

# Swachh Bharat Student Internship Report GOA UNIVERSITY



## M.Sc. Microbiology Part I

2021-2022

### School of Biological Sciences and Biotechnology

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## DECLARATION

We declare that this Report has been prepared by us, and to the best of our knowledge, it has not previously formed the basis for the award for any diploma or degree by this or any other University.

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as SBSI interns.

We are grateful to our mentor Dr. Trupti Asolkar for  
her constant guidance and support.

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mentor, Dr. Diptesh Naik.

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knowledge towards mushroom cultivation.

## SBSI PROPOSAL

<b>ACTIVITY</b>	<b>THEME</b>	<b>VILLAGE</b>	<b>HOURS</b>
Conduct survey and spread awareness on menstrual hygiene & sanitation	Sanitation & Hygiene	online	16
Cleanliness Drive	Sanitation & Hygiene	Goa University	04
Awareness Programme on mushroom cultivation	Education Outreach	Goa University	80

# INDEX

<b>S.NO.</b>	<b>Title</b>	<b>Page NO.</b>
1	Mushroom Cultivation Project	6-19
2	Cleanliness Drive	20
3	Menstrual Hygiene and Sanitation	21-23

# MUSHROOM CULTIVATION PROJECT



## INTRODUCTION

The mushroom cultivation is a profitable agribusiness and Oyster mushroom (*Pleurotus*) is an edible mushroom having excellent flavour and taste. It belongs to class Basidiomycetes, subclass Hollobasidiomycetidae, order Agricals. It grows wild in the forests of hilly areas and is cultivated in temperate and subtropical regions of the world. The technology of artificial cultivation of mushroom is somewhat recent innovation, incorporation of non-conventional crops in existing agricultural system can help in improving the social as well as economic status of small farmers.

Mushrooms are the source of extra ordinary power and virility and are used in the preparation of many continental dishes and have medicinal properties like anti-cancerous, anti-cholesterol, anti-tumorous. Mushrooms are useful against diabetes, ulcer and lungs diseases. Mushrooms are the good source of protein, vitamins and minerals. Mushrooms contain about 85-95% water, 3% protein, 4% carbohydrates, 0.1% fats, 1% minerals and vitamins (Tewari, 1986). Mushrooms contain appreciable amount of potassium, phosphorous, copper and iron but low level of calcium. Mushroom protein is intermediate between that of animals and vegetables. It can be grown on agricultural and industrial waste. More than the total produce from the land remains unused as waste in the form of straws, leaves, stems, roots etc. (Shah et al., 2004).

## **Taxonomic classification of Oyster Mushroom**

Domain: Eukarya

Kingdom: Fungi

Division: Basidiomycota

Class: Agaricomycetes

Order: Agaricales

Family: Pleurotaceae

Genus: *Pleurotus*

## TYPES OF OYSTER MUSHROOMS



Blue Oyster



Golden Oyster



Pearl Oyster



Pink Oyster



King Oyster



*P. florida*

# METHODOLOGY

## Location

The project was conducted at Education Outreach Committee (EOC) Social Entrepreneurship, Swachhata and Rural Engagement cell (SES-REC) established Mushroom cultivation and Incubation Centre, Faculty Block E, Goa University during March to May 2022.

## Preparation of fruiting chamber

Fruiting chamber is an enclosed space that provides controlled conditions for the growth of mushrooms. The growth of mushrooms at optimum conditions allows faster production of mushrooms from mycelium. Depending upon the requirement of mushroom fruiting chamber is designed.

The chamber was divided into two parts: dark room for spawn run and other as fruiting chamber. The wall was carpeted to avoid contamination by mold. The conditions maintained and monitored were:

### 1. Low CO<sub>2</sub> content

While mushroom spawn is establishing itself in a substrate, it needs high CO<sub>2</sub> (carbon dioxide) content. That's why we pack it into airtight bags and containers, along with helping to keep out contamination. However, once it's time for mushrooms to fruit, they need lower CO<sub>2</sub> content in the air.

### 2. Humidity

Mushrooms are made of 92% water. To create a hospitable environment for them to grow the humidity is kept above 80%. This will help prevent mushrooms from drying out.

## Lightning

During Spawn run the bags are kept in dark room. Mushrooms don't require much intensity of light to grow. Once pinheads are visible they are switched to light

rooms with light. A little bit of light is needed by mushrooms. If the lights are too harsh, they can dry mushrooms out or stunt their growth.

## Temperature

Fungi have a specific temperature range where they will thrive. Oyster mushrooms require range of 21°C to 30°C. **(2)**



Fruiting Chamber

Humidity Monitor

## Spawn Preparation

To prepare your own spawn first buy spawn from reputable store. Culturing the oyster mushroom mycelium on a sterilized medium to start the fungal growth and then transferring it to the cereal grains is a great method to produce oyster mushroom spawn. Potato dextrose agar (PDA) is a general-purpose medium is used. Take oyster mushroom that is desired to be cultured. Pull apart the cap of the mushroom to expose the internal tissues. Take a clean tweezers and cut very small pieces of inside tissues. Take several tiny pieces and put them on petri plate with PDA. Take healthy wheat grain and soak them in water for 24hrs and dry them. After drying transfer grains in clean glass jar and sterilize it. Inoculate mycelia from petri plate to Jar with sterile scalpel. The mycelium will cover the grains completely in 10 to 12 days. Lime or calcium carbonate is added to spawn and stored. **(3)**



Spawn grain

### **Substrate Sterilization**

Substrate contained material such as wheat straw, sugarcane stalk. The substrates were soaked in water for 24 hours to moisten them thoroughly and were stalked on the steep cemented floor so as to remove the excessive moisture from the substrates to get 65-75% moisture level. Substrate was filled in polythene bags and autoclaved at 121°C at 15psi for 15 to 20 min.

Other method to sterilize substrate would be to heat the substrate in water at 80°C, while avoiding boiling it for 45min. (Baysal, 2004)

## Inoculation of Bags

The inoculation of poly bags was done in layers. Spawn was added at rate of 5% to 10% per bag according to the dry weight of substrates. The spawn was added at the periphery of bags. The bags were then inoculated for spawn running under complete darkness. The pinholes were also made in the bags with the help of paper pins for exhaust of gases. Mushroom cultivation has two important phases viz, spawn running and fruitification. (Shah, 2004).



Sterilization of Substrate



Spawned bags kept in dark

## OBSERVATION

The spawn running, pinhead formation and fruiting bodies formation are three important phases in the cultivation of mushroom, require proper humidity and temperature. Temperature 30 C for spawn running and 20 to 25 C for fruitification.

**Spawn Running:** Spawn running takes 2 to 3 weeks. White mycelia completely covers the bag. (Tan, 1981)

**Pinhead formation:** The pinhead formation is the second stage of mycelial growth during cultivation of mushroom. Small pinheads like structures were observed, these pinheads were formed 6-7 days after the spawn running. (Ahmad, 1986)

**Fruiting bodies formation:** This is the third and final stage during the cultivation of mushroom. The fruiting bodies appeared 3-6 weeks after pinhead formation and took 35 to 40 days later after inoculation of spawn. (Shah, 2004)



Spawn run

Pinhead formation



Fruiting Body formation

## RESULT

**Yield of Oyster mushroom:** The crop of Oyster mushroom was harvested in three flushes. The maximum yield was obtained in first flush than the second and third flush. First harvest was achieved on 6<sup>th</sup> April 2022, 4-5 weeks after inoculation of substrate. Mushrooms were plucked by twisting the stalk.



First harvest on 6<sup>th</sup> April 2022

## CONCLUSION

Oyster mushroom were successfully cultivated at Mushroom Cultivation and Incubation centre, Goa University.

As world population is growing the global demand for food is expected to increase by 70% by 2050. (Islam & Karim, 2019). Food crisis and unemployment will be fatal for economy and health of human beings. Food crisis cannot be solved by conventional agricultural methods as agricultural land is losing its viability.

The major issues could be resolved by entrepreneurship opportunities of mushroom cultivation, as mushrooms can grow in different substrates which are usually waste of agricultural produce and doesn't require fertile land. Mushroom cultivation needs less water than cereals and grains.

Oyster mushroom holds advantage against other mushroom such as button mushroom as it can be dried and then marketed. There is a lot of demand for dried products of oyster mushroom. Various value-added products could be made from *Pleurotus ostreatus* and *Pleurotus-sajor-caju*. Mushroom soup powder, mushroom powder and ketchup can be produced on large scale. White oyster and colored oyster mushroom has short cultivation period and favorite among people. Oyster mushroom cultivation can fetch good economic returns. It can be turned into powder used as food supplements for its rich source of protein and vitamins. (Kotasthane, 2021).

Mushrooms can make a valuable dietary and can play an important role in contributing to the livelihoods of rural and urban dwellers, through food security and income generation. The current scenario of mushroom production in India is quite encouraging with an overall increase in 5 to 6 folds and was estimated to cross 50,000 tons (Verma, 2002).

The Research and development, government schemes, policymakers and entrepreneur are contributing towards the initiation and growth of the mushroom industry. In the current scenario the best crop and high yield production these days are of propelling the mushroom farming as they lead to high-profit margins that can be helpful to both farmers and the economy of the country. There is a positive relationship between mushroom production and farm-size and the income of mushroom growers goes up with the increase in farm size. Also, the consumers have lately shown an extra liking for mushroom eating, which has enhanced the mushroom demand and supply in India. Government and cultivators keeping in view the increasing demand of mushroom due to globalization and compete to the international market. (Raman, 2018).

## POSTER

On 24<sup>th</sup> March, the SBSI interns involved in the mushroom cultivation activity were given assignment to prepare a poster on the topic “**A Poster on Oyster Mushrooms: Science of Cultivation and Commercialization**”.

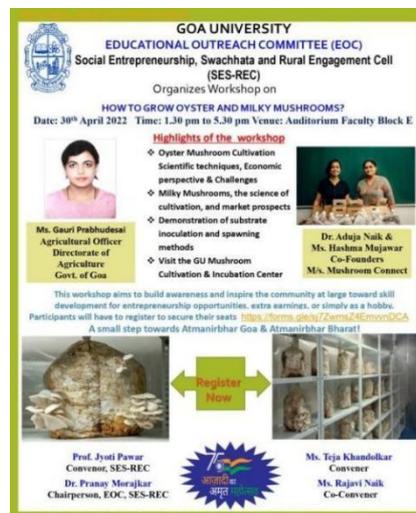
Our poster contained pictures of all the steps that are crucial for cultivation of mushrooms, these steps included preparation of the room, sterilization of substrate, spawning, incubation and harvesting. And it also included the pictures of the food products made from mushrooms that were being marketed at Vana Shrubs. These food products include pickles, poppadom and cookies made from mushrooms. The poster was submitted on 1<sup>st</sup> April 2022 through an email.



A Poster on Oyster Mushrooms: Science of Cultivation and Commercialization

## WORKSHOP

The Educational Outreach Committee (EOC), Social Entrepreneurship, Swachhata and Rural Engagement Cell (SES-REC) had organized workshop on “**How to grow Oyster and Milky Mushroom?**” on 30<sup>th</sup> April 2022 at 1:30 pm, Auditorium Faculty Block E for interested citizens. The aim of the workshop was to encourage people to take mushroom cultivation as entrepreneurship. Prof. Jyoti Pawar was the convenor of SES-REC. The guest speaker was Ms. Gauri Prabhudesai, Agricultural officer, Director of Agriculture, Govt. Of Goa. The other speakers were Dr. Adhuj Naik, Ms. Hashma Mujawar co-founder of Mushroom connect.



Flyer for GU Mushroom incubation Centre organized workshop

We helped to organize the event. At 10am we arranged all the tables required for different activities including table for stage, refreshments and water. Our group was given responsibility of stage, mic and photography during the event which we looked after successfully. We carried the mushroom bags from GU mushroom cultivation and incubation Centre to auditorium of Block E for demonstration. We directed participants towards auditorium and distributed them the brochures.



Stage duty given to Ms. Sharwani



Ms. Nikita welcoming the guest speakers with flowers

Dr. Teja Khandolkar welcomed the gathering and we welcomed guest speaker with flowers. Prof. Jyoti Pawar briefed the participants about role of EOC, SES-REC, GU towards rural engagement and social entrepreneurship. The esteemed speaker Smt. Gauri Prabhudesai gave an informative talk on how to grow oyster and milky mushrooms with other economic challenges and health benefits of mushrooms. The other speakers were, co-founders of mushroom connect Dr. Adhuj Naik and Ms. Hashma Mujawar, they informed people about their spawn business and also more gave knowledge about growing milky mushrooms. Our expert mentors Dr. Milind Naik, Dr. Shanti Desai, Dr. Bhakti Salgaonkar demonstrated mushroom cultivation with the help of SBSI interns. The participants were then taken to GU Mushroom cultivation and incubation Centre and we volunteered to make this process smooth and the workshop was complete success. The workshop ended at 6pm.



Prof. Jyoti Pawar delivering her speech



Dr. Milind Naik demonstrating mushroom cultivation



Audience at the workshop

## CLEANLINESS DRIVE

Goa University had organized cleanliness drive under the theme sanitation and hygiene on 25<sup>th</sup> March 2022. The departments and schools were assigned to clean their surrounding campus and classrooms. The microbiology department under the School of Biological sciences and biotechnology started their cleanliness drive at 9 am. The students, teaching and non-teaching faculty took part in the drive. Swachh Bharat Student Interns with the help of department cleaned the plastic, paper, glass, and electronic waste from surrounding area of Faculty Block E. The campus area was cleaned by 10:30 am.



Cleanliness drive carried by the students, teaching and non-teaching staff of Goa University at the Faculty Block E



Laboratory cleaned by the students and staff

The classrooms and laboratory were cleaned from 10:30 to 12:30. All the reagents and chemicals were kept in their respective place. The expired reagents were thrown, the tables were wiped. All the collected waste was then given to further Authorities.

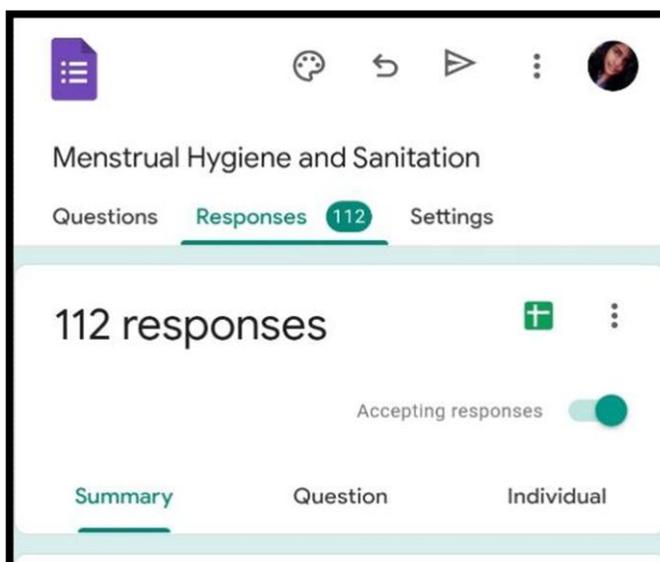
The drive was a complete success and everyone contributed towards Swachh Bharat Abhiyan.

## Menstrual Hygiene and Sanitation

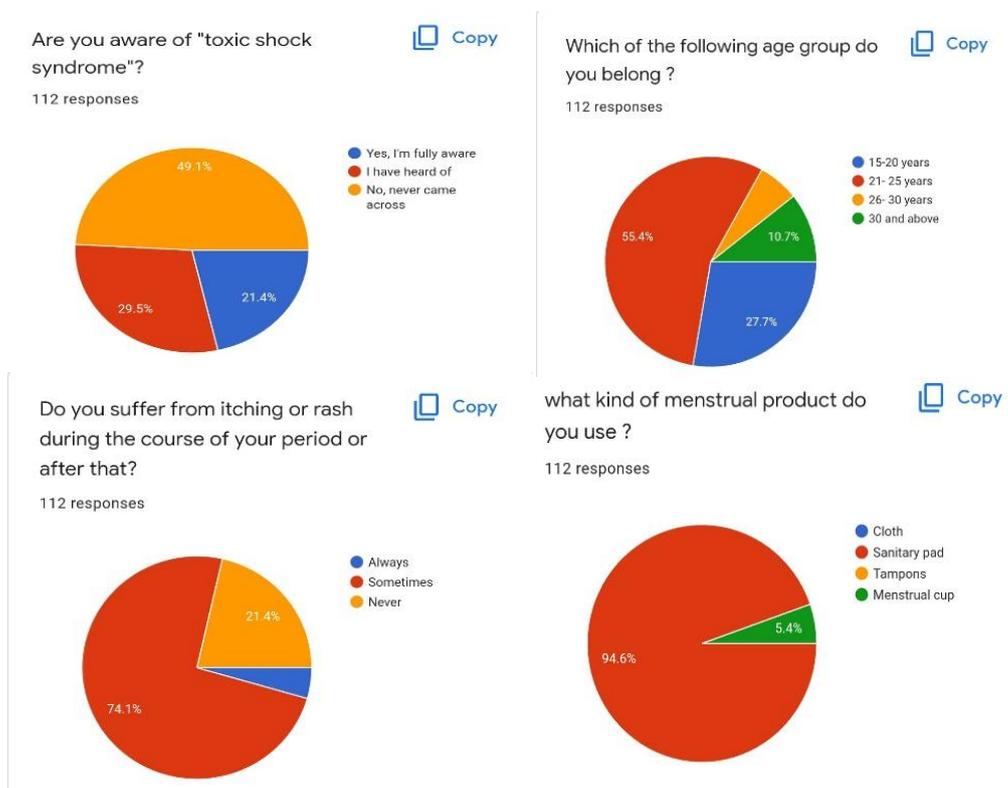
A survey on Menstrual Hygiene and Sanitation was conducted by us from 19<sup>th</sup> April 2022 to 19<sup>th</sup> May 2022. We received response from 112 women. In this survey with asked the participants 11 questions which corresponded with menstrual hygiene and sanitation and also asked them for suggestions on this topic.

The questions included the age group of the participants, menstrual products used by them, how often they change their menstrual products, if they suffer from itching or rash during course of the period, whether they are aware of Toxic Shock Syndrome (TSS) and about the method for disposal of the menstrual product used by them.

From the response we received from the survey, it can be concluded that most participants were of age group 15 to 25. A majority of women used sanitary pads (95%) over other menstrual products. More than 80% changed their menstrual product within 8 hours. 74% women get rashes occasionally during course of their periods. More than 70% women weren't completely aware of toxic shock syndrome. Most women didn't segregate their menstrual waste from other waste.



Google form showing the Responses received from the survey



A few responses to the questions from the survey

We made a video to create more awareness towards menstrual hygiene and sanitation and sent the video to the participants of survey. The video was viewed by more 340 people. In this video we talked about the environmental and medical issues with regards to the use of sanitary pads and suggested them alternative such as menstrual cups, tampons, reusable pads, etc., which are more sustainable to the environment and economic. We also aimed to spread awareness about the harmful effects associated with the use of menstrual products such as sanitary pads for longer duration. As it was apparent from the survey that most women did not know about the proper disposal method of the menstrual waste, we demonstrated it to them through the video.

# Menstrual Hygiene and Sanitation Video

The screenshot shows a YouTube video player interface. At the top left, there is a thumbnail for 'Sustainable Period Products' with a duration of 16:29. The video title is 'Menstrual hygiene and sanitation', posted 1 day ago, with 345 views, 76 likes, and 28 comments. Below the video player, the channel name 'Sharwani Nadkarni' is displayed with 16 subscribers and a 'SUBSCRIBE' button. The video description includes the following text:

**Swachh Bharat Student Internship (SBSI) Unit**  
Department of Microbiology  
School of Biological Sciences and Biotechnology  
GOA UNIVERSITY

**Mentor:** Dr. Trupti Asolkar (Coordinator), Dr. Milind Naik  
**SBSI Interns:** Nikita Mendes, Prachi Vishwakarma, Sharwani Nadkarni

**Comments:**

- Swizel Mendes XII ARTS A 1118 • 1 day ago: The best way to create awareness and encourage women and girls to try new methods and products . I found it very informative and hope so that soon all the people will apply it ....Keep it up 👍 (5 likes)
- Anagha Rewalkar • 1 day ago: It's good to see young generation being so concerned about such topics. Good information. Keep it up 😊 (2 likes)
- Silver Hawk Music • 23 hr ago: Very informative, people need to know about this. menstrual hygiene is to be discussed more. (2 likes)

video made by us to create awareness on menstrual

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