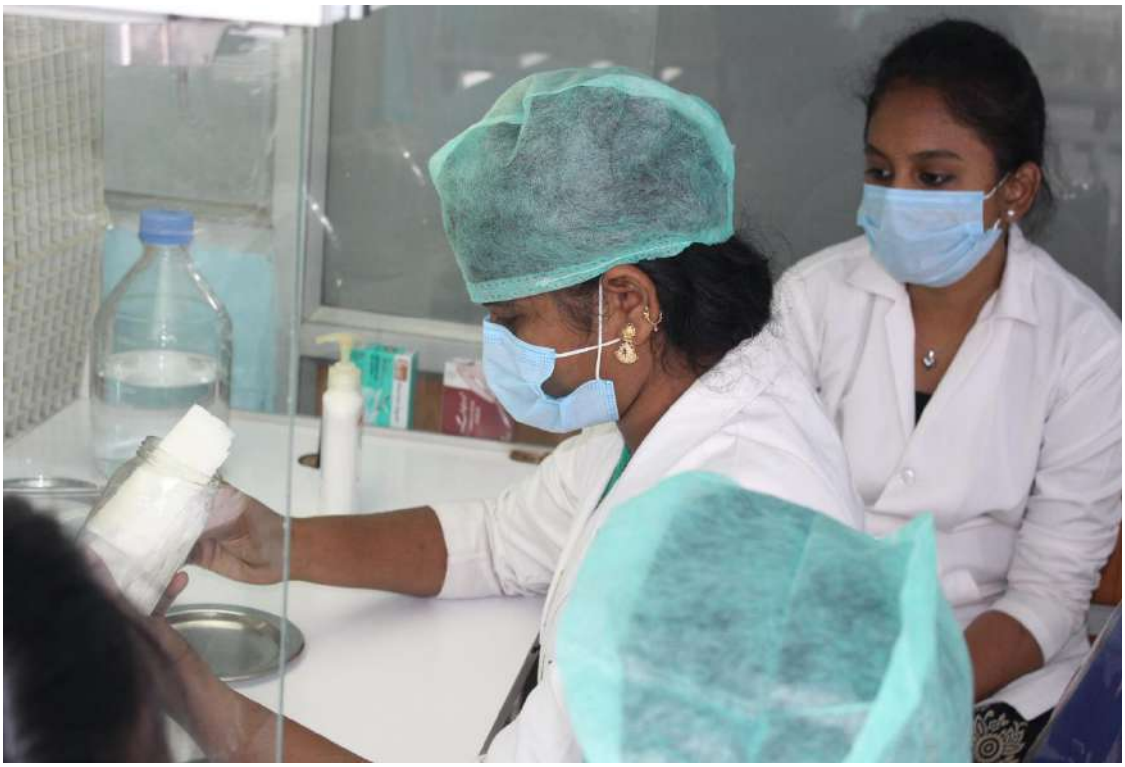
Trainees were taken to vegetative propagation complex, Ms A. Sathya, Field Assistant demonstrated the process of collecting leaves from *Saraca indica, Azadirachta indica* and *Premna serratifolia*. The collected leaves were inoculated in petriplates, contamining callus induction medium and were stored under dark condition.





11.03.2021:- Surface Sterilization

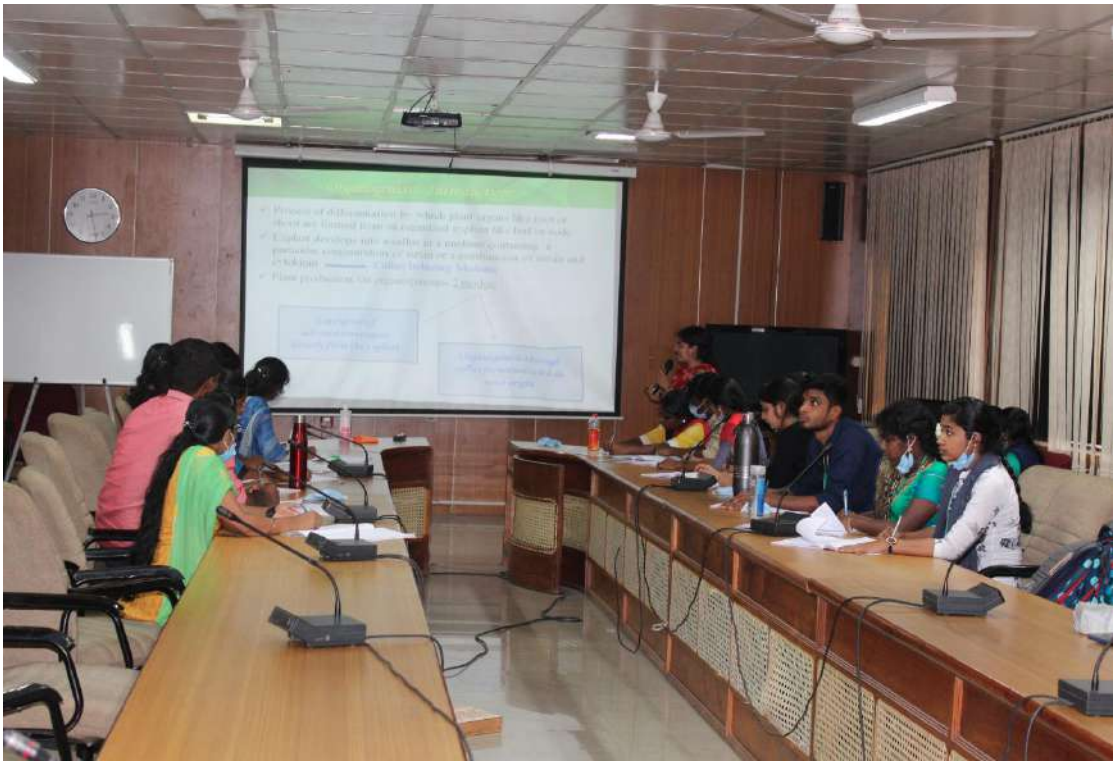
The trainees were split into 3 groups and surface sterilized teak seeds and inoculated them into water agar medium which was prepared by them. Later, the inoculated seeds were incubated.



Lecture on organogenesis

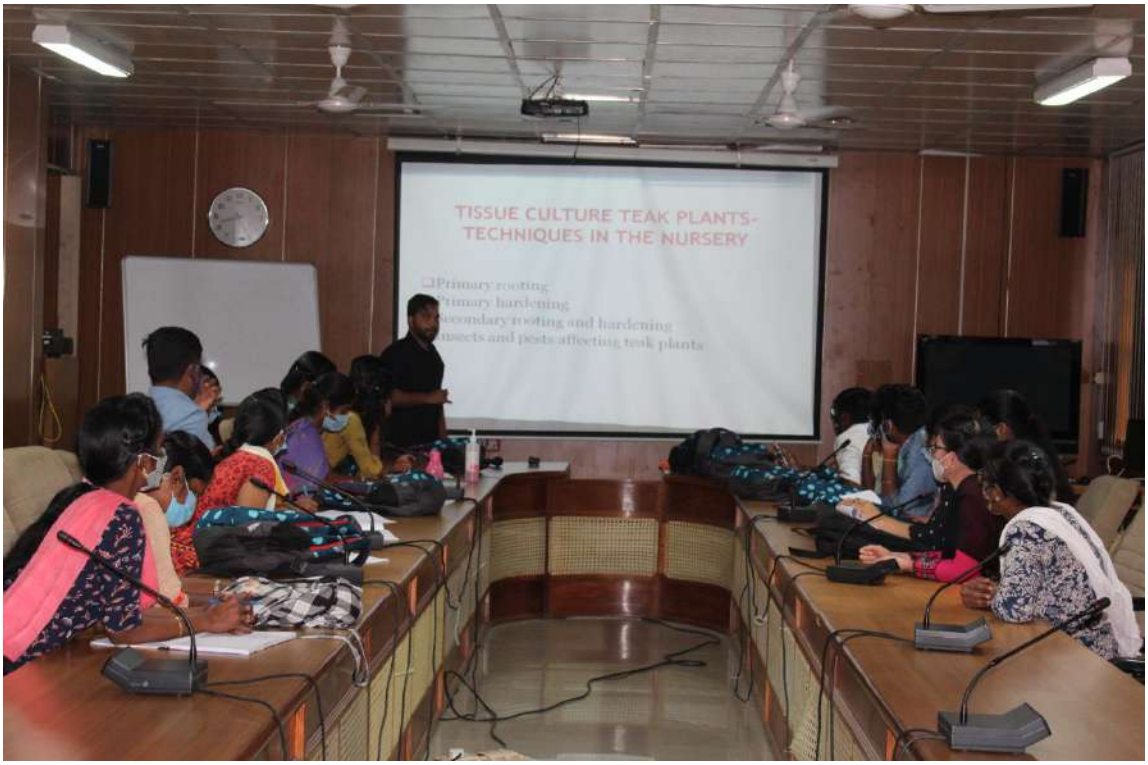
Ms.S. Arathi, JPF, Plant Biotechnology and Cytogenetics Division delivered a lecture on organogenesis, somotic embroyogenesis and applications of tissue culture. She also gave an insight to the following procedures:

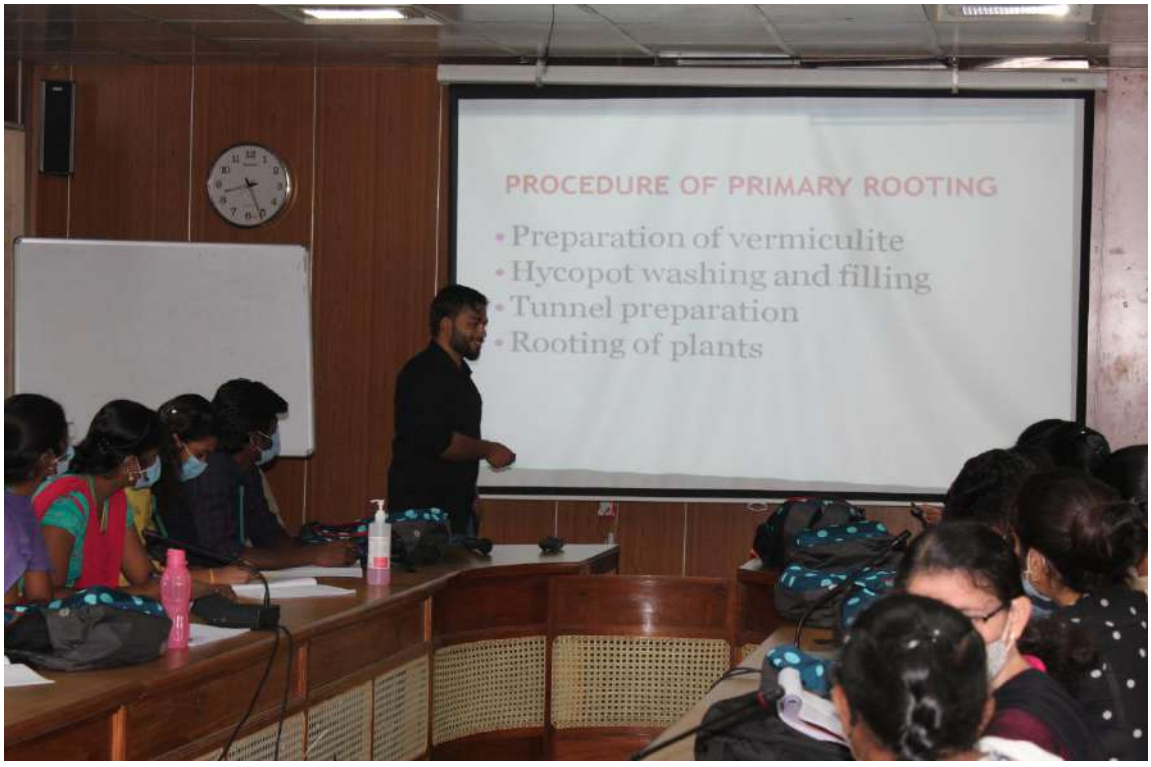
- Standardization of media
- Hormone preparation for initiating culture
- Parameters to be considered while preparing media



12.03.2021:- Lecture on Tissue Culture in Teak Plants

Mr Rajesh, Field Assistant, Plant Biotechnology and Cytogenetics Division delivered a lecture on various nursery techniques of teak. He also briefed about the different types of pest that affects tissue culture of teak plants and their treatments.





Inoculation of seeds

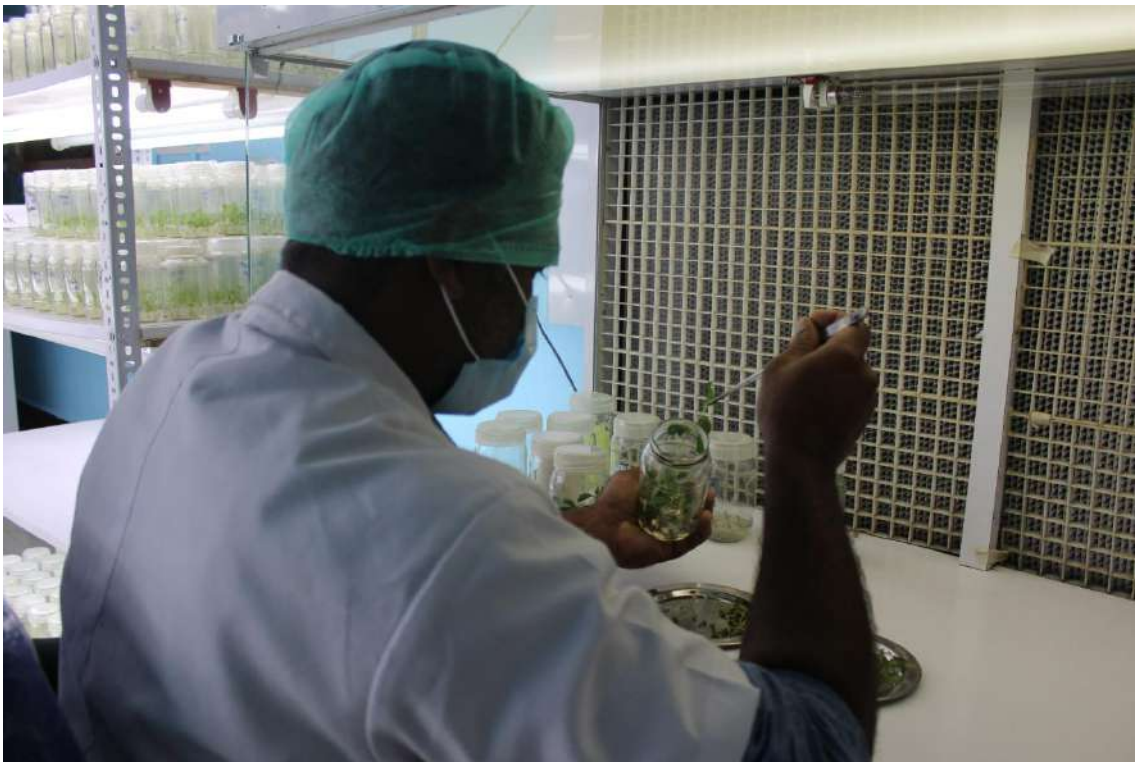
Ms.R. Mahalakshimi, Technical Officer, Plant Biotechnology and Cytogenetics Division demonstrated the process of inoculating seeds using inoculation media. The trainees sterilized and inoculated *Oroxylum indicum* (L.) seeds in the seed inoculation media. The inoculated bottles were incubated in the new tissue culture lab. This practical training was monitored by Ms. Kalaiselvi, Senior Research Fellow and Ms. S. Arathi, Junior Research Fellow, Plant Biotechnology and Cytogenetics Division. An exam was conducted to evaluate the trainees.

13.03.2021:- Observations on the stored media

The cultures stored were physically examined by the trainees for contaminations. The trainees are instructed to record their observations. The recorded observations were verified by Ms. Kalaiselvi, JPF and Ms. Arathi, JPF, Plant Biotechnology and Cytogenetics Division.

Preparation of Media

The standard method of inoculation of culture media which is used to obtain reproducibility of quantization results and the procedure for streaking plates were taught to the trainees by Ms. R. Mahalakshimi, Technical Officer, Plant Biotechnology and Cytogenetics Division. An exercise to prepare and inoculate 1 litre bamboo media was given to the trainees. The trainees actively prepared and inoculated the media using four quadrant method. The prepared media were autoclaved and stored by the trainees for later use.



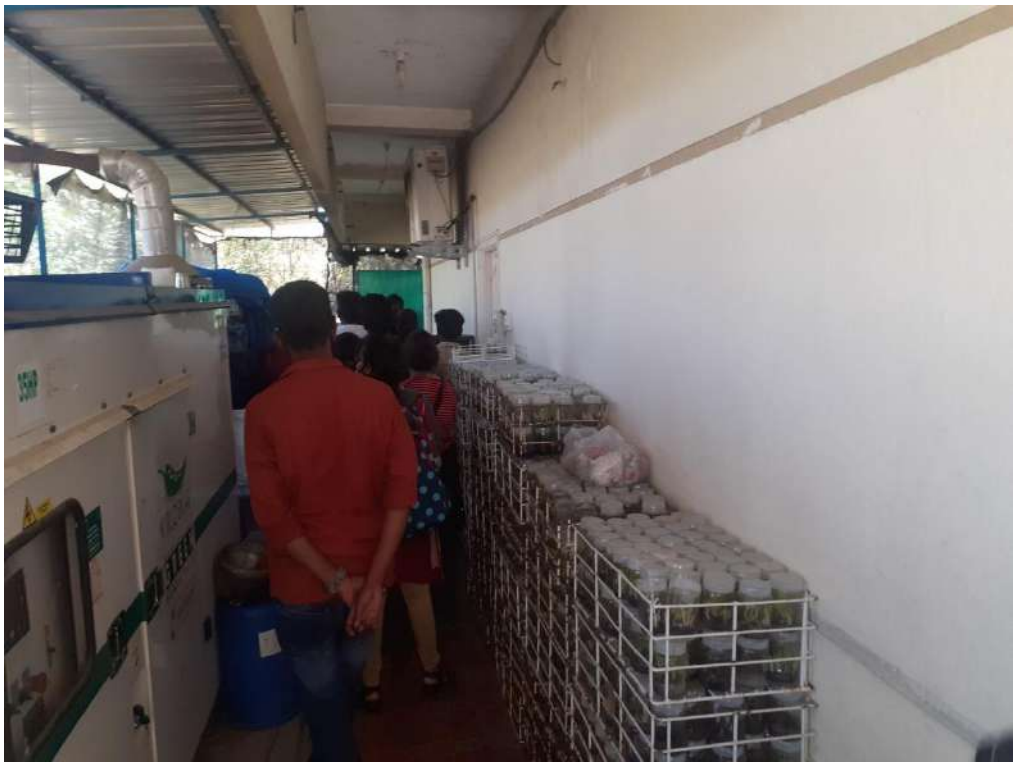
14.03.2021:- Visit to Annai Meenashi Biotech

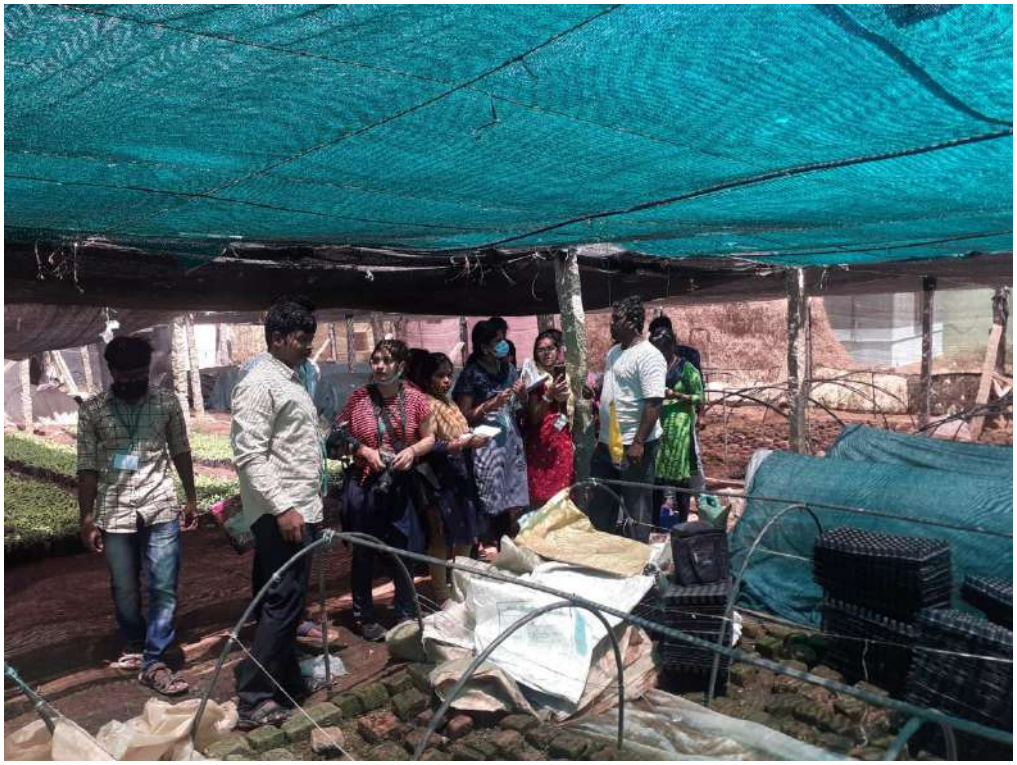
Field visit to M/s Annai Meenashi Biotech , Hosur was organized. Shri S. Shankar, Laboratory manager explained that Grand Naine Banana (G9 Banana) plant is the genus Musa sp. Banana is produced in good quality in India through tissue culture techniques.G9 banana is one of the most popular product of their biotech company for last 9 years which they produce in their plants tissue culture laboratory, he added. He also gave an insight to the following advantages of G9 Tissue Culture:

- True to the type
- High market value
- High yield and quality
- Early Maturity
- Free from all diseases at the time of supply

- Throughout the year plantation possible
- Uniform growth of fruits

The trainees were also taken to the nursery to give an exposure about the maintenance of seedlings produced through vegetative propagation. They went through out the nursery and experienced stage by stage process of converting tissue culture plants to saplings. Shri Shankar also encouraged the trainees to become entrepreneurs by explaining how he became an entrepreneur after completing his SSLC. He also explained what are the various affiliation needed to establish a tissue culture lab. Saplings were distributed to the trainees. Tips to start a tissue culture lab in a cost effective method was also shared to the trainees.

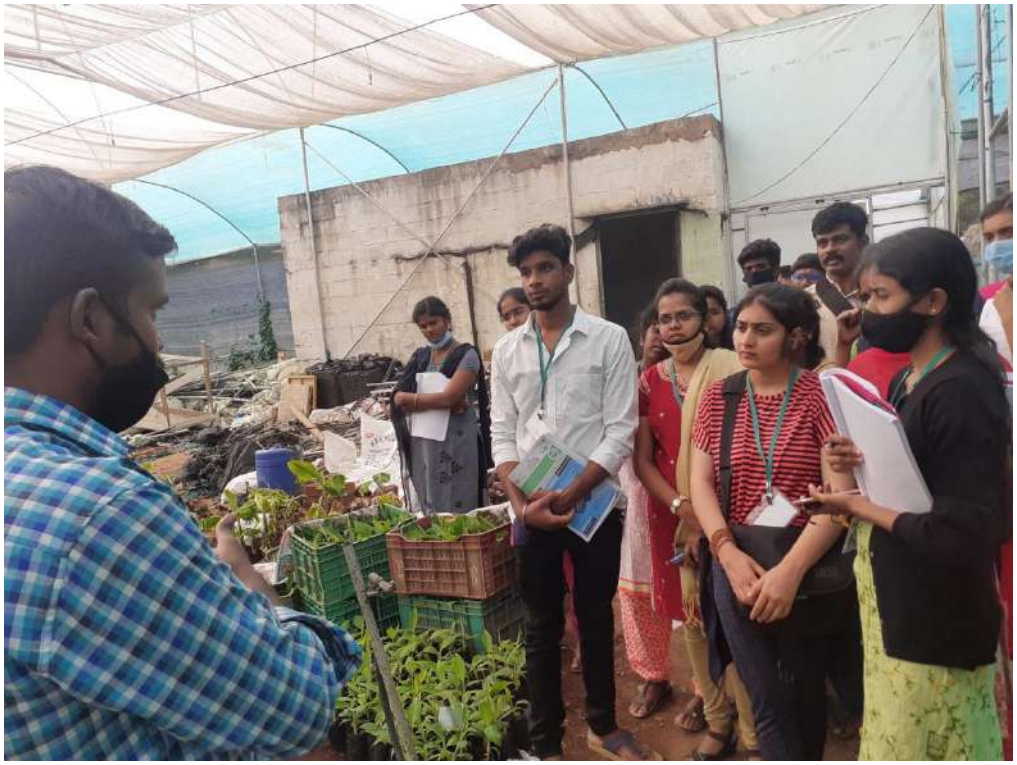




Visit to Jai Shree Biotech

The trainees were taken to M/s Jai Shree Biotech, Dr Sattainathan, Nursery Manager explained over all process of producing tissue culture plants. He explained how the suckers are converted into saplings. The following processes were explained in detail:

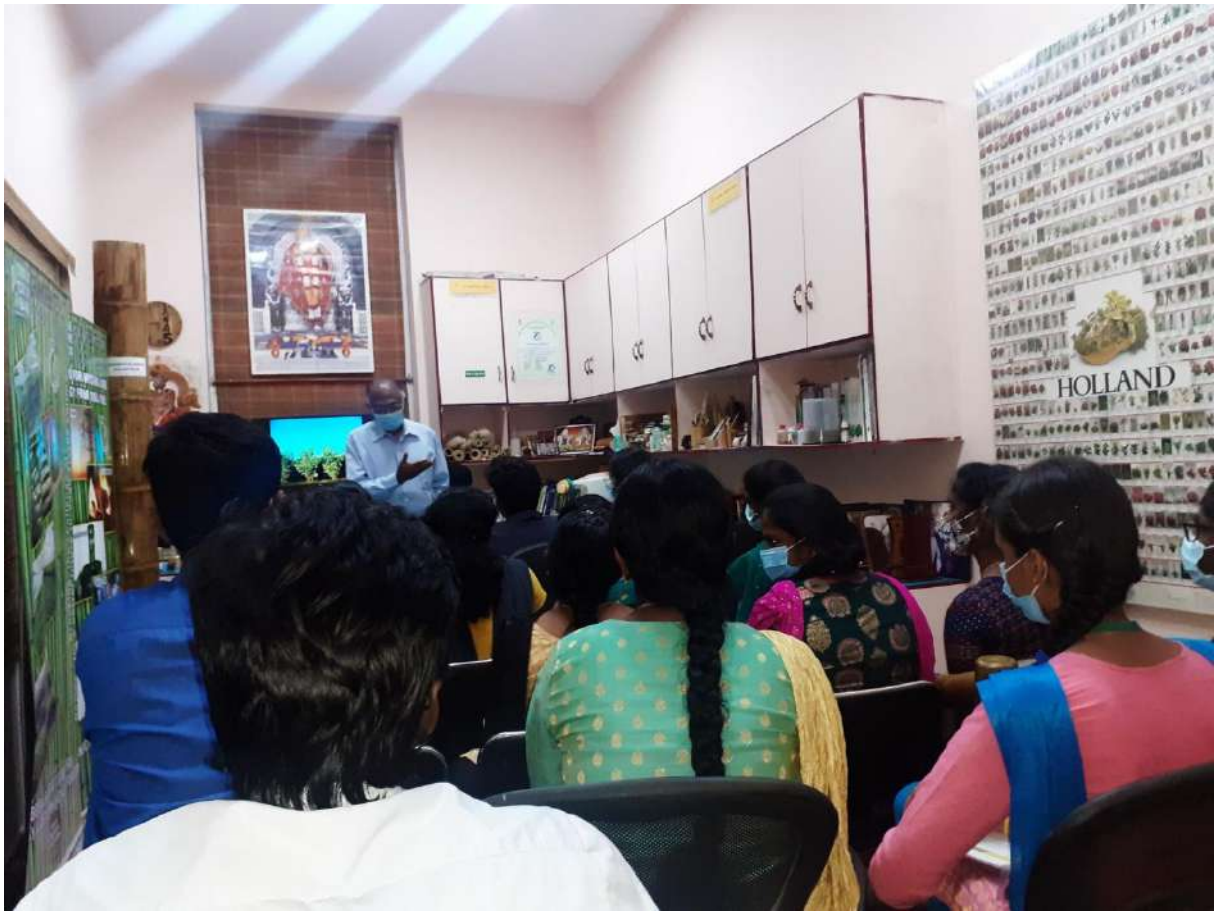
- Initiation
- Multiplication
- Shooting & rooting
- Primary Hardening in green houses
- Secondary Hardening in shade houses

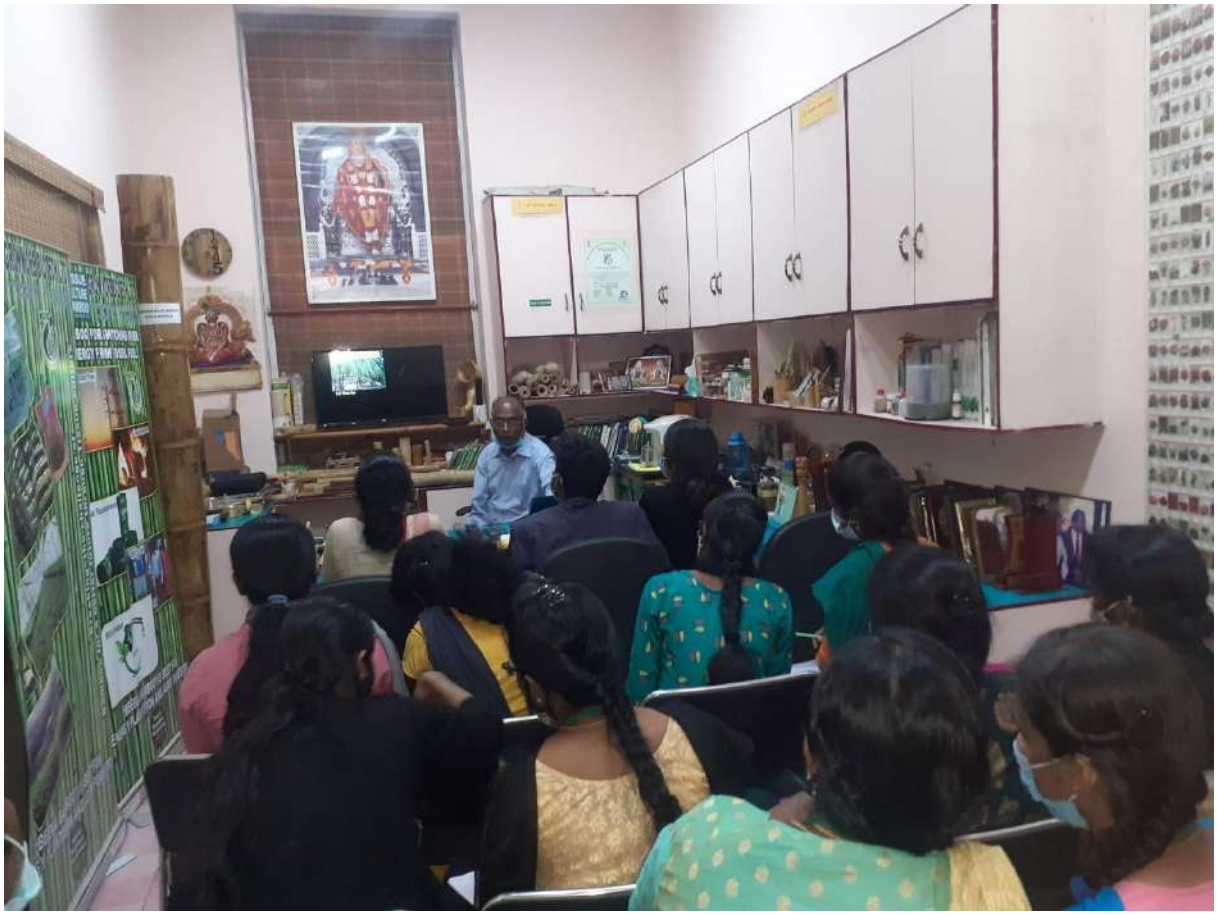


15.03.2021:- Visit to GrowMore Biotech Ltd

In order to provide a real time exposure on large scale production of quality planting stocks, a field visit to GrowMore Biotech Ltd, Hosur, a company excelling in providing high quality plants to farmers, industries and Government departments in India and exports to several countries was organized for the trainees. Mr. Panner Selvam, General Manager welcomed the trainees and gave an introductory session about the organization. During the session he explained that the Laboratory was certified by Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India under National Certification System for Tissue Culture Raised

Plants (NCS-TCP). This unit was one of the first laboratory to get accreditation in the year 2007 and continued to get certify for the past 10 years he added. He also explained how they got accredited from Australian Quarantine Inspection Service (AQIS) for exporting ex-agar plants from India to Australia in the year 2002. He also insisted that GrowMore Biotech was a Technological Partner with National Mission on Bamboo Application (NMBA) of Technology, Information, Forecasting and Assessment Council (TIFAC), Department of Science and Technology, Government of India. GrowMore Biotech enrolled with the Ministry of Micro, Small & Medium Enterprises, Government of India as MSME unit and it is a Corporate Life Member in National Academy of Biological Sciences (NABS), Chennai and also Life member in Hosur Small & Tiny Industries Association (HOSTIA).





Lecture on Bheema Bamboo

Mr. Panner Selvam gave a special emphasis on the development of the “Bheema Bamboo”, a superior clone, selected from *Bambusa balcooa*, a higher Biomass yielding Bamboo species developed by Dr. N. Barathi, GrowMore Biotech. He highlighted that this clone is thorn less, sterile, superior bamboo. Tissue cultured Bheema Bamboo is identical, homogeneous, and free from pest and disease, vigorous and superior clone. It can grow in the field for more than hundred years with no need for replanting. It yields higher Biomass if managed by following the Silvicultural methods, Irrigation practices and Fertilizer requirement schedule as prescribed by GrowMore Biotech Ltd. Session. The following varieties of bamboos in their nursery were shown to the trainees:

- *Bambusa balcooa*
- *Dendrocalamus brandisii*
- *Bambusa tulda*
- *Dendrocalamus giganteus*
- *Thyrsostachys siamensis*

He also explained the performance of Bheema Bamboo on the field and its important uses. Its certified high energy value (4500 kcal/kg) and low ash content make it an outstanding biomass feedstock for energy generation he added.

Lecture on initiation and multiplication of Bheema Bamboo

Ms. Ashritha, Asst General Manager, Nursery explained the initiation and multiplication of Bheema Bamboo. She explained the following special characters of the species:

- Fast Growing
- High Biomass
- Thorn-less
- Thick Walled
- Sterile Plant

She explained how to select superior clone and multiply them using Tissue culture methods and briefed that the tissue cultures of Bheema bamboo can be exported after the completion of primary hardening in the green house. The primary hardened Bheema bamboo plants which will be 5 to 6 inches in height, fully hardened in the green house for 3 months, grown in soil free media, will have 1 to 2 shoots ready to be planted in polybag in green house. Since the plants are 5 to 6 inches, it should be grown in a polybag for the next 3 months to get a height of 2 feet. This should be done under a nursery condition, having shade net or in shade net house. After 2 months, the

plants will be ready for planting to the main field. The plants will be delivered in 48 hours from India.

The Growth rooms, sunlight growth room, inoculation room, media storage room and mount filled LAF (built in cost effective manner) in which 5 members can work simultaneously were shown to the trainees.

Lecture on Methods of Plantation Bheema Bamboo

Dr.Bharathi, Chief Executive Officer explained the cost effective methods in tissue culturing bamboo species. He practically explained the use of polythene balloons instead of aluminium ducts, the mechanism of using direct sunlight and LED strips as a source of light in the growth room and other cost effective measures used for rooting. He also explained the following applications of the Bheema bamboo:

- Biomass for power generation projects.
- Paper Industries
- Construction and Furniture.
- Handicrafts & cottage industries.

He highlighted that Bheema Bamboo is recommended for the following:

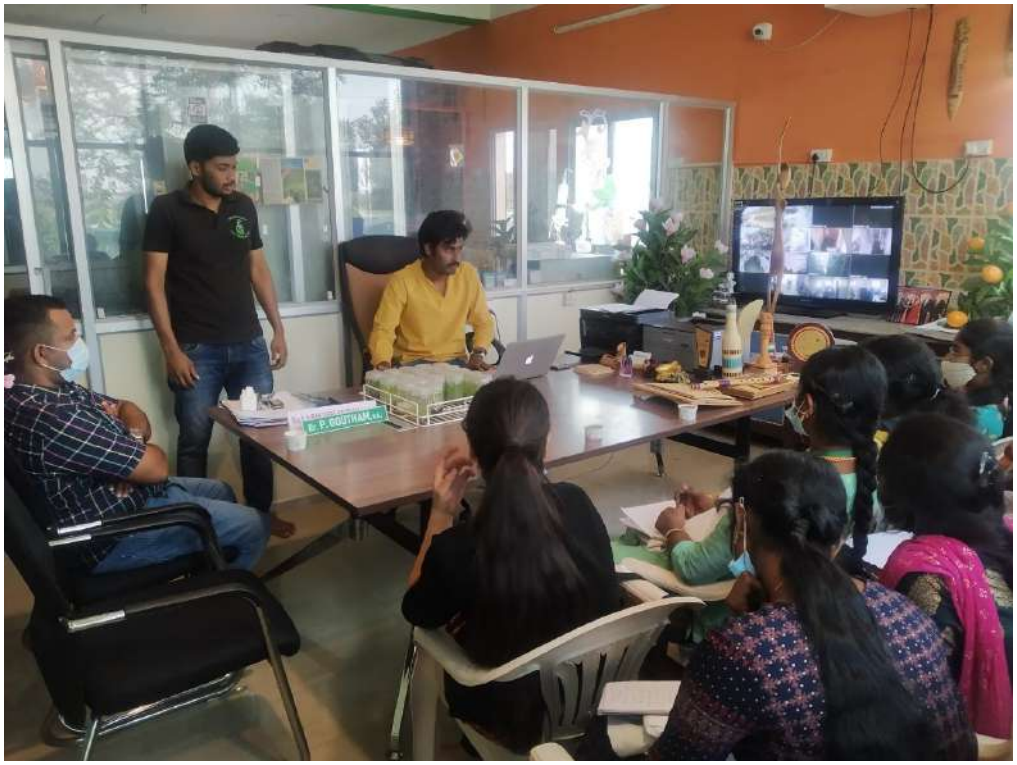
- Large scale plantation
- Energy plantation for power generation
- Homestead garden planting
- Large reforestation programs
- Land reclamation in mines, sodic soils, water logged areas etc.

The samples of towels and shirts produced from bheema bamboo were shown to the trainees. Oxy-99 a product which produces oxygen made from bhemma bamboo was also shown.

- Number of Plants per acre and Hectare
- Spacing pattern
- Recommended Irrigation
- Water Requirement
- Amount of Carbon-Di-Oxide(CO_2) Absorbed
- Cost Of Cultivation
- Average Yield under good Management Practice

Visit to Genenwin Biotech

A field visit to Genewin Bio-tech, Hosur was organized for the trainees to give an exposure on large scale production of tissue culture plants and highly equipped Research & Development wing. Mr.Gowtham Palani, Managing Director, Genewin Bio-tech welcomed the trainees and explained that the unit was established at Hosur, Tamil Nadu, India in 2007 which was recognized by Department of Biotechnology (DBT) under National Certification System for Tissue Culture Raised Plants (NCS-TCP), Ministry of Science and Technology, Government of India and they are one of the major producers of good quality and disease free plants on a large scale, 5 million plants per year through Tissue culture Techniques and sells at the lowest price throughout world. He also explained the difficulties and problems faced during the establishment the unit.

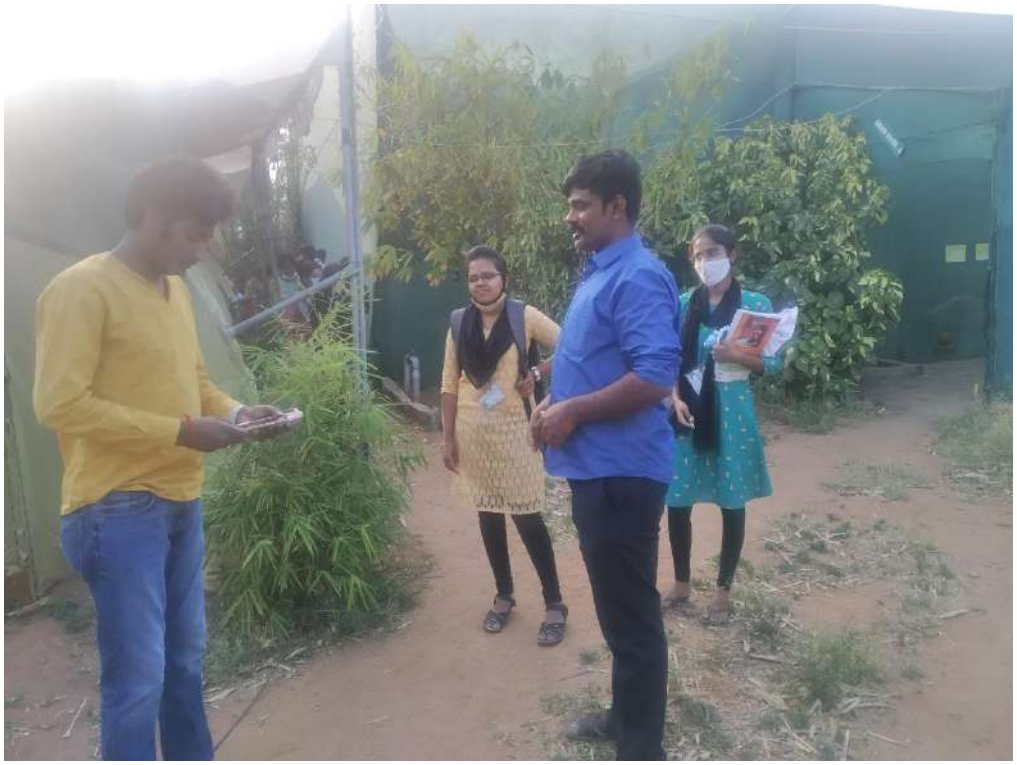


Visit to Tissue culture lab

After the introductory session Mr. Gowtham Palani and his team took the trainees to the tissue culture lab which is certified as ISO 7 - 10,000 and gave a lecture on the following:

- Media and buffer preparations
- Sterilization of explants
- Micro-propagation
- Callus culture
- Anther culture
- Synthetic seed production and cell suspension
- Plant genomic DNA isolation
- Protoplast isolation

The selection of the mother plant is one of the major constraints while initiating tissue culture he added in his lecture. He also gave an insight that how the mother plants from different countries were selected and secured for later use. The cultures of Banana and ginger at different growth levels were shown to the trainees. Practical training to operate inoculation reams and cleaning & maintenance of LAF were also provided to the trainees. Trainees actively took observations and interacted with the field staff.



Visit to various labs

The trainees were taken to the following labs to know about the recent techniques used in the field of tissue culture:

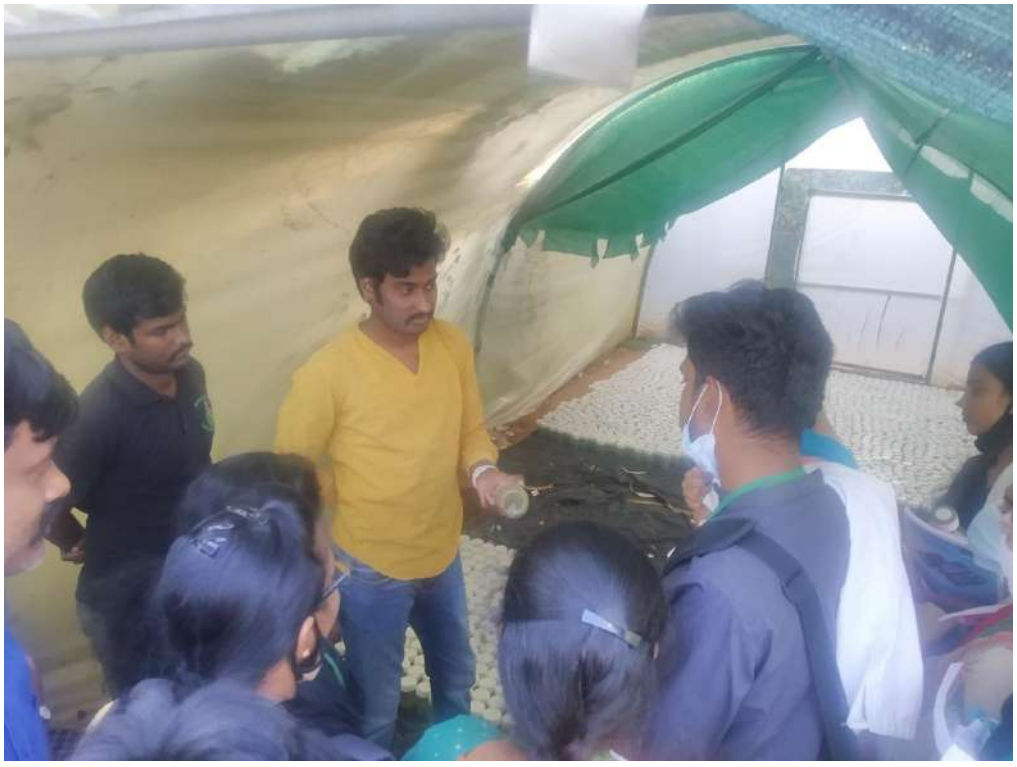
- Tissue culture Laboratory
- Explants Initiation Chambers
- Strain Improvement techniques
- Laminar Air Flow capacity
- Plant growth rooms
- 2 Green Houses
- Virus Indexing and subculture unit
- Media Preparation Lab and Sterilization unit

The trainees experienced the standards of the various infrastructures and standards of the individual units.

Lecture on the products of Genewin Bio-tech

Mr. Gowtham Palani explained that Genewin Biotech ltd are preparing 400 litres of media every day and approximately 6 lakhs plants per annum which are exported to various countries. He gave an overview on the primary and secondary hardening techniques practiced in their venture and listed the products developed by them. The preparation of the decomposable paper pots (Ellipot propagation paper – a biodegradable paper pots) used in their nursery for transferring plants were also explained to the trainees. The mother plants of various bamboo species collected from different countries like Thailand, Indonesia, Srilanka etc and the method of preserving them

were shown to the trainees. He also answered various questions raised by the trainees and guaranteed that Genewin Biotech ltd would supply the plants and buyback the same if needed.



16.03.2021:- Visit to HU Gugle Biotech Private Limited

The trainees were taken to HU Gugle Biotech Private Limited, Bangalore to provide a real time exposure on tissue culture of fruit breeding plants. Ms P.Shilpa, Nursery Manager welcomed the trainees and explained the basic structure of their tissue culture lab.

Visit to Tissue culture lab

After the introductory session, the trainees were split into 3 groups and taken into the lab. Their tissue culture lab was certified with ISO 7 - 10,000 and gave a lecture on the following:

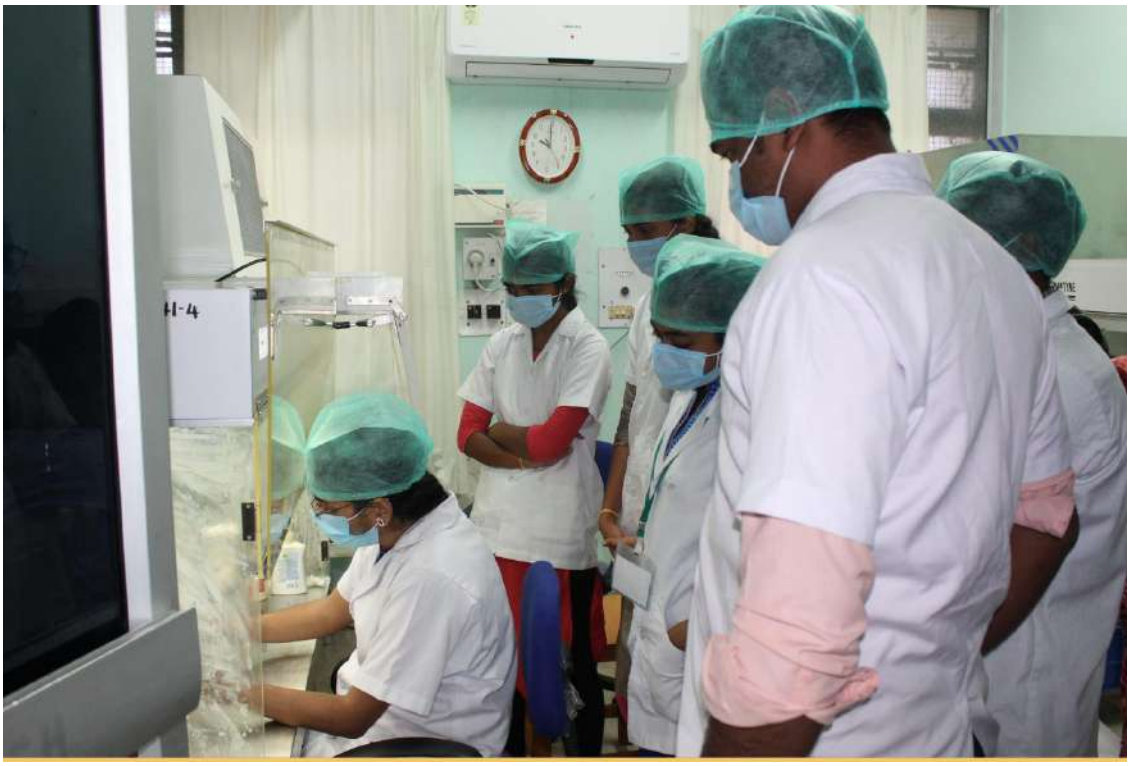
- Media and buffer preparations
- Sterilization of explants
- Micro-propagation
- Callus culture
- Anther culture
- Synthetic seed production and cell suspension
- Plant genomic DNA isolation
- Protoplast isolation

The trainees had gone through out the labs and nursery to gather experience about the unique methodology followed in their lab and nursery.

17.03.2021: Visit to Tissue culture lab

A mock practical examination was conducted to the trainees in order to determine whether the trainees are capable to implement their theoretical knowledge in the laboratory. The trainees were split into 3 groups. Exercise to prepare MS media for subculture is given to group 1. Group 2 was assigned to prepare MS media with 0.2 mg/l benzyl adenine (BAP) and Group 3 was assigned to prepare 8 mg/l thidiazuron (TDZ). Trainees individually prepared the media assigned to them

under the supervision of Dr Rekha R. Warrier, Scientist F & Training in-charge. The prepared media was autoclaved and stored.

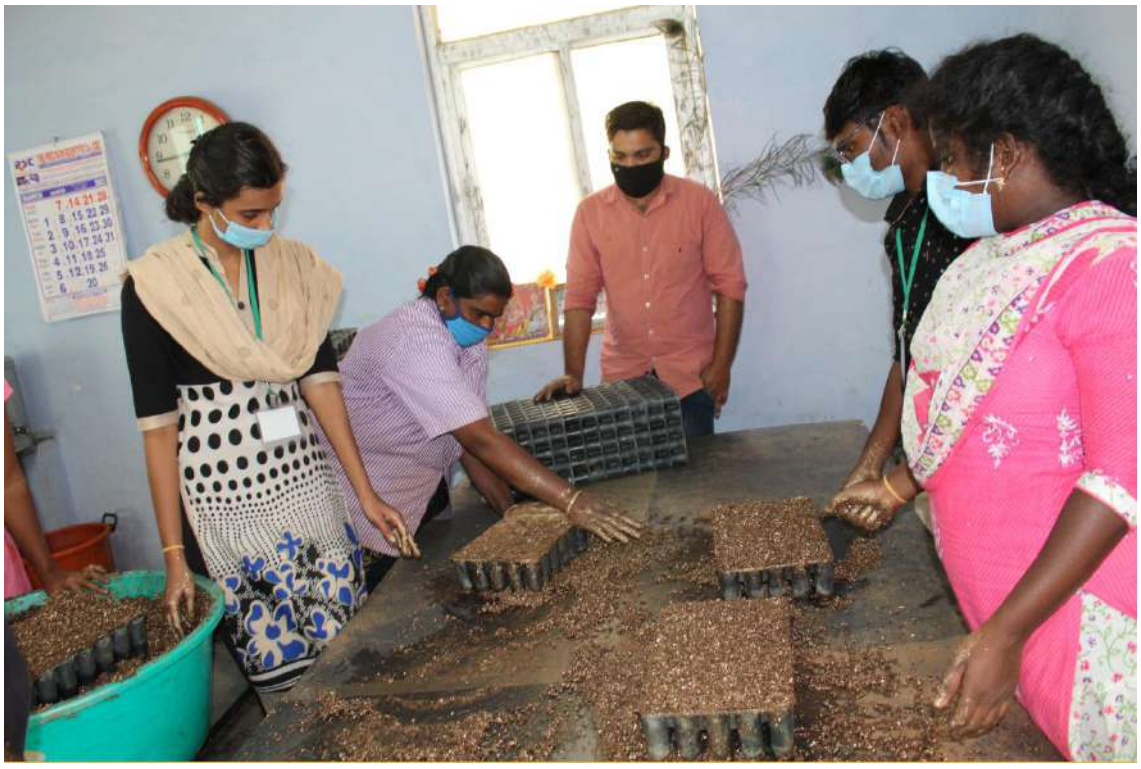


18.03.2021: Preparation of Bamboo Media

The standard method of inoculation of culture media which is used to obtain reproducibility of quantization results and the procedure for streaking plates were taught to the trainees by Ms R. Mahalakshimi, Technical Officer. An exercise to prepare and inoculate bamboo media was given to the trainees. The trainees actively prepared and inoculated the media using four quadrant methods. The prepared media were autoclaved and stored by the trainees for later use.

Filling Hycopots

As a pre-preparatory work for rooting, the trainees were split into 3 groups and were provided hands on experience on preparing hycopots and fill them with vermiculate. The filled hycopots were stored in the nursery by covering them in a poly tunnel to maintain moisture and temperature.



19.03.2021: Visit to the Plant Biotechnology Nursery

The trainees were taken to PBT nursery and Ms K. Shanthi, Chief Technical Officer explained the following:

- The general structure of the nursery
- How to establish mist chambers
- Preparation of beds in the mist chamber
- Fertigation in mist chamber

She also gave an overall idea about the maintenance of humidity and temperature and steps of coppicing. The shade house facilities were explained to the trainees and the overall process of collection of shoots was also explained. The process of transferring the selected healthy clones from lab to nursery was taught by was also taught.

Lecture on Coir Pith Compost Preparation

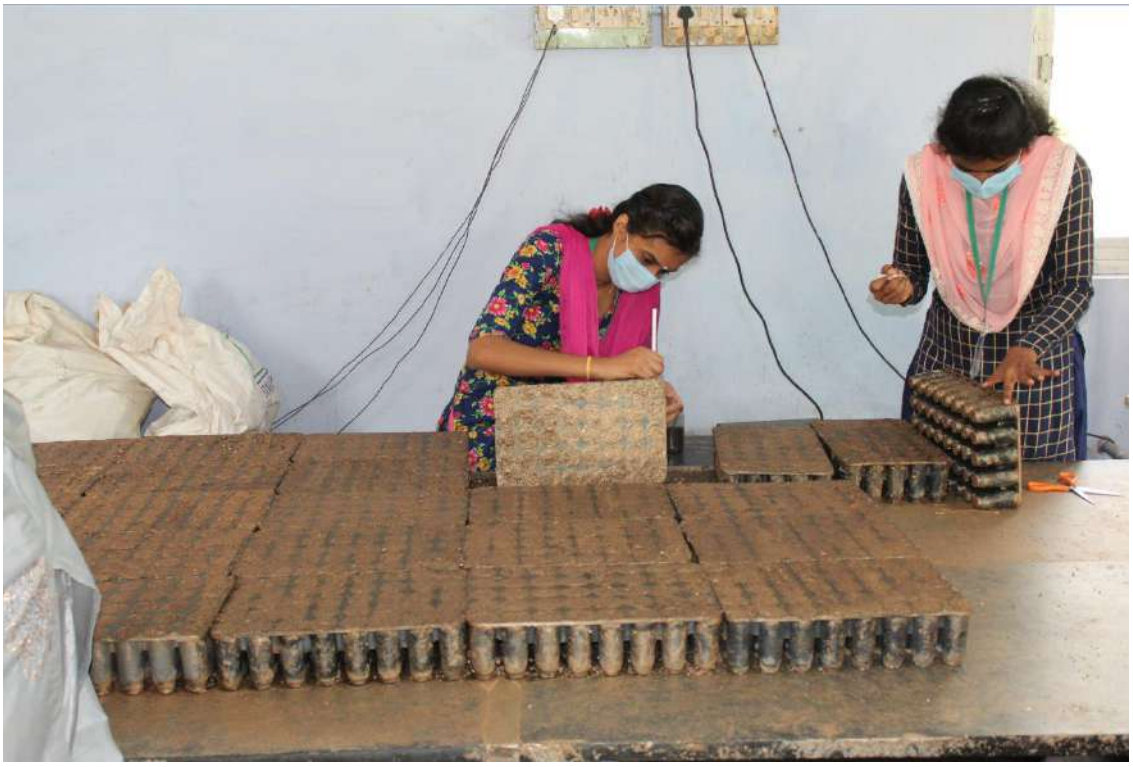
A lecture on coir pith preparation was delivered by Mr S.M. Paulraj, Technician, Plant Biotechnology and Cytogenetics Division and the following topics were covered in his lecture:

- Preparation of coir compost
- Steps involved in coir decomposition
- Nutritive value of raw and composted coir pith compost
- Benefits of composted coir pith

- Application of coir pith compost
- Limitation in using composted coir pith

Preparation of Coir Pith Compost

Trainees were split into 2 groups, collected the coir pith and created a coir heap in the site earmarked for composting. Coir pith was spread to the length of 4 feet and breadth of 3 feet. Initially coir pith was put up for 3 inch height and thoroughly moistened. After moistening, nitrogenous source material (in the form of urea) was added. Later, the heap was turned and water was sprinkled on the heap to maintain optimum moisture.



Vermiculite Preparation

The manufacturing process used to produce vermiculate was demonstrated by Ms K. Shanthi, Chief Technical Officer. She explained about the raw materials used in the preparation; preparation method; ratios of mixtures; health aspects and various parameters like temperature, moisture etc for the preparation of vermiculite. The trainees were split into 03 groups and exercise to prepare vermiculate was given to each group.

Planting Cuttings

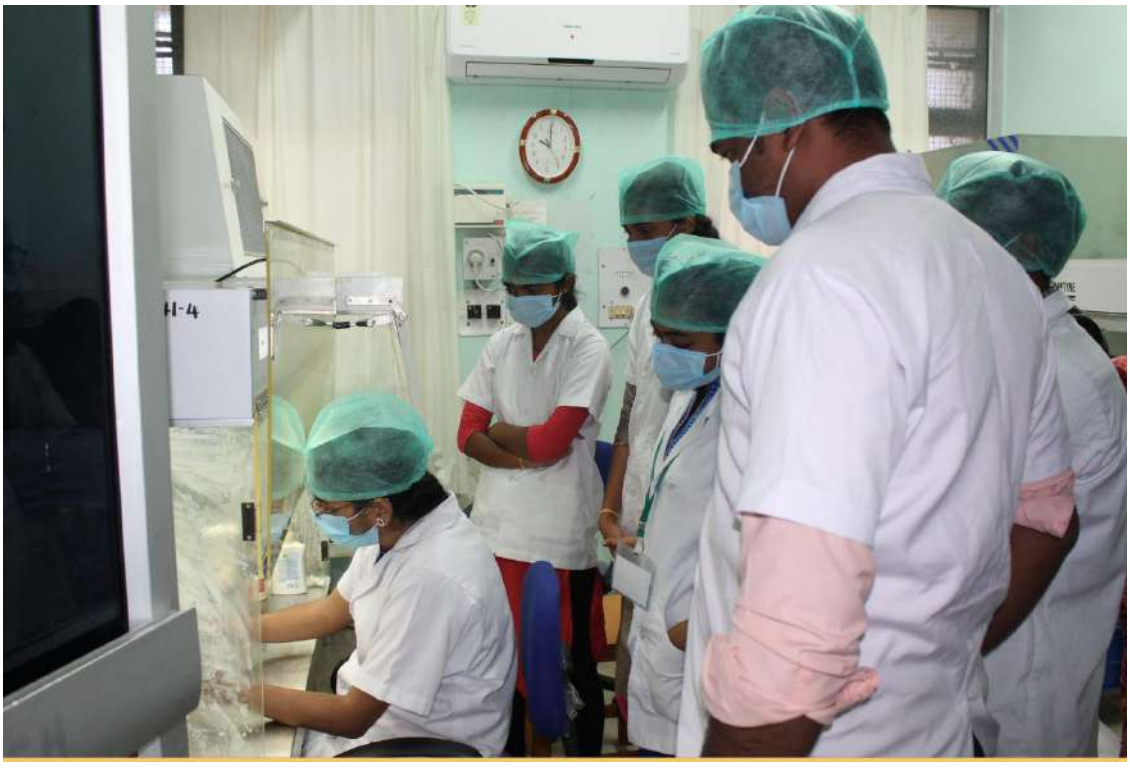
The processed cuttings were planted into hycopots. The cuttings were kept in polytunnels until a good root system is developed and shoot growth starts. Fresh water and bavistin were sprayed and the polytunnel was tightly covered by filling the ends with sand.

20.03.2021: Demonstration on Woody Plant Medium

Ms R. Kalaiselvi, JPF and Ms S. Arathi, JPF demonstrated the preparation of Woody Plant Medium (WPM). They also demonstrated the varying hormonal combinations with WPM and explained how to optimize the media for culture initiation, direct regeneration, multiple shoot induction, rooting, callus production, induction of somatic embryos and regeneration of somatic embryos into plantlets. The concept of various hormonal combinations used with the standardized multiple shoot induction medium with different basal media such as MS medium was also discussed.

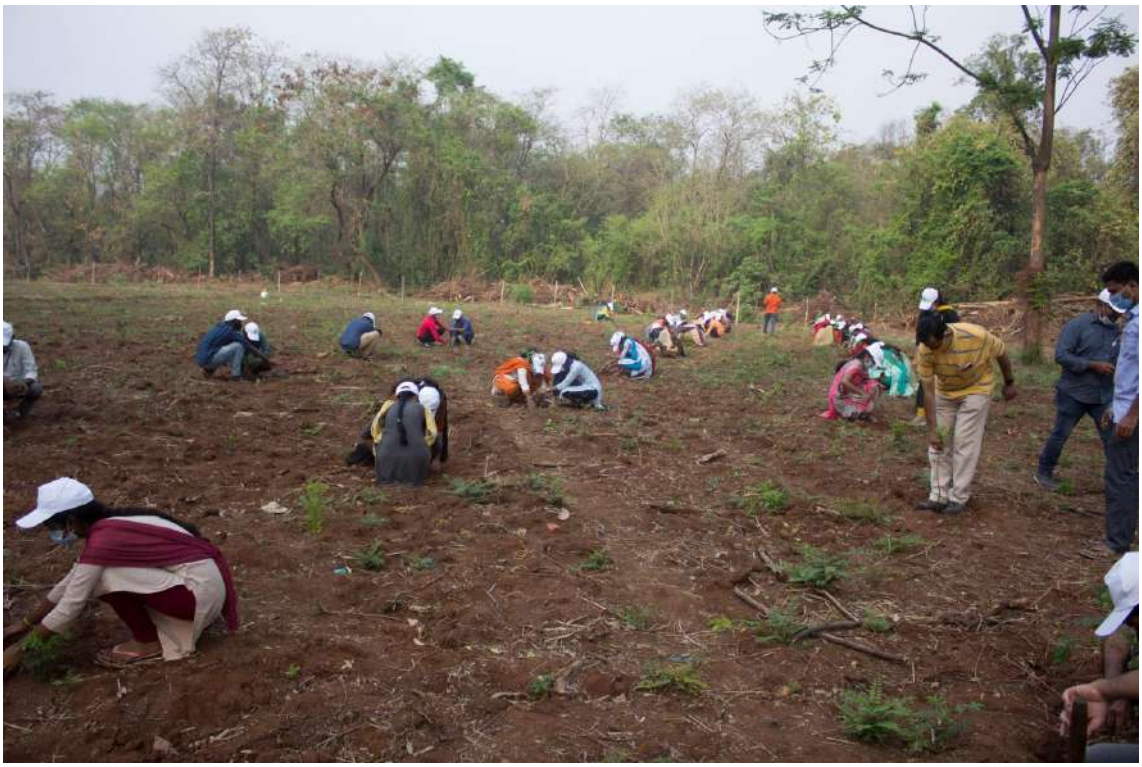
20.03.2021: Sub-Culturing Media

Ms R. Kalaiselvi, JPF and Ms S. Arathi, JPF explained the process of sub-culturing involving removal of the medium and transfer of cells from a previous culture into fresh growth medium to enable further propagation of the cell line or cell strain and gave a demo on sub-culturing of teak clones. Individual exercise to sub-culture one bottle of incubated media was given to the trainees. The trainees actively sub-cultured the media and stored the same in the new tissue culture lab for later use.



21.03.2021: Mass Tree Saplings Planting Drive

A mass tree sapling planting programme was organized at Panampully Field Research Station of IFGTB near Palakkad in connection with International Day of Forests 2021. Participants of the three Green Skill Development Programmes planted over 300 saplings in Panampully Field Research Station.



22.03.2021: Visit to Forest College and Research Institute (FCRI), Mettupalayam

A visit to Forest College and Research Institute, Mettupalayam was organized for the trainees and Dr P. Rajendren, Associate Professor, Agroforestry Department explained the following:

- Agriculture vs tree plantations
- Well-developed technologies in forestry plantations
- Sustainable forest management
- Current trends in forestry plantations
- The role of quality planting stock in afforestation

23.03.2021: Visit to Horticulture Directorate, Ooty

The trainees were taken to the tissue culture laboratory of the Horticulture Department in the Botanical Garden, the Nilgiris. Mr. Prabhu, Horticulture Officer explained that the after being dormant for over five years, the tissue culture laboratory was back to functioning at its full capacity, with hybrid banana plants, strawberries and orchids being developed at the facility over the last few months. He also gave an insight to the tissue culture practices followed in the Directorate. Trainees interacted and cleared their doubts.

Visit to Central Potato Research Station

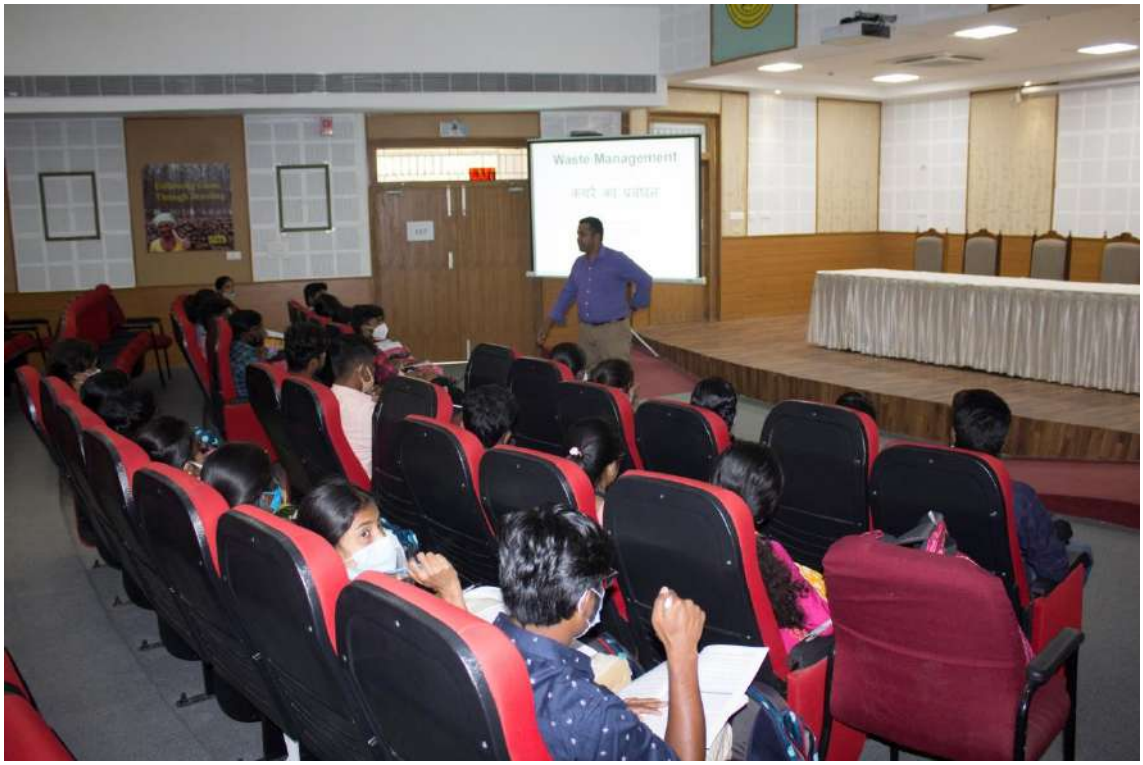
The trainees were taken to Central Potato Research Station, Ooty. Dr E.P. Venkatasalam, Head and Senior Scientist explained that the station is being doing Research for the development of agro-techniques for potato cultivation, development of varieties possessing combined resistance to late blight and cyst nematode and to develop control measures for late blight, cyst nematode, bacterial wilt and other soil and tuber borne diseases. He also explained the hardening procedures to the trainees and enlightened them on the importance of aeroponic techniques (a soilless technique for growing plants) used in potato cultivation. Later, the trainees were taken to potato field.

Visit to Rose Garden

The trainees were taken to Rose garden, one of the most famous botanical gardens maintained by the Horticulture Department of Tamil Nadu. Ms Menaka, Horticulture Officer explained about appropriate basal medium and growth regulators used for culturing rose plants. She highlighted how the stock cultures are maintained explained about various budding methods. Hands-on Training on T-budding (also known as shield budding, a technique of grafting to change varieties of plants) were also given to the trainees.

24.03.2021:-Lecture on Cleaner Production and Waste Minimization

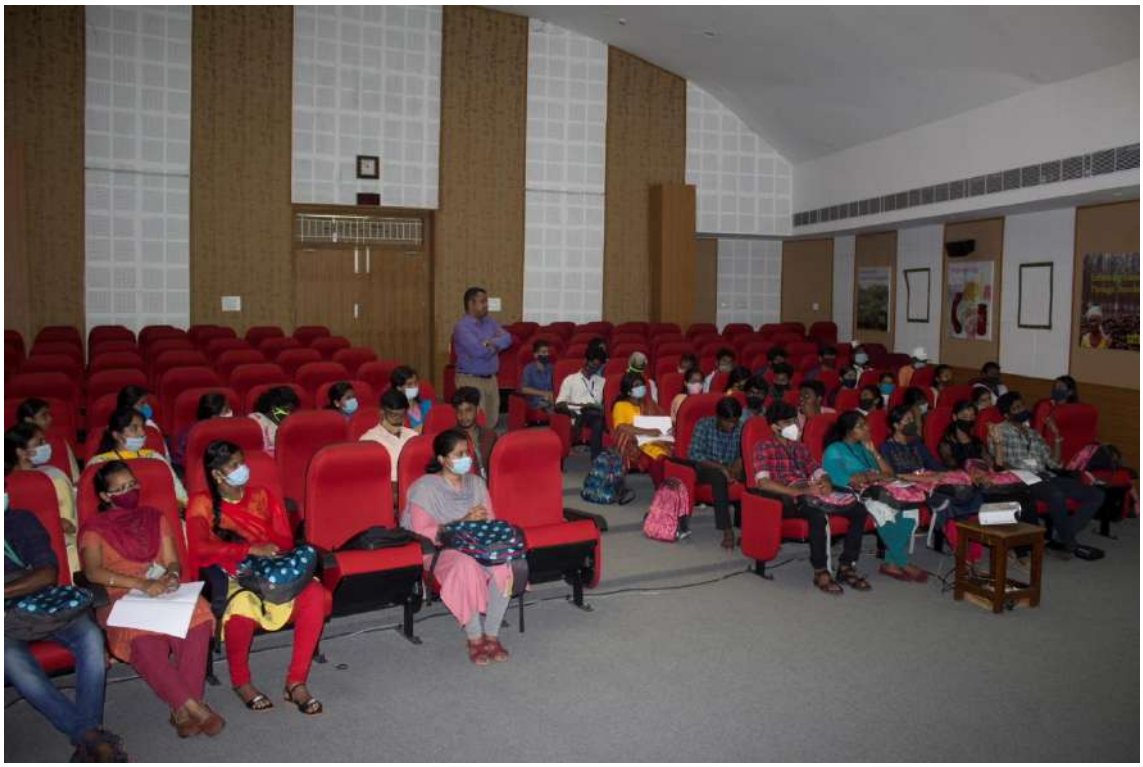
Dr S. Vigneswaran, Senior Programme Officer, ENVIS RP, IFGTB delivered a lecture on Cleaner Production & Waste Minimization and Laboratory Waste Management. He also gave an insight on various tips for preventing the generation of wastes. In addition, 2 short films on waste management were screened to the trainees to provide an exposure on how wastes can be converted to useful products.



NABARD Initiatives

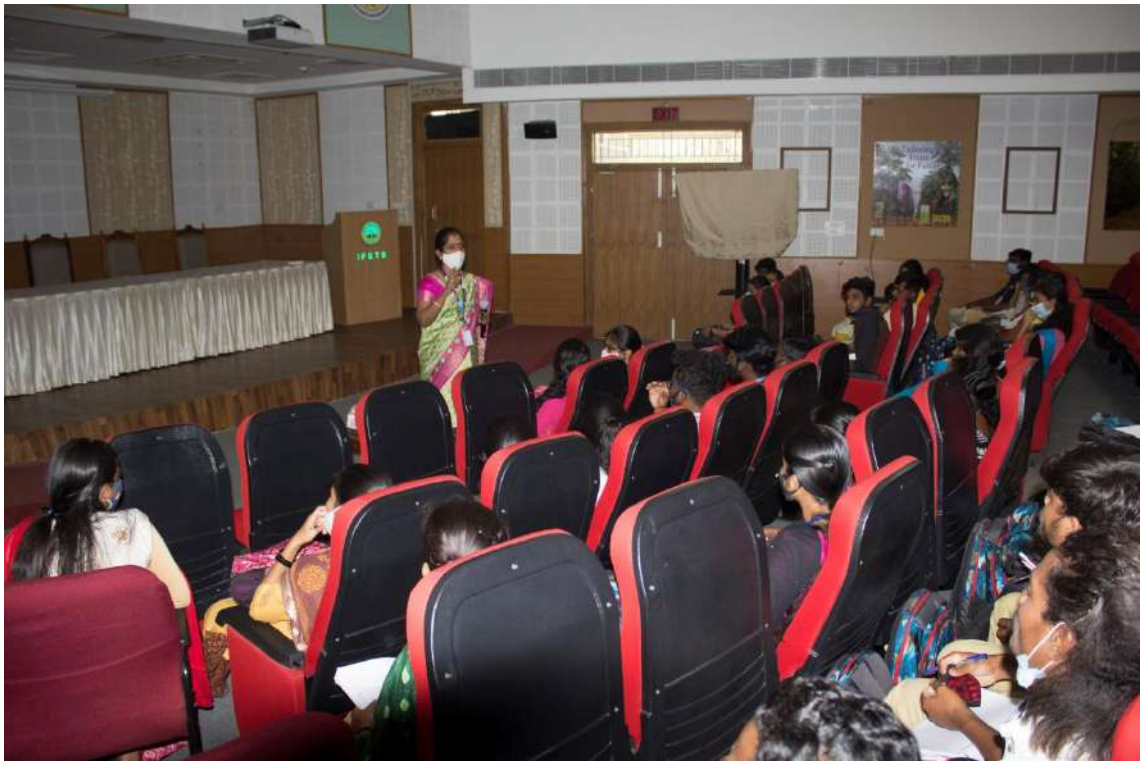
Dr S. Vigneswaran, Sr. Programme Officer delivered a lecture on NABARD and its functions. Initially he explained why NABARD has been established as an apex institution and deliberated about on farm schemes and off farm schemes. :

The annual report of the NABARD for the FY 2019-20 was shared to the trainees and various subsidies provided by NABARD were also discussed.



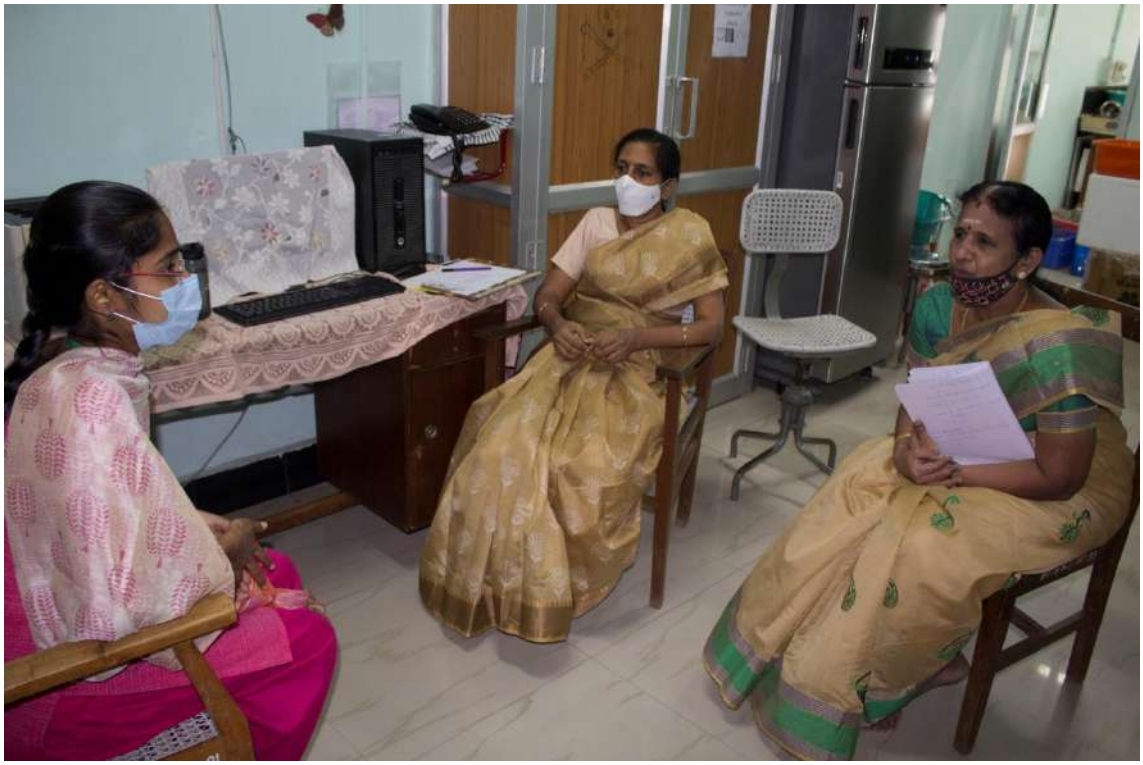
Banking Linkages –SBI, Coimbatore

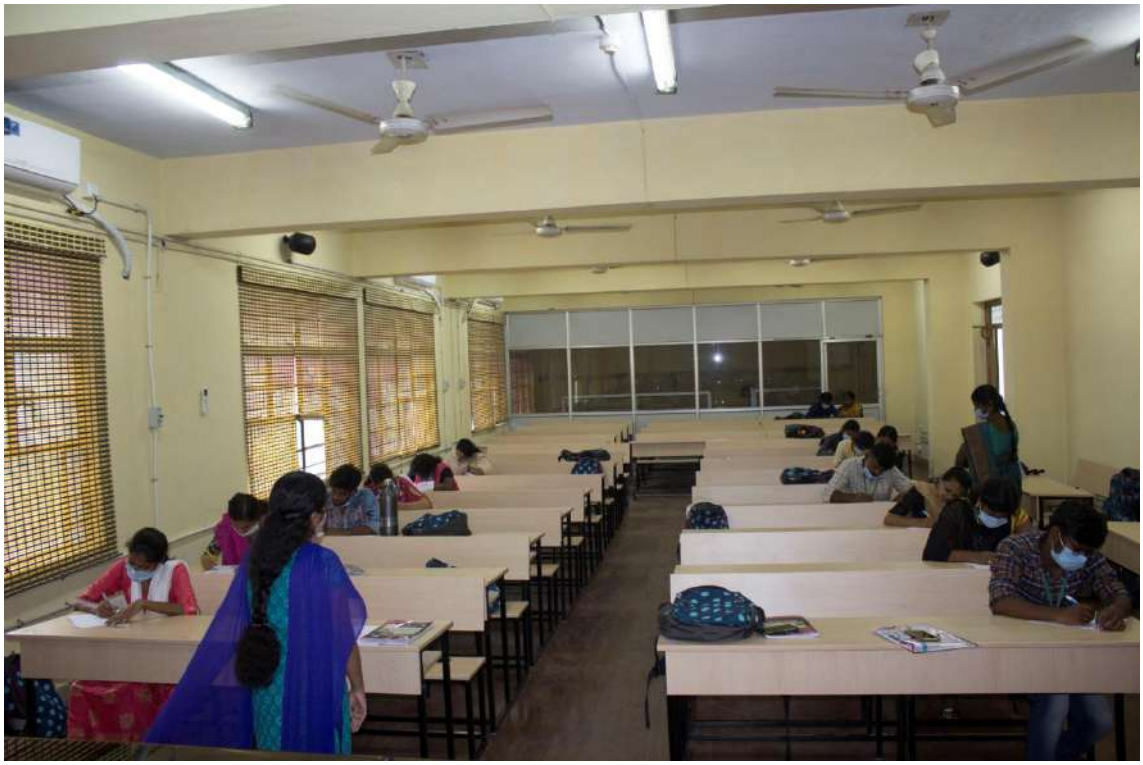
Ms S. Ramya, Farm Sector Technical Officer, State Bank of India, Coimbatore delivered a lecture on “Role of SBI in building an Entrepreneur". She explained that State Bank of India grants financial assistance to technically qualified, trained and experienced entrepreneurs for setting up new viable industrial projects. Loans are also extended to technocrats who are unable to meet the normal margin requirements under the liberalized schemes. She also briefed that State Bank of India offers business loan to meet the varied needs of large business houses as well as Small and Medium Enterprises (SME).



25.03.2021:- Assessment of Trainees

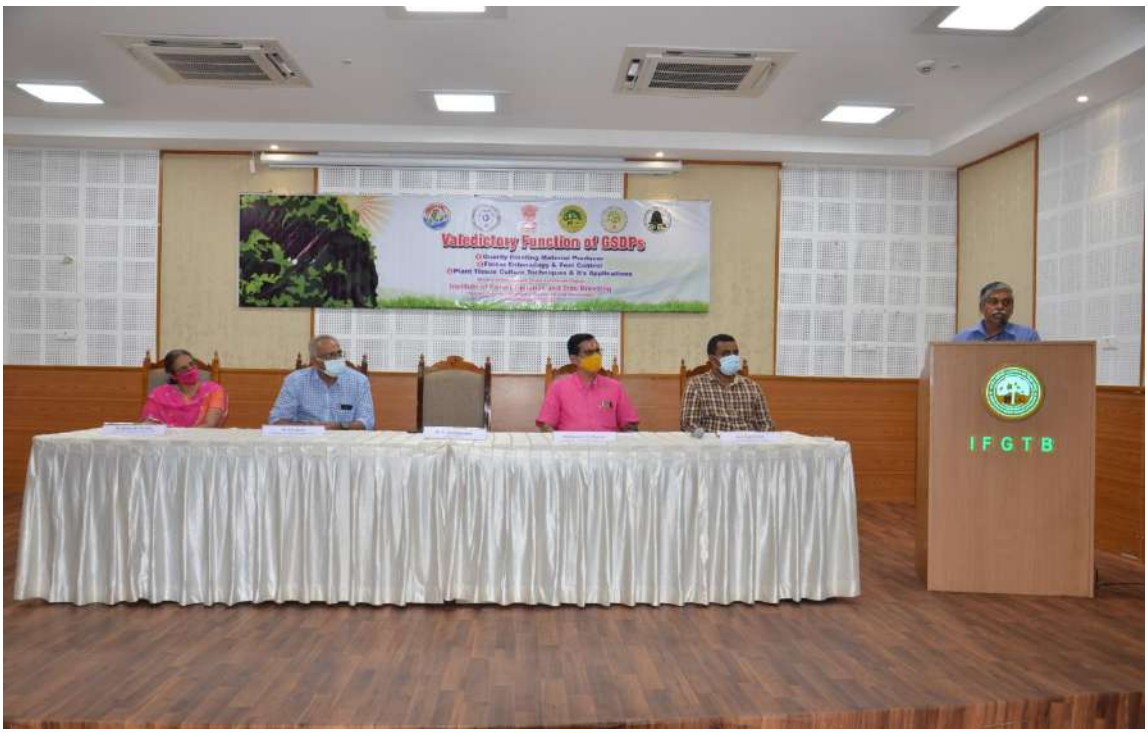
Trainees were assessed based on theory (35%) and practical (65%) with an in-house officer and an external examiner on 12.03.2020. Dr R. Yasodha, Scientist G evaluated the trainees as an external examiner and Dr Rekha R Warrier, Scientist F & Training in-charge functioned as the internal examiner. Practical assessment was carried out in the new tissue culture lab. Later written examination was conducted for theory assessment. All the trainees cleared the examinations both in theory and practical.

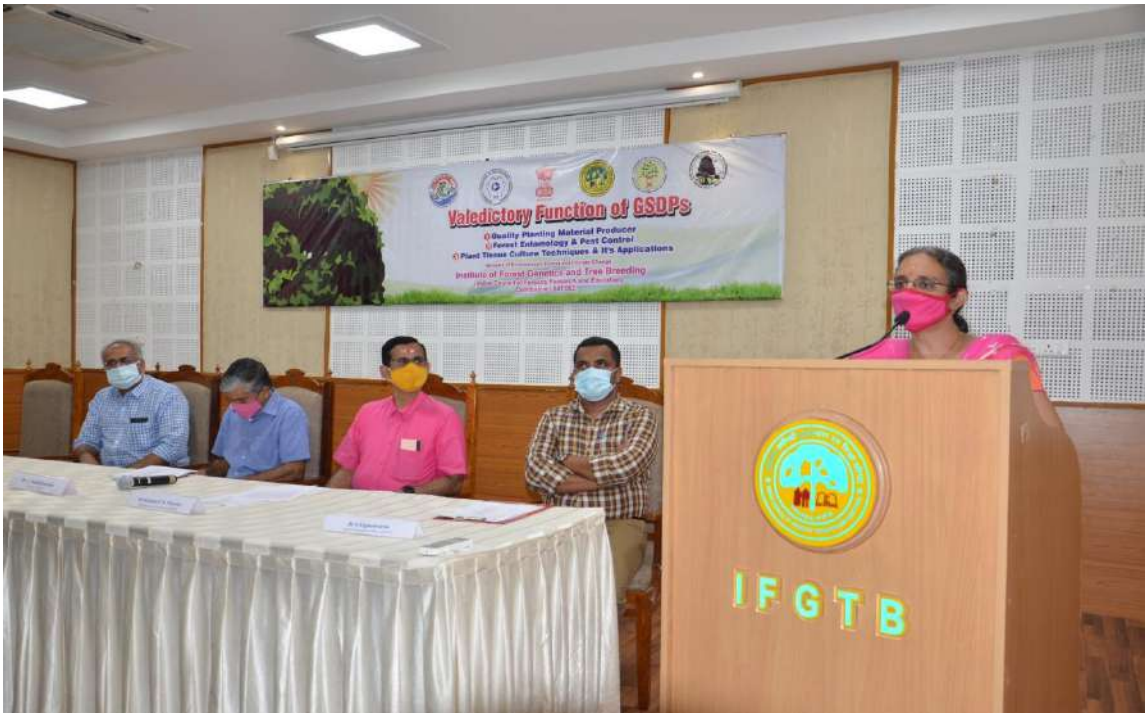


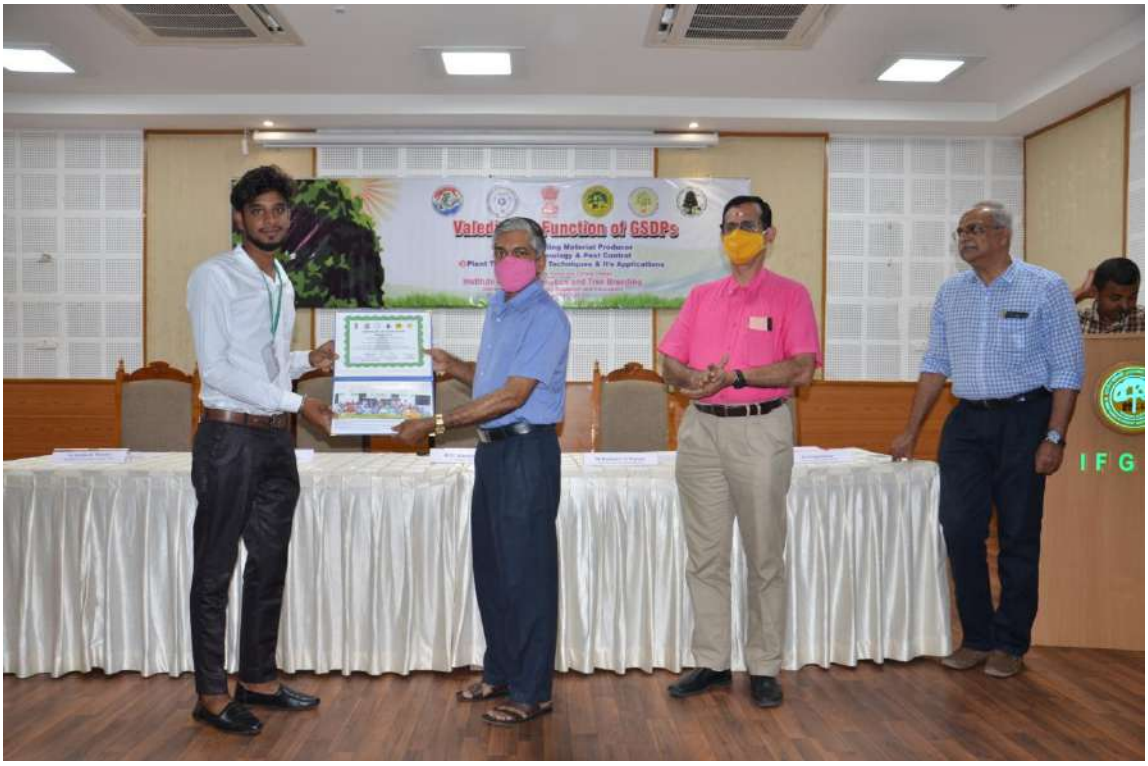


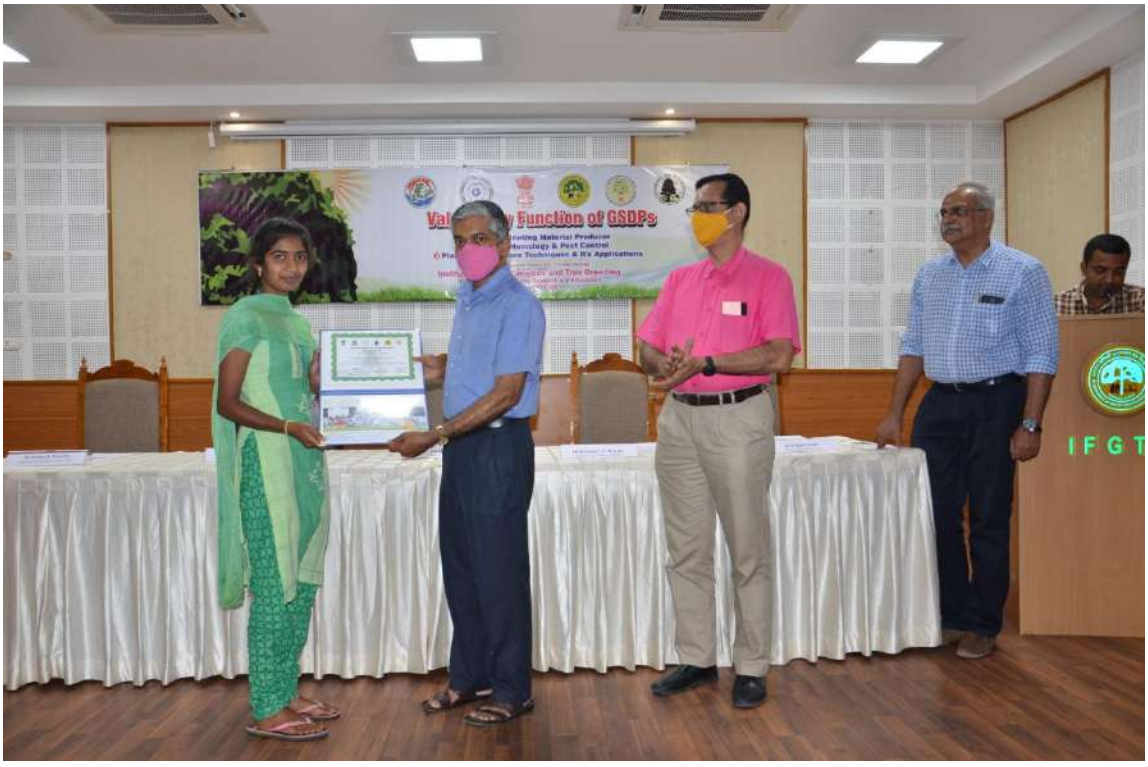
Valedictory function

The valedictory function of the Certificate Course was held on 26.03.2021. Dr C Kunhikannan, Director IFGTB awarded certificates from the Union Ministry of Environment, Forest and Climate Change (MoEFCC) to the successful trainees. 14 trainees from different parts of the country successfully completed the training. Dr Kannan C. S. Warrier, Scientist F, Coordinator ENVIS and Nodal Officer GSDP proposed the vote of thanks and thanked MOEFCC & ENVIS Secretariat for sanctioning the certificate course to IFGTB ENVIS.








Function of GSDPs
IFGT

Green Skill Development Programme (GSDP)

Plant Tissue Culture Techniques & its Applications

Organized by

ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement

Institute of Forest Genetics and Tree Breeding

(Indian Council of Forestry Research and Education)

Coimbatore

FINAL LIST OF CANDIDATES

S. No	Name	Application ID	Gender	Community	State	D.O.B	Qualification	Contact no	Mail Id
SELECTED CANDIDATES									
1.	Amisha Rani	AMIS01121998	Female	OBC	Haryana	01.12.1998	BSc Biochemistry	9306709456	Amishakamboj50@gmail.com
2.	Annie Thomas	Anni24051998	Female	Gen	Kerala	24-05-1998	BE Agriculture Engineering	9952229555	anniethomasat1@gmail.com
3.	Asha. V	ASHA19061997	Female	BC	Tamil Nadu	19-06-1997	M.Sc Biotechnology	7094061621	vishwanathanasha@gmail.com
4.	Athira KM	ATHI27081997	Female	Gen	Kerala	27-08-1997	M.Sc Microbiologoy	9207032674	athiranair541@gmail.com
5.	David Seminito	Davi05041997	Male	BC	Tamil Nadu	05-04-1997	M.Sc Biotechnology	9655223459	davidseminito5497@gmail.com
6.	E. Shanthi Priya		Female	OBC					
7.	K M Jerun Nisha	KM_J211121994	Female	OBC	Uttar Pradesh	21.12.1994	Msc Botany		
8.	M Girija Sangari	M_GI01011998	Female	BC	Tamil Nadu	01-01-1998	M.Sc Botany	8508446457	girijamurugavelu@gmail.com
9.	Nandhini J	NAND07061994	Female	OBC	Tamil Nadu	07-06-1994	M.Sc Botany	7639870591	nandhini.jpn111@gmail.com
10.	Prabakaran T	PRAB27061999	Male	SC	Tamil Nadu	27-06-1999	B.Sc Micro Biology	9677632050	prabakaran7351@gmail.com
11.	Sathiya Sheela D	SATH11031995	Female	SC	Tamil Nadu	11-03-1995	M.Sc Botany	6379882766	manavaisheela1357@gmail.com
12.	Sharly. C	Shar18101997	Female	BC	TN	18/10/1997	BSc Botany	9500588570	sharly.electto@gmail.com
13.	Subbu Raj. S	SUBB15031986	Male	OBC	Tamil Nadu	15-03-1986	10th Level	9597593777	subburaj.raj03@gmail.com
14.	Vipin Kumar Sahu	VIPI06111998	Male	OBC	Chhattisgarh	06-11-1998	B.A English	8839868050	sahuvipin013@gmail.com

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EVALUATION REPORT BY THE PARTICIPANTS

[Note: Please fill-in all the items in the reports, your objectivity will help us to make improvements in the future course(s)]

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10. To what extent are you satisfied with the following?
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    d. Food quality and service: [8]

e. Lecture hall facilities: [10]

f. Interaction with the faculty: [10]

g. Lab facilities: [10]

11. Which part of the course did you find most useful?
Lab work and field visits

12. Which parts of the course did you find least helpful?
—

13. Your overall impression about the course?
Good

14. What were the weaknesses of the course?
—

15. Any suggestions for how to improve the course?
—

16. Any other comments/observations/suggestions:
To add on other topics like molecular biology techniques and Genetic techniques to trainning.

17. Your overall rating about ENVIS Resource Partner? [10]

18. Your overall rating about IFGTB? [10]

Amisha Rani
(Name & signature of the participant)

Dr. Annie Thomas

Feedback Form

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    d. Food quality and service: [10]

e. Lecture hall facilities: [10]

f. Interaction with the faculty: [10]

g. Lab facilities: [10]

11. Which part of the course did you find most useful?

Both Theory & Practical was Resplendant.

12. Which parts of the course did you find least helpful?

Nil.

13. Your overall impression about the course?

Impressed really by the Training Given to me & the Best Learning technique to be Implemented by the course.

14. What were the weaknesses of the course?

No.

15. Any suggestions for how to improve the course?

Nil

16. Any other comments/~~observations~~/suggestions:

Best training I have Ever had in the Trainings I have attended till date across the Nation

17. Your overall rating about ENVIS Resource Partner? [10]

18. Your overall rating about IFGTB? [10]

Dr. Annie Thomas
(Name & signature of the participant)

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10. To what extent are you satisfied with the following?
    a. Transport facilities availed: [10]
    b. Accommodation Facilities availed: [10]
    d. Food quality and service: [10]

e. Lecture hall facilities: 10

f. Interaction with the faculty: 10

g. Lab facilities: 10.

11. Which part of the course did you find most useful?
Practical sessions, field trips, nursery classes & theory class.

12. Which parts of the course did you find least helpful?
Nil

13. Your overall impression about the course?
Excellent

14. What were the weaknesses of the course?
Nil

15. Any suggestions for how to improve the course?
Its good as the way as it is now.

16. Any other comments/observations/suggestions:
Nil

17. Your overall rating about ENVIS Resource Partner? 10

18. Your overall rating about IFGTB? 10

Athulya M

(Name & signature of the participant)

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7. Did you get enough opportunities to interact with the fellow participants? 10
8. How far have you been benefited from the lab session? 10
9. Relevant hands on training provided during this course? 10
10. To what extent are you satisfied with the following?
    a. Transport facilities availed: 10
    b. Accommodation Facilities availed: 10
    d. Food quality and service: 10

e. Lecture hall facilities: 10

f. Interaction with the faculty: 10

g. Lab facilities: 10

11. Which part of the course did you find most useful?

Theory, Practical & field visit.

12. Which parts of the course did you find least helpful?

—

13. Your overall impression about the course?

—

14. What were the weaknesses of the course?

Everything was good.

15. Any suggestions for how to improve the course?

—

16. Any other comments/observations/suggestions:

—

17. Your overall rating about ENVIS Resource Partner? 10

18. Your overall rating about IFGTB? 10

(Name & signature of the participant)

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    d. Food quality and service: [10]

e. Lecture hall facilities: [10]

f. Interaction with the faculty: [10]

g. Lab facilities: [10]

11. Which part of the course did you find most useful?

Practicals & field visit

12. Which parts of the course did you find least helpful?

Nil

13. Your overall impression about the course?

very good

14. What were the weaknesses of the course?

Nil

15. Any suggestions for how to improve the course?

Nil

16. Any other comments/observations/suggestions:

Nil

17. Your overall rating about ENVIS Resource Partner? [10]

18. Your overall rating about IFGTB? [10]

K. David Seminito

(Name & signature of the participant)

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    d. Food quality and service: [9]

e. Lecture hall facilities: [9]

f. Interaction with the faculty: [9]

g. Lab facilities: [9]

11. Which part of the course did you find most useful?
Practical session & lab visit.

12. Which parts of the course did you find least helpful?
–

13. Your overall impression about the course?
Very Good

14. What were the weaknesses of the course?
–

15. Any suggestions for how to improve the course?
Some new species could be taught

16. Any other comments/observations/suggestions:
–

17. Your overall rating about ENVIS Resource Partner? [9]

18. Your overall rating about IFGTB? [9]

(Name & signature of the participant)

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5. Is the curriculum discussed is relevant to the course? 10
6. How useful were the lab sessions during this course? 10
7. Did you get enough opportunities to interact with the fellow participants? 10
8. How far have you been benefited from the lab session? 10
9. Relevant hands on training provided during this course? 9
10. To what extent are you satisfied with the following?
    a. Transport facilities availed: 10
    b. Accommodation Facilities availed: 10
    d. Food quality and service: 10

e. Lecture hall facilities: 8

f. Interaction with the faculty: 9

g. Lab facilities: 10

11. Which part of the course did you find most useful?

Nursery Techniques, field visit in Hosur and bangalore and Lab & calculation Session.

12. Which parts of the course did you find least helpful?

–

13. Your overall impression about the course?

I gained So much knowledge about plant tissue culture, its very good and useful.

14. What were the weaknesses of the course?

–

15. Any suggestions for how to improve the course?

–

16. Any other comments/observations/suggestions:

–

17. Your overall rating about ENVIS Resource Partner? 10

18. Your overall rating about IFGTB? 10

(Name & signature of the participant)

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9. Relevant hands on training provided during this course? [9]
10. To what extent are you satisfied with the following?
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    d. Food quality and service: [10]

e. Lecture hall facilities: 8

f. Interaction with the faculty: 10

g. Lab facilities: 10

11. Which part of the course did you find most useful?

Lab activities, Nursery activites, Field visit.

12. Which parts of the course did you find least helpful?

No. all those things so useful.

13. Your overall impression about the course?

Now I have to know overall tissue culture Lab activites only because GCDP training.

14. What were the weaknesses of the course?

No.

15. Any suggestions for how to improve the course?

No.

16. Any other comments/observations/suggestions:

Rejection of Our ~~tour~~ Katalur tour trip was small dissapointment. Because if we went that place we got more experience.

17. Your overall rating about ENVIS Resource Partner? 9

18. Your overall rating about IFGTB? 10

J. Mary.

(Name & signature of the participant)

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7. Did you get enough opportunities to interact with the fellow participants? 10
8. How far have you been benefited from the lab session? 10
9. Relevant hands on training provided during this course? 10
10. To what extent are you satisfied with the following?
    a. Transport facilities availed: 10
    b. Accommodation Facilities availed: 10
    d. Food quality and service: 10

e. Lecture hall facilities: 10

f. Interaction with the faculty: 10

g. Lab facilities: 10

11. Which part of the course did you find most useful?

Van, practice and Trip

12. Which parts of the course did you find least helpful?

-

13. Your overall impression about the course?

Very good

14. What were the weaknesses of the course?

Nil

15. Any suggestions for how to improve the course?

-

16. Any other comments/observations/suggestions:

Nil

17. Your overall rating about ENVIS Resource Partner? 10

18. Your overall rating about IFGTB? 10

(Name & signature of the participant)

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8. How far have you been benefited from the lab session? 10
9. Relevant hands on training provided during this course? 10
10. To what extent are you satisfied with the following?
    a. Transport facilities availed: 10
    b. Accommodation Facilities availed: 10
    d. Food quality and service: 10

e. Lecture hall facilities: 10

f. Interaction with the faculty: 10

g. Lab facilities: 10

11. Which part of the course did you find most useful?

All Practical Classes & Theory & Field visits.

12. Which parts of the course did you find least helpful?

—

13. Your overall impression about the course?

Excellent

14. What were the weaknesses of the course?

—

15. Any suggestions for how to improve the course?

—

16. Any other comments/observations/suggestions:

—

17. Your overall rating about ENVIS Resource Partner? 10

18. Your overall rating about IFGTB? 10

D. Sathiya Sheela.

(Name & signature of the participant)

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10. To what extent are you satisfied with the following?
    a. Transport facilities availed: 10
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    d. Food quality and service: 10

e. Lecture hall facilities: 10

f. Interaction with the faculty: 10

g. Lab facilities: 10

11. Which part of the course did you find most useful?

All Nursery techniques, Lab work, field visit part.

12. Which parts of the course did you find least helpful?

Nil

13. Your overall impression about the course?

Awsome course and very useful for me and very valuble course.

14. What were the weaknesses of the course?

Nil

15. Any suggestions for how to improve the course?

Nil

16. Any other comments/observations/suggestions:

No comments

17. Your overall rating about ENVIS Resource Partner? 10

18. Your overall rating about IFGTB? 10

E. Shilpa

(Name & signature of the participant)

Green Skill Development Programme (GSDP)

Organized by

ENVIS Resource Partner on Forest Genetic Resources and Tree Improvement

Institute of Forest Genetics and Tree Breeding

(Indian Council of Forestry Research and Education)

Coimbatore

EVALUATION REPORT BY THE PARTICIPANTS

[Note: Please fill-in all the items in the reports, your objectivity will help us to make improvements in the future course(s)]

1. Name of the Institution**: ENVIS RP, IFGTB, Coimbatore**
2. Title of the Course: **'Plant Tissue Culture Techniques and its Applications'**
3. Duration & Period of the course: **320 Hours (22.02.2021 to 26.03.2021)**

Points : 10 for very well structured to 00 for very unstructured [10 (highest) to 00 (lowest)]

5. Is the curriculum discussed is relevant to the course? [10]
6. How useful were the lab sessions during this course? [10]
7. Did you get enough opportunities to interact with the fellow participants? [10]
8. How far have you been benefited from the lab session? [10]
9. Relevant hands on training provided during this course? [10]
10. To what extent are you satisfied with the following?
    a. Transport facilities availed: [10]
    b. Accommodation Facilities availed: [10]
    d. Food quality and service: [10]

e. Lecture hall facilities: 10

f. Interaction with the faculty: 10

g. Lab facilities: 10

11. Which part of the course did you find most useful?

All the Technical, Field visit part.

12. Which parts of the course did you find least helpful?

Nil

13. Your overall impression about the course?

Awesome Course, Great opportunity for me forever.

14. What were the weaknesses of the course?

Tea time should be at 10:00 AM. Because 11:00 AM timing is ~~not~~ ~~th~~, late and can't able eat more lunch, since not feeling that much Hungry, Sir.

15. Any suggestions for how to improve the course?

Nil.

16. Any other comments/observations/suggestions:

Nil

17. Your overall rating about ENVIS Resource Partner? 10

18. Your overall rating about IFGTB? 10

Sharly.C
(SHARLY.C)
(Name & signature of the participant)

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EVALUATION REPORT BY THE PARTICIPANTS

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5. Is the curriculum discussed is relevant to the course? 10
6. How useful were the lab sessions during this course? 10
7. Did you get enough opportunities to interact with the fellow participants? 10
8. How far have you been benefited from the lab session? 10
9. Relevant hands on training provided during this course? 10
10. To what extent are you satisfied with the following?
    a. Transport facilities availed: 10
    b. Accommodation Facilities availed: 10
    d. Food quality and service: 8

e. Lecture hall facilities: 10

f. Interaction with the faculty: 10

g. Lab facilities: 10

11. Which part of the course did you find most useful?

Lab, Practice
field Trip

12. Which parts of the course did you find least helpful?

calculation Part

13. Your overall impression about the course?

good

14. What were the weaknesses of the course?

Nil

15. Any suggestions for how to improve the course?

If teacher is unable to explain calculation Part
Instead of them give another teacher

16. Any other comments/observations/suggestions:

Nil

17. Your overall rating about ENVIS Resource Partner? 10

18. Your overall rating about IFGTB? 10

(Name & signature of the participant)