

**MAR ATHANASIOS COLLEGE FOR ADVANCED STUDIES TIRUVALLA
(MACFAST)**



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HANDS ON TRAINING REPORT/ LABORATORY PRACTICAL

MAR ATHANASIOS COLLEGE FOR ADVANCED STUDIES TIRUVALLA (MACFAST)

Tiruvalla, Pathanamthitta, Kerala 689 101

HANDS ON TRAINING REPORT /LABORATORY PRACTICAL

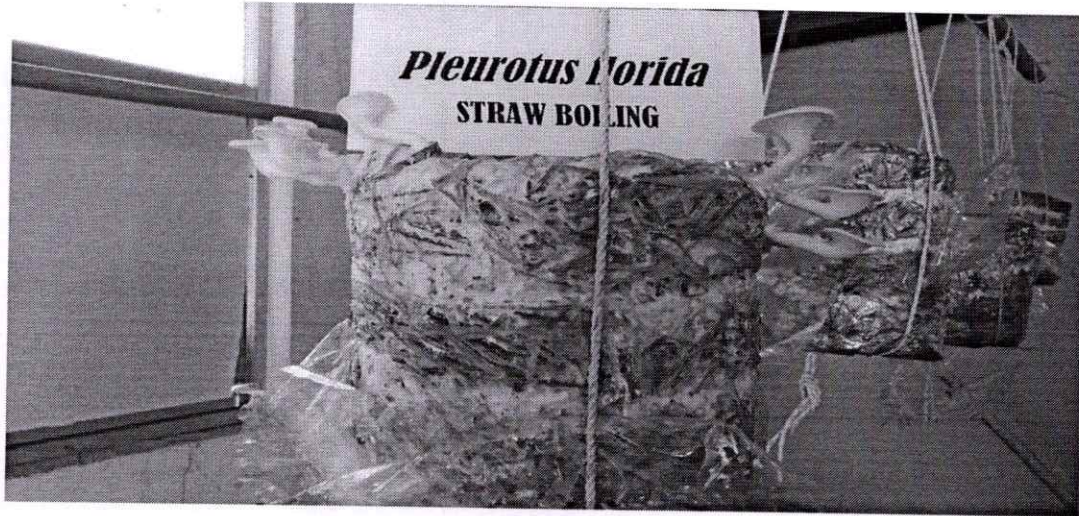
School of Biosciences is providing additional practical training for students in addition to their regular laboratory practicals. The objective of the additional practical training programme is to provide opportunities to apply their acquired skills and knowledge in working life. The additional practical training programme given to the students are the following:

- **Mushroom Cultivation**
- **Water Quality Analysis**
- **Soil Analysis**
- **Plant Tissue Culture**
- **Chocolate Making**
- **Cake Making**

❖ Mushroom Cultivation

As part of the curriculum, the School of Biosciences initiated to start mushroom cultivation for the purpose of imparting training to students for starting a new venture. The School of Biosciences started a Mushroom lab with the sanction from the Principal Rev.Fr. Dr.Cherian J Kottayil on 19-2-2018. The Faculty co-ordinator was Ms.Beena Cherian. Two varieties of mushrooms namely *Pleurotus florida* and CO-1 were cultivated in our lab using paddy straw boiling and chemical methods. The spawn required for the cultivation was purchased from KVK, Thelliyoor. Cultivation were done by students and the harvested mushroom was utilized for the purpose of research work. The cultivated mushroom was subjected to chemical analysis (Acidity, pH, Vitamin C, moisture analysis) and product development.





Mushroom cultivated in our lab

Cultivation number	Spawn quantity
1st cultivation	10 packets (20 beds)
2nd cultivation	6 packets (12 beds)
3rd cultivation	4 packets (8 beds)
4th cultivation	6 packets (12 beds)

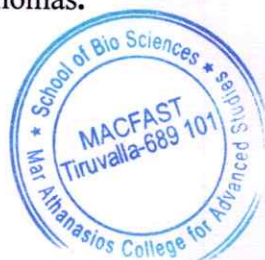
The cultivated mushrooms were utilised to develop 4 new products such as:

1. Mushroom soup powder
2. Mushroom cutlet mix
3. Dried mushroom pickle
4. Highly nutritious convenience food Nutri mush

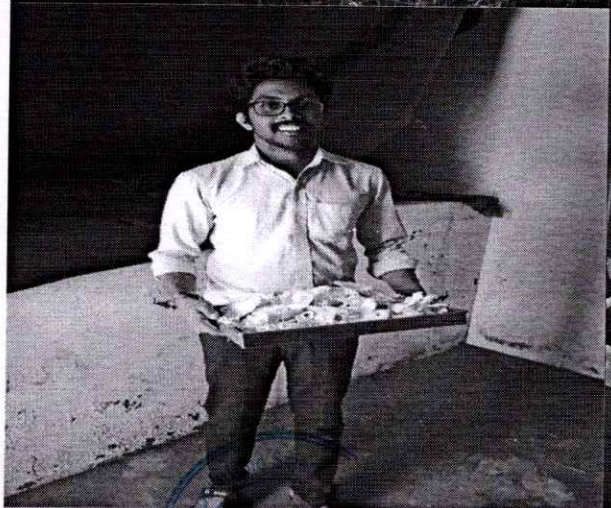
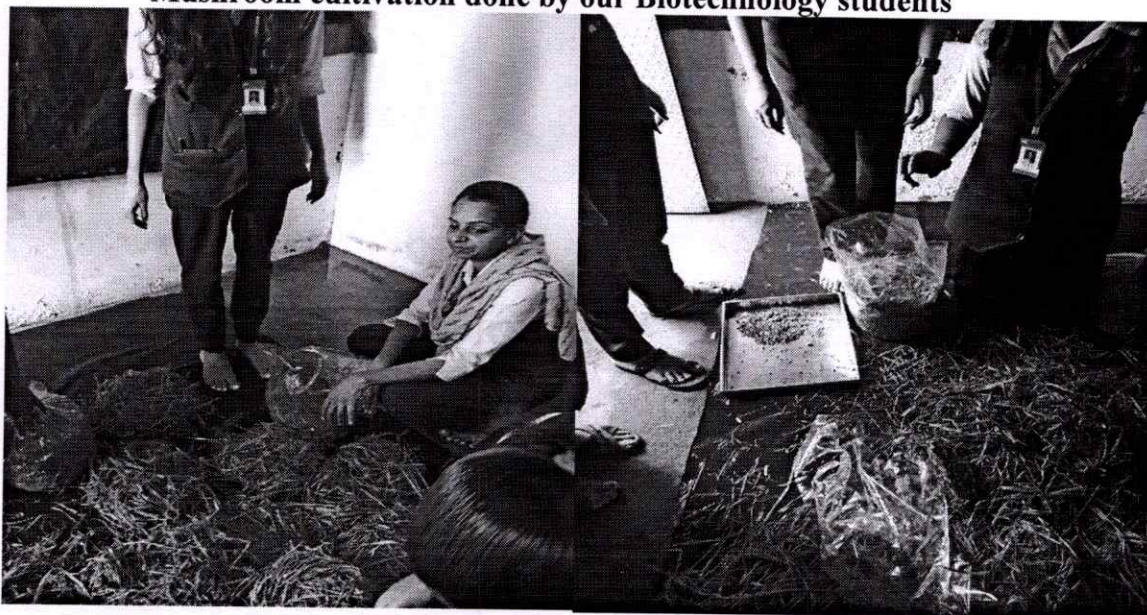
The Standardization of the products were done by food technology and biotechnology students in our food processing lab. The developed products were subjected to sensory, chemical and microbial analysis.

Outcome

Article published in the Journal of Science Technology & Management, MACFAST titled the nutritive values, therapeutic properties and bioactive compounds of mushrooms by Beena Cherian and Shanto V Thomas.



Mushroom cultivation done by our Biotechnology students



❖ Water Quality Analysis

Bacteriological quality of the water sources were found to be severely above the accepted levels for drinking water and poses a major threat to human health. Water analysis is performed by students of the school of Biosciences under the mentoring of two faculties and the results are reported to the HOD and Principal. Water quality analysis thus aims at ensuring superior quality of the drinking water. The regular testing will help to maintain the water quality and the safe drinking water will eliminate the chances of potential health hazards related to water contamination.

The Practise:

Water samples are collected from the drinking water sources of the campus in regular intervals (15 days) in clean, sterile sampling bottles and labelled accordingly. The samples are then subjected to presumptive testing for coliform bacteria by the most probable number (MPN) method. Water samples from all the drinking sources are checked twice a month and any variation (if any) in the water quality is dealt with by periodic chlorination of water sources..

The Procedure:

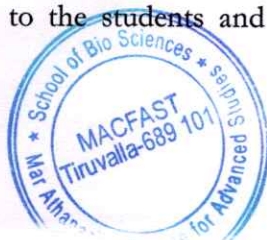
pH, hardness and bacteriological analysis (MPN) for total coli forms were performed. pH was determined by automated pH meter available in the School of Bioscience Laboratory. The hardness of water is evaluated by total hardness estimation method using buffer solution, indicator solution and standard EDTA with the below formula;

$$\text{Total hardness} = \frac{\text{ml of EDTA}}{\text{volume of sample}} \times 100\text{ppm}$$

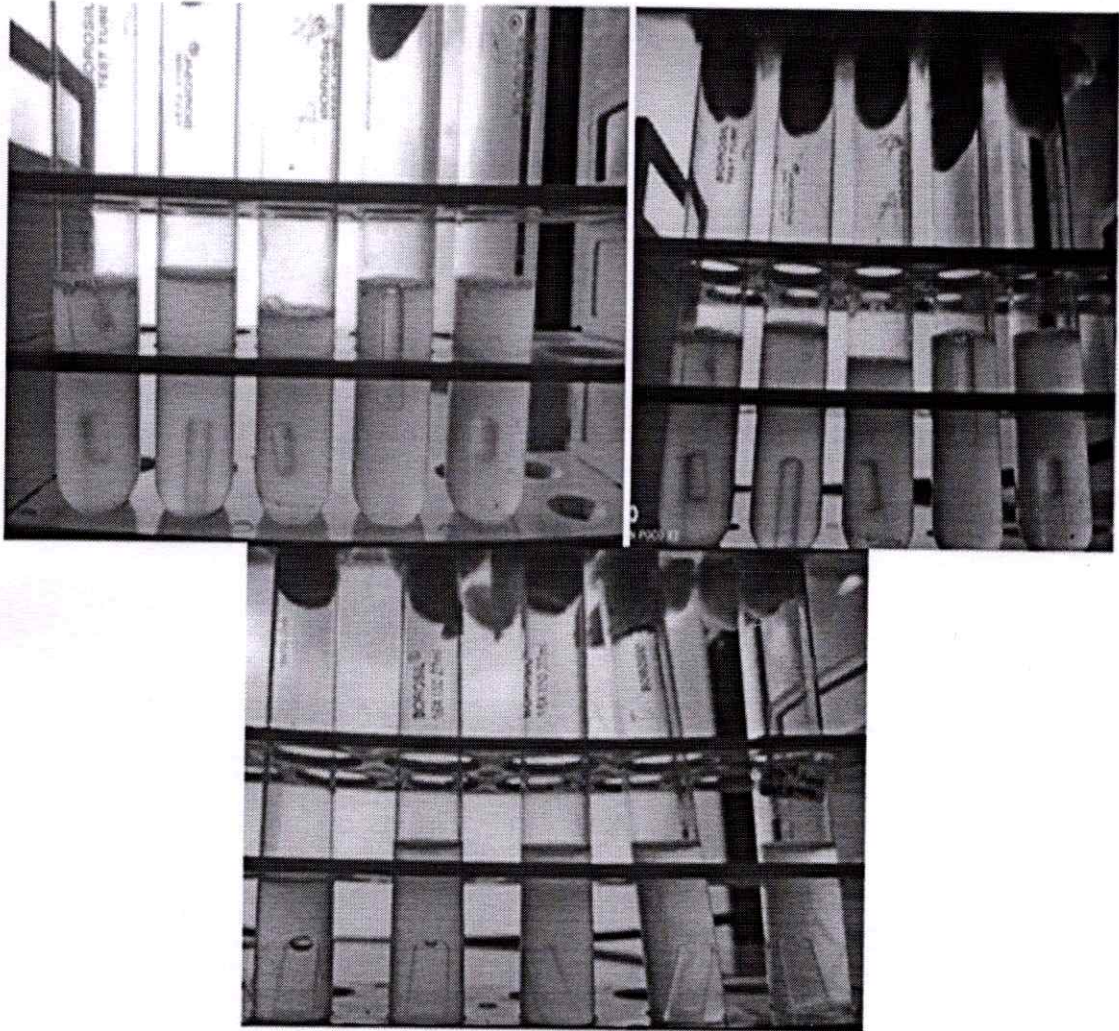
Bacterial examination of water is performed by multiple tube fermentation method using double strength lactose broth, single strength lactose broth and Duraham's tube.

Outcome:

Periodic checking of the bacteriological quality of water has resulted in a general awareness regarding the importance of safety measures to the students and has made them personally responsible and socially committed.



Water Analysis by MPN Method using Lactose Fermentation Broth



❖ Soil Analysis

Soil analysis is a set of various chemical processes that determine the amount of available plant nutrients, chemical and physical properties of soil, which is important for plant nutrition, and "soil health". Soil analysis is performed by students of the school of Biosciences under the guidance of faculty and the results are reported to the HOD and Principal. Chemical analysis of soil estimates the content of basic plant nutrients such as nitrogen, phosphorus and potassium. It also helps to determine the physical parameters important for soil health such as electrical conductivity and pH - value. Soil analysis focuses on finding out the nutrient level of soil sample collected from selected localities.

The following specific objectives have been set for this practice:

- To determine the macro nutrient profile of the soil sample
- To estimate the micro nutrient status of the soil sample
- To evaluate pH and electrical conductivity of the soil.
- To evaluate total organic carbon content in a soil

The Procedure:

A uniform portion of soil sample was collected from selected places using a shovel by first making a V-shaped cut into the soil to the depth of sampling. Next, a 1-inch-thick vertical slice of soil to the same depth was removed from the smoothest side of the cut and a 1-inch strip of soil with the length of the slice was removed. Before collecting the sample, organic debris, rocks and trash from the soil surface were removed carefully. A clean container (not zinc-coated if determining Zn) was used to collect the soil portions and mixed thoroughly. Then, enough soil was collected to fill a sample box. The sample was air dried thoroughly for 36 hours before nutrient analysis conducted. The soil sample was then subjected to analysis for macronutrients, micronutrients, total carbon content and pH value.





Outcome:

Students are able to understand major soil environments used for agriculture.

❖ Plant Tissue Culture

As part of the curriculum the School of Biosciences initiated plant tissue culture training programme for the students. Plant Tissue Culture is a collection of techniques used to maintain or grow plant cells, tissues or organs under sterile conditions on a nutrient culture medium of known composition.

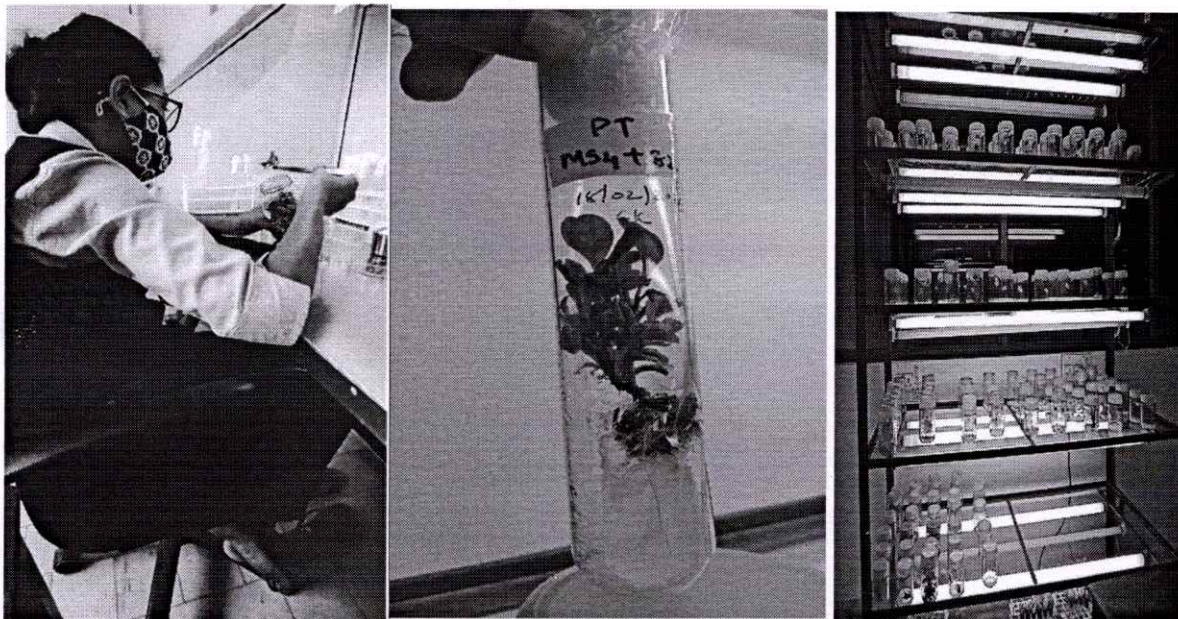
Objective

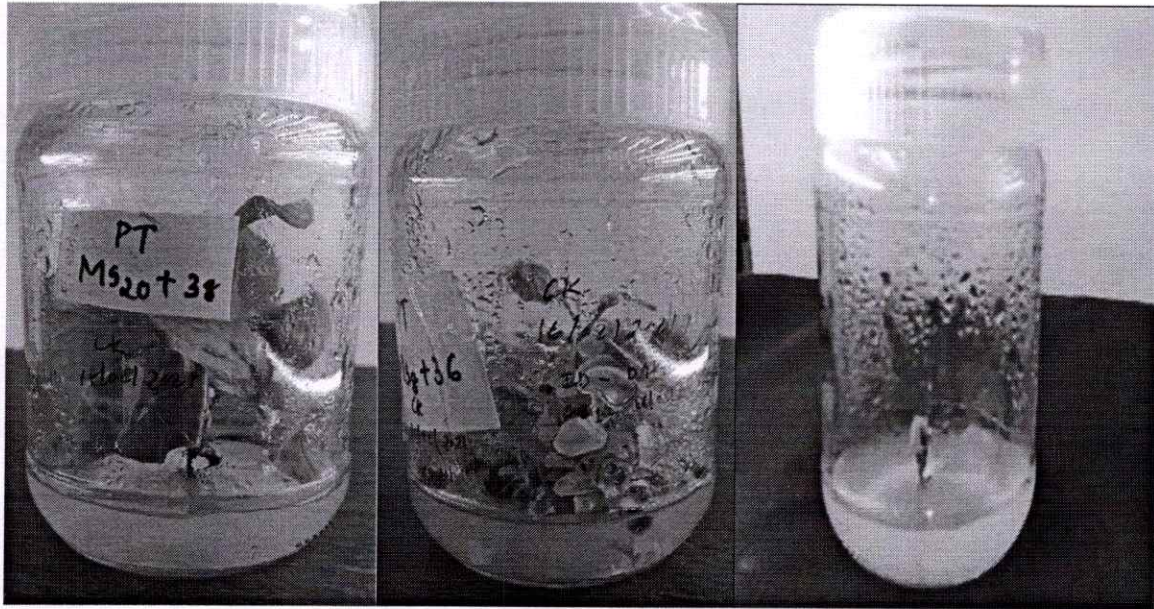
- To provide basic knowledge on plant tissue culture
- Principles and applications of Tissue culture
- Preparation of tissue culture media and sterilization Techniques
- Hands on training for different tissue culture techniques



Procedure

The initiation phase is the first phase of plant tissue culture. Here the tissue of interest is obtained and introduced and sterilized. During this stage tissue is initiated into culture. The multiplication phase is the second step of tissue culture where the in vitro plant material is redivided and introduced into the medium. Medium is composed of appropriate components for growth i.e., regulators and nutrients. These are responsible for the proliferation of the tissue and the production of multiple shoots. In third phase, roots are formed to induce rooting.





Outcome

The students could learn how to prepare different types of media, to develop callus from explants & shoot from the callus.

❖ Chocolate Making

The chocolate training is designed to develop practical skill and entrepreneurship in students. The practical work will include cocoa bean processing, chocolate manufacture, tempering, moulding, filling etc. The programme was co-ordinated by Ms. Pinchu Elizabeth Thomas

Procedure

A lecture session on cocoa processing- from cocoa bean to bar and chocolate making. Explaining the various stages like harvesting, post-harvest management, fermentation, drying, roasting, peeling, winnowing, grinding and conching and molding.

- Types of chocolate- dark, milk and white chocolate
- Difference between compound and couverture chocolate
- How to select a right chocolate for molding
- Tempering techniques



- Polymorphism of cocoa butter
- Importance of temperature and crystallisation points in chocolate
- Temperature points of various confections
- Crystallisation of chocolate ganache
- To understand flavouring and colouring techniques
- Learn filling techniques
- Learn enrobing and panning
- Modern decorations
- To understand molding techniques and different types of molds- materials, designs, durability etc.
- Effect of humidity and temperature on chocolate
- Packing and storage of chocolates
- Methods to prevent bloom in chocolates

List of products

- Plain chocolate- dark, milk and white
- Chocolate with filling
- Pralines
- Soft centers
- Nuts, raisins n cherry
- Fruity cantered
- Peanut butter filling
- Caramel filling
- Truffles- dark, milk and white
- Bonbons
- Lollipops
- Cake pops
- Chocolate salami
- Chocolate ganache
- Layered chocolate
- Marble chocolate
- Coloured chocolates
- Wafer coated chocolate

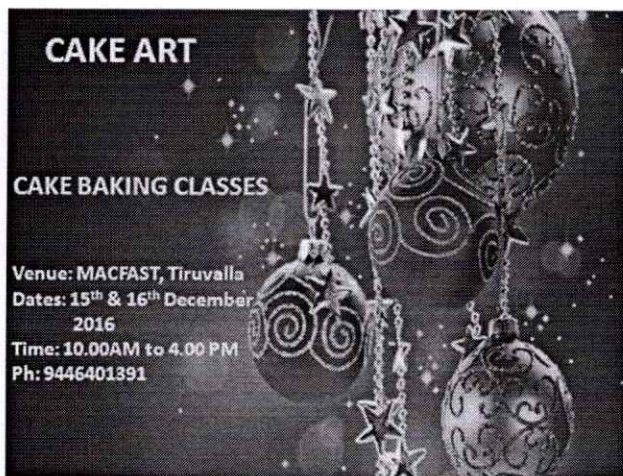


- Coconut bounty



❖ Cake baking

The School of Biosciences organised hands on training in Cake baking for our students with lecture and practical classes. The programme was co-ordinated by Ms. Pinchu Elizabeth Thomas. Hands-on training were given on the preparation of various types of cakes including Vanilla sponge cake, Black Forest, Red Velvet cake, tea cake etc.



CYA

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