A Brief Report
On

Three-Day Skill development of Mushroom Cultivation for the North-Eastern Region

Organised By

Department of Biotechnology
Pachhunga University College
(A Constituent College of Mizoram University)
Aizawl, Mizoram

In Collaboration With

RAJIV GANDHI NATIONAL INSTITUTE OF YOUTH DEVELOPMENT
Institution of National Importance by the Act of Parliament No.35/12
Ministry of Youth Affairs and Sports,
Government of India, Sriperumbudur – 602 105.

Contents

PREFACE AND ACKNOWLEDGEMENT

Skill development is important because skills determine the ability to execute the plans with success. Skill training not only provides skills in a particular area, but trains them to build andenhance networking, time management, etc. The programme ***Three days Skill developmentof Mushroom cultivation for NER*** is a golden opportunity for the youth of North East regionof India especially for the current target ST people. They were provided with experts of mushroom cultivation and were given an opportunity to perform the practical, moreover they were given mushroom blocks so that they can witness the growth and appearances of oyster mushroom, they can research their own blocks which may give them interests and ideas on the cultivation. They were also provided with materials where they can learn by themselves in future. We are highly obliged to the funding received from Rajiv Gandhi National Institute of Youth Development (RGNIYD) and without their help, the workshop will not happen. The organizers are thankful to our respected principal Dr. Tawnenga for his encouragement, guidance and support and by providing whatever is asked. Organizers are also thankful to the faculty and staff of the department of life science, department of Biotechnology and IRC for their help and support. The last but not the least, we are grateful to all the participants and resource persons for making the workshop a grand success.

BACKGROUND

Mushrooms are vital food in a country like India where vegetarian dominate and moreover to overcome malnutrition and to tackle food insecurity. FAO has recommended mushrooms as a food item contributing to protein nutrition of the developing countries. Cultivation of the oyster mushroom has various advantages as it converts complex organic ligno-cellulosic compounds into nutritious food, aids recycling of agro-waste, contributes to pollution control, does not compete with agricultural land and provides avenues to self-employment. Hence there is an urgent need to popularise the technology amongst the community.

Objectives

- To educate Students for mushrooms cultivation technology
- To help build a knowledge on wild mushrooms; differentiating poisonous and ediblemushrooms
- To impart hands on training on entrepreneurship development in Oyster Mushroom Cultivation

Rational behind the programme

There is a demand for technology at grass root level to enable people to break away from the poverty trap and to acquire a sense of livelihood. Training is generally been considered the outlet for an exchange of concepts within a community. Therefore, the proposed training can help develop skills that can be useful for their livelihood.

Target Group for the Program

As mentioned before the main target of this program is the tribal youth of North East India especially Mizoram who were having less chance of exposure to this kind of workshop. The program is to educate them for technology related to mushroom farming and cultivation, to help build a knowledge on wild mushrooms; differentiating poisonous and edible mushrooms and to impart hands on training and entrepreneurship development in Oyster Mushroom Cultivation.

Inaugural Function of the Program

The inaugural function of the program was chaired by Dr. Mukesh Kumar Yadav, an Assistant Professor from the department of Biotechnology, Pachhunga University College (PUC). After welcome address was given by the chairman, inaugural speech was delivered by Prof. Sibnath Deb (Chief guest) and the Director of RGNIYD. He spoke about the importance of becoming economically independent and the significance of the skill development programme. He also appreciates PUC for taking initiatives to conduct such programme.

Topics Covered by the Resource Persons

The first lecture was a Special talk by **Dr.Daniel Lalawmpuia** from the Department of Economics, PUC. His topic was ***"National youth policy 2014 and sustainable development goals 2030".*** He started by giving a brief introduction about national youth policy 2014 by first mentioning the five objectives and priority areas. He mentioned that the policy was approved by the Union cabinet on 9th June 2014. He continued the introduction by explaining each of the objectives and priorities one by one along with its future imperatives.

He expanded his speech by talking the importance of youth and that India is expected to be the 4th largest economy by 2025 since the working population is increasing each year, and hence focus on the youth group is important.

He continued by giving the definition of sustainable development by saying it is a non-destructive development to meet the need of the present. He proceeded to the next topic which was sustainable development goals which was adopted on the 70th session of the UN general assembly on 25th September 2015. India is also a signatory to the agreement.

The SDGs (Sustainable Development Goals) has 17 goals and 169 targets. He continued his speech by explaining the 17 SDGs which was to be achieved by 2030. The 17 goals include i. Zero proverty ii. Zero hunger iii. Good health and well-being iv. Quality education v. Gender equality vi. Clear water and sanitation vii. Affordable and clean energy viii. Decent work and economic growth ix. Industry, innovation and infrastructure

x. Reduced inequality xi. Sustainable cities and communities xii. Responsible consumption and production xiii. Climate action xiv. Life below water xv. Life on land

xvi. Peace, justice and strong institutions xvii. Partnerships for the goals He concluded his speech by explaining SDG Index which was prepared by NHI. In India, Mizoram ranked 11th in SDG Index.

The next speaker **Dr. John Zothanzama,** Associate Professor from the Department of EVS, Mizoram University spoke on ***"Introduction to Mushroom and scope of mushroom cultivation".*** He started his speech by giving an introduction on Mushroom by explaining mushroom is a type of fungi and the cultivation was started in 17th century in France. He mentioned that there are 500 identified edible species, out of which 60 species are cultivated. He continued his speech by saying the health benefits of Mushroom and the scope of mushroom cultivation in Mizoram.

He explained by mentioning the market scenario in Mizoram and that 90% mushroom are imported and 10% are made up locally cultivated mushroom. He expanded his speech by explaining the oyster mushroom cultivation by explaining each step of the cultivation i.Preparation of spawn ii. Substrate preparation iii. Spawning of substrate

iv. Incubation v. Fruiting and harvesting He enlighten us by giving the advantages of oyster mushroom by explaining the following i. Variety of substrates- oyster mushroom is able to grow well in multiple substrates which contains lignin, cellulose and hemicellulose

ii. Simple method- the cultivation procedure is a simple method iii. Longer shelf life- among the mushroom oyster mushroom has a longer shelf life and hence high productivity. He continued his speech by explaining the production cost for starting the cultivation of each batch of mushroom.

Dr. Lallawmsanga, Scientific officer, DBT BioNEST talks on ***"Wild mushrooms:edible vs poisonous" and "Health benefits of Mushroom Research in Mizoram".*** He started his speech by sharing the most commonly eaten mushroom namely *Lentinula lateritia, Auricularia auricula-judae, Schizophyllum commune, Schizophyllum commune, Lactifluus piperatus, Russula subfragiliformis, Termitomyces, Agaricus bisporu, Pleurotus otreatus*. He continued his speech by sharing the commonly mistaken poisonous mushroom to be edible mushroom. Which are as follows: i. *Agaricus arvensis* and *Agaricus xanthodermus*

ii. *Macrolepiota procera* and *Macrolepiota rhacodes* iii. Morels (Morchella spp.) and False morel (*Gyromitra esculenta*). He showed the different poisonous mushroom which are commonly seen in Mizoram namely *Amanita virosa* (Destroying angel), *Amanitaphalloides* (Death cap), *Myxacium archeri*, *Gyromitra esculenta* (False Morel), *Amanita*

muscaria (Fly Agaric), *Chlorophyllum molybdites* (Green spored parasol), *Galerina marginata (Autumn Skullcap), Pleurocybella porrigens (Angel wing), Podostroma cornudamae, Conocybe filaris, Cortinarius rubellus (Deadly Webcap), Lepiota brunneoincarnata (Deadly dapperling), Boletus satanus (Devil's bolete).*

Dr. Lallawmsanga taken up the next presentation, he enlightens us on how to identify poisonous mushroom, he gave a brief introduction on the toxin known as mycotoxin and amanitin. The different ways to identify poisonous mushroom are as follows: i. Presence of warts/scales ii. Presence of umbrella shaped cap iii. Presence of volva iv. White sporeprint v. Presence of annulus vi. Presence of Gills. After this he spoke about the health benefits of mushroom. He mentioned that as food the mushrooms are world-wideappreciated for their taste and flavour and are consumed both in fresh and processed form. They are poor in calories and rich in proteins, fibres, carbohydrates, and important vitamins such as thiamine, riboflavin, ascorbic acid and minerals. He also demonstrated that the regular consumption of mushrooms or the consumption of isolated bioactive constituents present in mushrooms is beneficial to health. Mushrooms contain many substances and several of them could have some biological activity, such as: polysaccharides, small peptides, phenolics, terpenoids, proteins (fungal immune-modulating proteins—FIPs, lectins, glycoproteins and non-glycosylated proteins and peptides), polysaccharide–protein complexes, nucleosides, lipid components (ergosterol), alkaloids, amino acids, nucleotides. He highlighted the different medicinal properties of mushroom: i. Anti-inflammatory properties: ii. Anti-microbial properties: Antioxidant: iv. Antidiabetic: v. Antidepressant: vi. Anticancer vii.Neuroprotective properties: viii. Hepatoprotective properties: ix. Antigenotoxic properties: x.Neurodegenaration: xi. Antiviral properties: *Agaricus blazei Murill* (AbM), *Hericium erinaceus* (HE), and *Grifola frondosa* (GF) have been shown to exert

antimicrobial activity against viral agents Lastly, he spoke and taught about cultivation of *Schizophyllumcommune* by explaining different steps.


Demonstration of *Schizophyllum commune* cultivation was taken up by **Dr. Lalawmsangaand Mr.William Carrie** where all the materials required was provided by the resource person and the students were given hands on training on the cultivation of *Schizophyllum commune*.

The last speaker for Day1 **Mr. William Carrie,** Research Scholar from Department of Biotechnology, Mizoram University talk about "***in-vitro technique for the cultivation of mushroom and preservation".*** He started his speech by giving a brief introduction about mushroom in general. He talks about the anatomy of mushroom and explain all the different parts of mushroom (Cap, Stem, Gills, spores, annulus, volva). He proceeded tothe *in vitro* technology by explaining how it is performed by giving examples. He gave the outlines for in vitro mushroom culture as follows: i. Collection of fruiting bodies ii. Preparation of pure culture iii. Preservation (short term and Long term).

He mentioned that the collection of fruiting body should be in a suitable plastic container or vials, Data sheet for mushroom collection should contain essential information on locality, environment, vegetation, weather parameters, habitat, and morphological

features of the mushroom. And for the preparation of pure culture there are two techniques namely tissue culture and spore culture. In a tissue culture a small portion of fruiting body is used for obtaining mycelium culture where as in spore culture multiple spores are used for obtaining mycelium culture. Secondly, he talks about sterilization which will be done by autoclave, ethyl alcohol or sodium hypochlorite. Next, he explained the tissue culture technique and the process which was followed by spore print preparation. Finally, he talked about short term and long-term preparation where in the short-term sub culturing of the mushroom was employed and in long term preservation oil overlay, cryopreservationor immersion in distilled water technique was used.

The second day (Day2) was chaired by **Dr. Prashant Kumar Singh,** Assistant Professor, Department of Biotechnology, Pachhunga University College (PUC). The first speaker **Mr. Francis Lalmalsawma Sailo**n the owner of *Zo Mushroom* and the winner of Mizoram Kailawn, 2019 talks on ***Scope of Mushroom cultivation: from entrepreneurshippoint of view***. He talked about his work in zo mushroom which is based on mushroom spawning, cultivation and farming.

He spoke about how there is no GST for fresh mushroom in Mizoram and that the shelf life for fresh mushroom is less due to which it gets deteriorated during transportation from outside Mizoram. Mizoram has 70% mushroom imported and 25% spawn

imported. He also talked about the major constraints which are: farm designing, growing medium, crop management, pest and disease management, market and economy, processing and value.

Mr. Albana L Chawngthu, Research Scholar, PUC taken up the next session with a topic ***Cultivation of Oyster mushroom***. He spoke about the various techniques and requirement for mushroom cultivation especially POLYTHENE METHOD OF OYSTER MUSHROOM CULTIVATION.

The second speaker for the second session was **Miss HC Lalramnghaki,** Research Scholar, PUC. The topic of her presentation was ***Growing house: substrate preparation and maintenance of mushroom cultivation***. Miss Lalramnghaki gave a presentation aboutthe followings SUBSTRATE for mushroom

DEMONSTRATION:

Demonstration was taken up by **Mr Albana L Chawngthu and HC Lalramnghaki,** Research Scholars of PUC. They demonstrated the method of mushroom cultivation with the students as follows:

Instruments required:

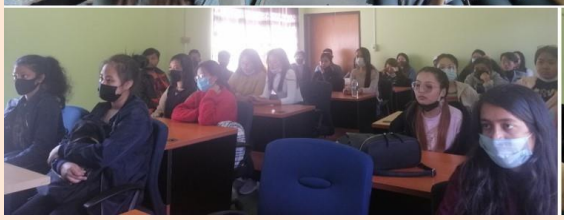
1. Autoclave or pressure cooker (20psi, 121 C)- plastic bags doubled or tripled so as toprevent breakage due to high heat and pressure
2. Water level should not be above a piece of steel sieve attached at the bottom
3. In case of cooker or any other steel containers, 3 phits then simmer for around 1 hrsroughly
4. Steam sterilization also applicable
5. Floors and working area should all be sterilized

Hands on training were done with the students where they learn the following:

1. Mixing of spawn and paddy straw in specific ratios in plastic bags
2. Mixture pressed hard inside the bags and tied using rubber

The third day (Day3) was chaired by **Dr. Punuri Jayashekar Babu,** an Assistant Professor from the department of Biotechnology, PUC. Certificate were distributed to all participants and organizers. Vote of thanks was delivered by **Dr. Zothanpuia, Programme Coordinator**, an Assistant Professor, Department of Biotechnology, He thank the funding RGNIYD, all the staff and colleagues of PUC and Participants.

All the participants and organizers moved to Government Mushroom cultivation farm at Chite, Mizoram using Buses and the staff and scientists, experts from the farm taken up the program by demonstrating and showing the techniques, rooms and mushrooms which were cultivated. All the participants were presented with a mushroom block from the organizers as mementos, so that they can continue growing it in their own home.




INTEGRATED HORTICULTURE
TRAINING CENTRE -CHITE AIZAWL
Youth-led Sustainable Development Programme
in Higher Educational Institutions

Annexure 1: Program Schedule

Day-1

10/02/2021

(Wednesday)

Chairman: Dr. Mukesh Kumar Yadav
Assistant Professor, Department of BiotechnologyPachhunga University College (PUC) **Rapporteur: Lalrokimi**

First Session						***Second session***		
10:00-10:30 am Welcome address: Dr. Tawnenga Principal, PUC & Dr. Zothanpuia, Coordinator	***10:30-11:00 am*** *Inaugural Speech: Prof Sibnath Deb* Chief Guest, *Director, RGNIYD, Tamil Nadu, Ministry of Youth Affairs and Sports, Government of India*	***High Tea (11:00-11:15 am)***	***11:15-12:15 am*** Special Talk: Dr Daniel Lalawmpuia, Dept. of Economics, PUC ***Topic: National youth policy 2014 and sustainable development goal***	***12:15-1:15 pm*** Dr. John Zothanzama Associate Professor, Dept. of EVS Mizoram University ***Topic: Introduction to Mushroom and scope of mushroom cultivation***	***Lunch (1:15 – 2:00 pm)***	***2:00-3:00 pm*** Dr. Lallawmsanga Scientific officer, DBT BioNEST ***Topic: Wild mushrooms: Edible Vs Poisonous***	***3:00-4:00 PM*** Dr. Lallawmsanga Scientific officer, DBT BioNEST & William Carrie, Research scholar, Dept. of Biotechnology, MZU **Demonstration: *Schizophyllum commune* Cultivation**	***4:00-4:30 pm*** Panel Discussion Host: Dr. MukeshKumar Yadav **Panelist:** • Dr. John Zothanzama • Dr. Lallawmsanga • Dr. Daniel Lalawmpuia

Day-2 11/02/2021 (Thursday) **Chairman: Dr. Prashant Kumar Singh** Assistant Professor, Department of BiotechnologyPachhunga University College (PUC) **Rapporteur: Lallawmsangi**						
10:00 – 11:30 am Mr. Francis Lalmalsawma Sailo Owner: Zo Mushroom Winner: Mizoram Kailawn 2019 ***Topic: Scope of Mushroom cultivation; from entrepreneurship point of view***	***High Tea (11:30-11:45 am)***	***11:45– 12:15 am*** Mr. Albana L Chawngthu Research scholar, PUC ***Topic: Cultivation of Oyster Mushroom***	***12:15– 1:00 pm*** HC Lalramnghaki Research scholar, PUC ***Topic: Growing house; Substrate preparation and maintenance of mushroom cultivation***	***Lunch (1:00-1:30 pm)***	***1:30 – 3:30 am*** Mr. AlbanaL Chawngthu, HC Lalramnghaki and Mary Lalramchuani Research scholars, PUC **Practical:** Hands on training of Oysters mushroom cultivation	***3:30 – 4:30 am*** Panel Discussion Host: Dr. PrashantKumar Singh **Panelist:** • Mr Albana L Chawngthu • Mr. Francis Lalmalsawma Sailo

Day-3

12/02/2021

(Friday)

Chairman: Dr. Punuri Jayasekhar Babu

Assistant Professor, Department of BiotechnologyPachhunga University College (PUC) **Rapporteur: Betsy Zodinpuii**

10:00 – 11:15 am Dr. Vanramliana Dept. of Zoology, PUC ***Topic: Post-Harvest Management and Value-Added products of Mushroom***	***High Tea (11:15-11:30 am)***	***11:30– 12:30 pm*** Dr. Lallawmsanga Scientific officer, DBT BioNEST ***Topic: Health Benefits of Mushroom & Mushroom Research in Mizoram***	***12:30– 1:30 pm*** Mr. William Carrie Research Scholar Dept. of Biotechnology MZU ***Topic: In-Vitro technique for the cultivation of mushroom and preservation***	***Lunch (1:30 – 2:00 pm)***	***02:00 – 3:00 pm*** Visit to mushroom farm **Guide:** Mr. AlbanaL Chawngthu, HC Lalramnghaki and Mary Lalramchuani	***3:00 – 4:00 pm*** ***Valedictory Function*** • **Chairman:** Dr. Punuri JayasekharBabu • **Special note:** RGNIYD personnel • ***Certificate Distribution*** • **Speech:** From Participants • **Vote of Thanks:** Dr.Zothanpuia,Program Coordinator

Annexure II: Profile of the Resource persons

1. **Dr. Lallawmsanga**

   Scientific officer

   DBT BioNEST IncubatorMizoram University

   Work experience: Currently, he is working in Bio incubator Nurturing Social Entrepreneurship for Scaling Technologies in the field of Bio-prospecting and Environmental Management (MZUBioNEST- BEM). He had published several papers related to mushrooms in highly reputed journals. He used to work on aproject entitled "Characterization and utilization of Mushrooms biodiversity of Mizoram" funded by DBT ICAR-DMR, Solan

2. **Albana. L. Chawngthu**

   Faculty, UGC Community CollegeDiploma in Mushroom CultivationPachhunga University College

   Completed courses for:

   1. Mushroom cultivation and spawn production technology-ICAR, Umiam, Meghalaya
   2. Spawn production and Mushroom cultivation-DMR, HP Solan

3. **Francis Lalmalsawma Sailo**

   Entrepreneur

   Edu Qualification: Bsc Hospitality Administration, Catering Tech & AppliedNutrition.

   PROJECTS:

   1. *Co Founder: Zo Mushrooms*

      (Integrated project of Mushroom Spawning, cultivation & Processing)2.Co Founder: Vinotec

      (product : Isabella Red Wine)

      3. Co Founder: Zo Events & Management.

   ACHIEVEMENTS:

1. *One of the Winner of 3rd Mizoram Rahbi Micro Startup Capital Competition.*

2. *Winner of 1st Prize Innovation in Agriculture @ Startup India Mizoram Yatra 2018*

3. *Winner of Mizoram Kailawn B-plan Contest 2019.OTHER ACTIVITIES:*

1. *Member : Young Indians Mizoram Chapter. (YI is the Young wing of Confederation of Indian Industry)*
2. *Member: The Aijal Club*
3. *Chairman: Mizo Reform Movement*
4. *Life Member: Drug Free Foundation, Mizoram.*
5. *Member: All India Professional Congress (AIPC)*

4. **William Carrie**

Research Scholar, Molecular Microbiology and Systematic Laboratory, Department of Biotechnology Mizoram University

Working with mushroom documentation and In-vitro cultivation and Molecular Identification

5. **H.C. Lalramnghaki**

Research Scholar, Department of Zoology, Mizoram University & Pachhunga University College.

Research Topic: Molecular characterization and Evaluation of Locally Isolated Entomopathogenic Nematodes against Major Insect Pests in Mizoram, India.

Research Interest: Pest Management, Agricultural Entomology, Biological Control, Nematology.

Dr. John Zothanzama

Associate Professor, Department of Environmental Science, Mizoram University

Working in areas of wood rooting fungus and mushrooms and has published a good number of papers in a highly reputed journal.

Feedback from the Participants

Background of the Participants: All the 56 participants selected were mostly from the Science stream. Pachhunga university college students dominate and several colleges like Govt. Zirtiri Residential Science College and Govt. Johnson College students were also participated in the program.

Internet Connection Problems Faced by the Participants: The course was conductedoffline and no issue with the internet problems were noticed during the program

Effectiveness of the Online Program: NA

Clarification of Queries by the Participants during the Program: All the participants reported the productivity of the program saying that they learn the concept and technique of mushroom cultivation and majority of them said that they can propagate in their own home by cultivating them. The queries related to the funds that can be benefitted by youngentrepreneurs were also addressed.

Perception about the Resource Persons: All the participants rated the resource persons by giving them good points especially Albana L Chawngthu who was an expert in mushroom cultivation especially oysters, who also taken up all the demonstrations.

Views about the Online Mode of the Program: NA

Views about Duration of the Program: The duration of the program was marked OK by all the participants

Views about Attending Similar Program in Future: All the participants were interested in attending similar program in future

Views about Sharing of Information about the Program with Others: All the participants were interested in sharing the information what they have learned in the program and about the program with others.

Conclusion and Recommendations

A good feedback were received from all theparticipants and suggested if this kind of program can be organized annually will be more helpful.