Faculty of Agriculture

1.3 MUSHROOM CULTIVATION  Duration: 3 Months

**COURSE INTRODUCTION**

Mushroom cultivation, locally known as "Khumbi," is an emerging agricultural business in Pakistan. With a high demand in the local market, mushroom farming has tremendous potential for growth. The demand for both fresh and canned mushrooms has increased significantly in recent years, driven by a shift towards vegetable proteins and a growing interest in global cuisine.

Despite its potential, mushroom cultivation in Pakistan is still in its infancy, hindered by inadequate support from both the private and public sectors. The high infrastructure requirements for mushroom cultivation have slowed its development. Statistics reveal that Pakistan's annual mushroom imports valued $1.54 million in 2022, with no exports recorded that year. In contrast, total imports in 2021 stood at $1.38 million.

The mushroom market in Pakistan is largely dependent on imports, with a significant hike in sales of 11.5% from 2003 to 2021. Currently, a small portion of the total market demand is met through local production of fresh mushrooms, while the majority is fulfilled by importing canned mushrooms from China, which accounts for 99% of the market share.

A major challenge facing the mushroom industry in Pakistan is the lack of awareness among conventional farmers and young entrepreneurs about mushroom cultivation. Many believe that mushrooms are cultivated in land like other crops. To tap into the growing demand for mushrooms, hands-on training is necessary to equip farmers and entrepreneurs with the skills required for mushroom cultivation.

**Objectives:**

1. To equip trainees with the knowledge and skills required for mushroom cultivation.

2. To categorize different varieties of fungi which are commonly eaten

3. To provide hands-on training in mushroom cultivation, processing,

4. To enable trainees to start their own mushroom cultivation business.

5. To Explain marketing strategies for mushrooms

**COURSE CURRICULUM:**

**Module 1: Introduction to Mushroom Cultivation (Weeks 1-2)**

1. Introduction of mushroom cultivation
2. Types/species of mushrooms (Milky, Button & Oyster)
3. Life history of mushroom
4. Products from mushroom
5. Mushroom cultivation techniques

**Module 2: Mushroom Spawn Production (Weeks 3-4)**

1. Options for obtaining spawn Mushroom
2. Identification of edible mushroom
3. Spawn production techniques
4. Steps in growing edible mushroom species
5. Spawn production equipment and materials
6. Growing of media
7. Quality control measures for spawn production

**Module 3: Mushroom Cultivation Techniques (Weeks 5-6)**

1. Understanding soil and compost, components and characteristics
2. Making compost for mushroom, Different composition of compost, Moisture level in compost
3. Mushroom bed preparation
4. components and characteristics
5. Spawn inoculation and incubation
6. Storage of spawn
7. Problems with spawn handling, Biotic and abiotic conditions for spawn production
8. Fruiting body formation and harvesting, fruiting patterns of mushrooms
9. Environment control, equipment to measure and control the environment

**Module 4: Mushroom Processing and Preservation (Weeks 7-8)**

1. Growing methods (caves, bags, houses, outdoor, troughs etc.)
2. Casing ; biological process , characteristics of biological process, procedure
3. Techniques; spawning case , ruffling, scratching
4. Mushroom cleaning and grading
5. Fungi nutrition
6. Casing to harvest, growing indoors, growing outdoor
7. Harvesting buttons, cups and flats on button mushroom
8. Mushroom drying and packaging (Drying mushrooms, Freezing mushrooms, Cold storage of mushrooms)
9. Mushroom preservation techniques, Canning mushrooms
10. Controlled atmosphere storage.

**Module 5: Mushroom Marketing and Business Management (Weeks 9-10)**

1. Mushroom market trends and demand
2. Marketing strategies for mushroom products
3. Business planning and management for mushroom cultivation

**Module 6: Practical Training and Project Work (Weeks 11-13)**

1. Hands-on training in mushroom cultivation and processing
2. Project work on mushroom cultivation and marketing
3. Final project presentation and evaluation

Laboratory Equipment & Tools

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S#** | **Item name** | **Qty** | **Cost/ Unit** | **Amount** |
| 1 | Growing bags | 200 | 50 | 10000 |
| 2 | Shelves and racks | 01 | 150000 | 150000 |
| 3 | Probes and triers for seed | 05 | 26000 | 130000 |
| 4 | Substrate (0.5-1 ton) | 01 | 500000 | 500000 |
| 5 | Mycelium (1 kg) | 01 kg | 10000 | 10000 |
| 6 | Inoculation tools (needles, syringes, etc.) | 01 | 10000 | 10000 |
| 7 | Watering system (sprayers, misters, etc.) | 01 | 20000 | 20000 |
| 8 | Heating and cooling system (small)/Air conditioner | 01 | 250000 | 250000 |
| 09 | Humidifier | 01 | 35000 | 35000 |
| 10 | Air exchange system | 01 | 50000 | 50000 |
| 11 | Lighting (LED grow lights) | 10 | 5000 | 50000 |
| 12 | Thermometer & hygrometer | 01 | 5000 | 5000 |
| 13 | Autoclave (small) | 01 | 500000 | 500000 |
| 14 | Gloves and protective clothing | 01 | 10000 | 10000 |
| 15 | Face masks and respirators | 10 | 500 | 5000 |
| 16 | Cleaning solutions and disinfectants | 01 | 10000 | 10000 |
| 17 | CO2 meter | 01 | 50000 | 50000 |
| 18 | Inoculation loop | 100 | 50 | 5000 |
| 19 | Air quality monitor | 01 | 100000 | 100000 |
| 20 | Glass jars | 10 | 500 | 50000 |
| 21 | Glass containers | 10 | 200 | 20000 |
| 22 | Petri dishes | 50 | 200 | 10000 |
| 23 | Test tubes | 50 | 200 | 10000 |
| 24 | Gloves gardening | 50 | 500 | 25000 |
| 25 | Safety glasses | 20 | 1000 | 20000 |
| 26 | Lab coats | 30 | 1500 | 45000 |
|  | Scalpel | 50 | 150 | 7500 |
|  | Forceps | 50 | 150 | 7500 |
|  | Mushroom picking tool | 10 | 8000 | 80000 |
| 27 | Miscellaneous | 01 | 500000 | 500000 |
|  | Grand Total |  |  | **2675000** |