



CHAPTER 3: Mushroom



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Lesson Learning Outcomes

Student will be able to:

- 3.0 — **Discuss potential for mushroom**
- 3.1 — **Types of mushrooms in Malaysia**
 - — **3.1.1 Benefits of potential mushroom crop**
 - — **3.1.2 Mushroom industry in Malaysia**

3.1 Types of mushrooms in Malaysia

Approximately 20 varieties of mushrooms are cultivated in Malaysia.

1. Grey Oyster *Pleurotus sajor-caju*



Known for its meaty texture and mild flavor, grey oyster mushrooms are widely cultivated and used in various Malaysian dishes.

2. Black Jelly *Auricularia spp*



This unique mushroom is prized for its gelatinous texture and is often used in traditional Chinese cuisine and medicine.

3. Ganoderma/ Ling Zhi *Ganoderma lucidum*



Also known as lingzhi, this mushroom is valued for its medicinal properties and is commonly used in traditional remedies.

3.1 Types of mushrooms in Malaysia

4. Split Gill mushroom
Schizophyllum commune



5. Straw Mushroom
Volvariella volvacea



6. Monkey Head Mushroom
(*Hericium erinaceus*)



7. Split Gill mushroom
Schizophyllum commune



8. Cendawan Paha Ayam
Coprinus spp



9. Cendawan Perut Lembu
Clitocybe spp



3.1.1 Benefits of potential mushroom crop

Cultivating mushrooms can offer numerous benefits:

1

Health Benefits

Nutrient-Rich: Mushrooms are packed with essential nutrients, including vitamins, minerals, and antioxidants.

Medicinal Properties: Certain mushrooms have medicinal properties, such as anti-inflammatory, antiviral, and anticancer effects.



3.1.1 Benefits of potential mushroom crop

Cultivating mushrooms can offer numerous benefits:

2

Environmental Benefits

Waste Recycling: Mushrooms can grow on agricultural waste, helping to recycle organic materials and reduce waste.

Sustainable Farming: Mushroom cultivation has a low environmental footprint, requiring less water and land compared to traditional crops



3.1.1 Benefits of potential mushroom crop

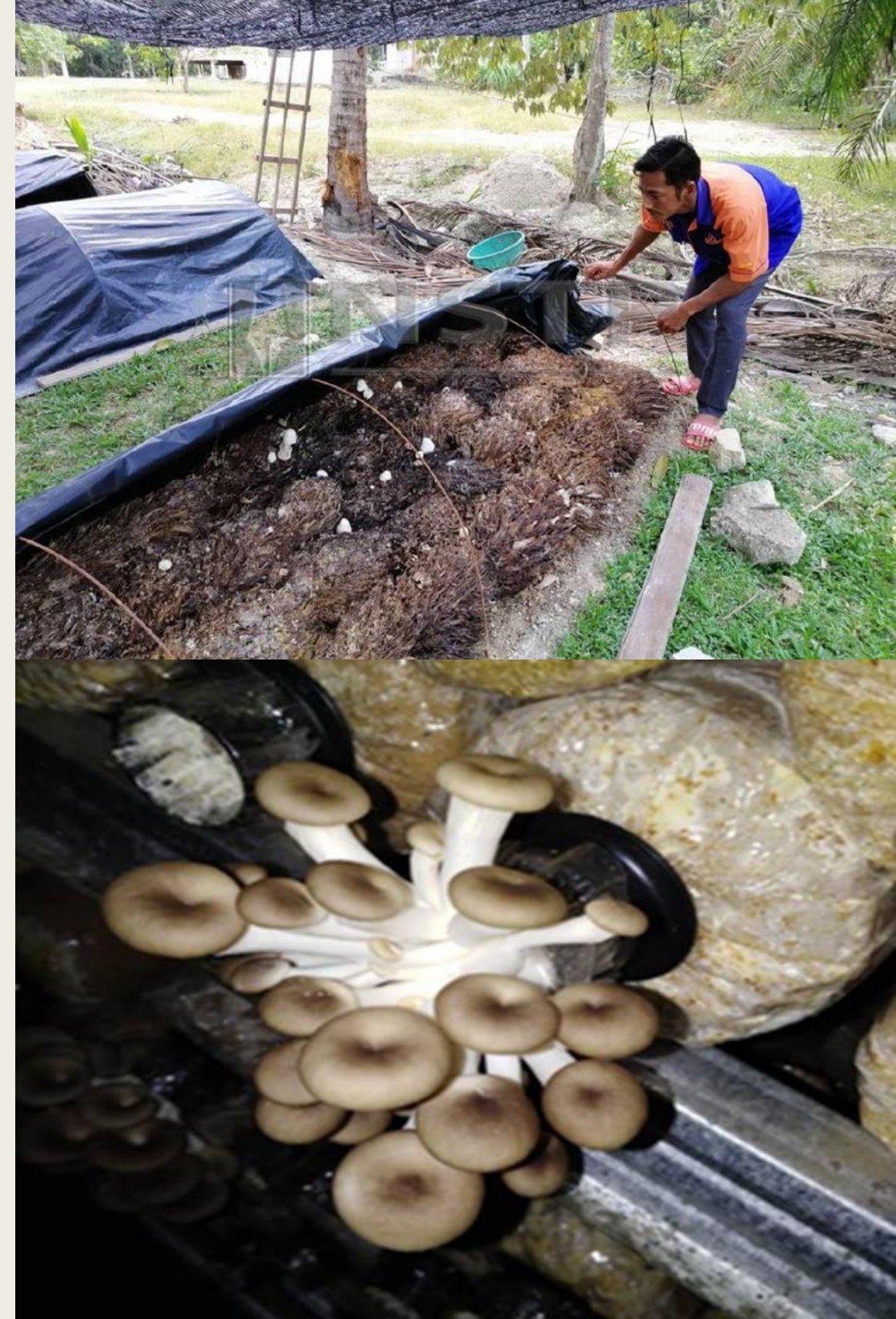
Cultivating mushrooms can offer numerous benefits:

3

Agricultural Benefits

Soil Health: Mushrooms help decompose organic matter, enriching the soil with nutrients and improving soil health.

Crop Diversification: Adding mushrooms to a farming system can diversify income sources and reduce risks associated with monoculture.



3.1.1 Benefits of potential mushroom crop

Cultivating mushrooms can offer numerous benefits:

4

Economic Benefits

Income Generation: Mushroom farming can be a profitable venture due to the high market demand for edible and medicinal mushrooms

Low Initial Investment: Compared to other crops, mushroom cultivation requires relatively low initial investment and can be done in small spaces

Employment Opportunities: Mushroom farming can create jobs in rural areas, contributing to local economies





3.1.2 Mushroom industry in Malaysia



Emerging Industry: The commercial mushroom industry in Malaysia began in the 1960s and has gradually improved¹. It is now attracting many entrepreneurs, especially young people



Malaysia is a tropical country with hot and humid climates and high annual rainfall, with average range of temperature of 23 – 35 °C and humidity of 80 – 90%.



The mushroom industry in Malaysia is relatively small and moderate. Currently, the production area of mushrooms is estimated at around 274 ha, and is operated by more than 4700 farmers or entrepreneurs.



The production of mushrooms is spread out in almost all the states, with the biggest production area in Selangor, followed by Johor and Kedah.

3.1.2 Mushroom industry in Malaysia

Economic Impact

High-Value Commodity:

Mushrooms are considered a high-value commodity under Malaysia's National Agro-Food Policy.

Market Demand

The demand for mushrooms is increasing every year, driven by higher domestic consumption and health awareness.

Imports and Exports

Despite growing domestic production, Malaysia still imports a significant amount of mushrooms, mainly from China. The country also exports fresh mushrooms to Singapore and dried mushrooms to Thailand.





3.1.2 Mushroom industry in Malaysia

Challenges

1

Production Costs

High production costs and the need for advanced technology are major challenges

2

Skilled Labor

The industry requires highly skilled personnel to improve cultivation yields and manage pests.

3

Waste Management

Effective waste management, particularly the utilization of Spent substrate, is crucial for the industry's sustainability.



Lesson Learning Outcomes

Student will be able to:

- 3.2 — **Demonstrate production and cultivation technique for mushroom**
- 3.2.1 — **Layout design for mushroom house**
- 3.2.2 — **Cultivating grey oyster mushrooms (*Pleurotus sajor-caju*)**

3.2.1 Layout design for mushroom house

1.Preparation Area

Purpose: For substrate preparation and sterilization.

Features: Mixer machine, bagging machine, steamer and storage for raw materials.



2.Inoculation Room

Purpose: To inoculate the mushroom spawn into the substrate

Features: Clean environment, HEPA filters, and inoculation tools.

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3.Incubation Room

Purpose: For mycelium colonization.
Features: Temperature (25-32°C), humidity (60-70%), and 70% darkness.



Mushroom Workshop

4. Fruiting Room

Purpose: For mushroom fruiting.

Features: High humidity (85-95%), temperature (24-29 °C), 90 % darkness (use black netting as wall), proper ventilation and resistant to pest and disease (netting walls and cemented floors)





Suitable mushroom house measurement:
Large: 20' x 50' – (10,000 - 15,000 bag)
Small: 20' x 15' – (3,000-4,500 bag)



2.2.2 Cultivating grey oyster mushrooms (*Pleurotus sajor-caju*)

1

Preparation of mushroom bag

2

Steaming Mushroom Media Bags

3

Inoculating Mushroom Bags

4

Incubation (Spawn Run) Phase

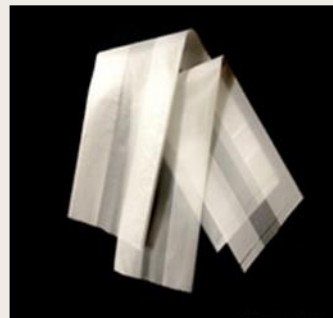
5

Preparing for Mushroom Fruiting & Harvesting



a. Preparation of mushroom bag

- 1 Prepare heat resistant plastic bag (Polypropylene plastic) 13" x 6", cap and neck media bag, cotton/ sponge stopper
- 2 Mix rubber wood dust, bran and agricultural lime at a ratio of 100: 10: 1
- 3 Mix with water until the wood dust mixture does not crumble (70%-75%).
- 4 Put the rubber wood dust mixture into the plastic and compact it (weighing 850-950 g)



b. Steaming Mushroom Media Bags



1

Fill the steamer with water, ensuring the water level is below the rack or tray that will hold the mushroom bags. The bags should not touch the water directly.

2

Place the mushroom media bags on the rack or tray inside the steamer. Make sure the bags are not overcrowded and have space for steam to circulate around them.

3

Turn on the heat to high and bring the water to a boil (temperature around 100°C) . Once boiling, reduce the heat to maintain a steady steam.

4

Allow the bags to steam for a sufficient amount of time (4-7 hours). This duration helps to kill any contaminants present in the substrate.



Steaming Mushroom Bags





c. Inoculating Mushroom Bags

Clean the workspace thoroughly with disinfectant. This step is crucial to minimize the risk of contamination. Wear clean gloves and a mask to protect the spawn and substrate from contaminants.

Open the mushroom spawn bag carefully using sanitized scissors or a knife. Using small quantities (5 g), use a spoon to mix the spawn into the substrate.

Seal the top of the bag using a filter patch and net. The filter patch allows air exchange while preventing contaminants from entering.

Place the inoculated bags in a 70% darkness, warm environment with a temperature range of 28-32°C for the incubation period. This is known as the spawn run.

Inoculating Mushroom Bags



d. Incubation (Spawn Run) Phase

1

The spawn run typically takes 45 days (depend on mushroom spawn). During this period, the mycelium (the vegetative part of the fungus) will colonize the substrate, turning it white.

2

Check regularly for signs of contamination, such as mold or discolored patches. If contamination is detected, isolate the affected bags to prevent it from spreading.

3

Ensure some ventilation to avoid the build-up of CO₂, which can hinder mushroom growth.

e. Preparing for Mushroom Fruiting & Harvesting

- 1 Once the substrate is fully colonized (when the mycelium has turned the substrate white), arrange the bags on the shelf in a collapsed or vertical manner and the net is opened
- 2 High humidity is essential for mushroom fruiting. Maintain humidity levels between 85-95%. Use a humidifier or mist the growing area with water regularly to keep the humidity high.
- 3 Small pin-like formations or “pins” will begin to appear, signaling the start of fruiting. Continue maintaining the optimal conditions to encourage these pins to develop into full-sized mushrooms.
- 4 Harvest mushrooms when the caps are fully formed but before they start to curl up and release spores. For grey oyster mushrooms, this is usually when the caps are still slightly curved downwards, but edges are starting to flatten.



Harvesting Mushroom







Lesson Learning Outcomes

Student will be able to:

3.4 — **Examine commercial potential of mushroom**

3.4.1 — **Commercial potential of mushroom**



3.4.1 Commercial Potential Of Mushroom

The commercial potential of the mushroom industry is significant and growing rapidly

🔍 Market Growth

Global Market Size: The global mushroom market was valued at approximately USD 50.3 billion in 2021 and is expected to grow at a compound annual growth rate (CAGR) of 9.7% from 2022 to 2030.

Regional Insights: Asia Pacific dominates the market, accounting for nearly 80% of the global share in 2022. This region's growth is driven by high consumption rates and favorable climatic conditions for mushroom cultivation.

✍️ Economic Benefits

High Demand: Increasing consumer awareness of the health benefits of mushrooms is driving demand. Mushrooms are rich in nutrients and have medicinal properties, making them popular in both food and pharmaceutical industries.

Profitability: Mushroom farming can be highly profitable due to the relatively low initial investment and high market prices for both fresh and processed mushrooms.



Technological Advancements

Automation: Investments in smart automation for mushroom production are increasing. Automated systems can reduce labor costs and improve efficiency, making mushroom farming more scalable.

Innovative Cultivation Techniques: Advances in cultivation techniques, such as vertical farming and controlled environment agriculture, are enhancing yield and quality.

Sustainability

Environmental Impact: Mushroom cultivation is environmentally friendly, as it can utilize agricultural waste as a substrate. This helps in recycling organic materials and reducing waste.

Sustainable Practices: The industry is moving towards more sustainable practices, including the use of renewable energy sources and organic farming methods





Challenges

Production Costs: High production costs and the need for advanced technology can be barriers for small-scale farmers.

Market Competition: The market is competitive, with major players investing heavily in research and development to stay ahead.



Future Prospects

Health Trends: The growing trend towards plant-based diets and natural health products is expected to further boost the demand for mushrooms.

Expansion Opportunities: There are significant opportunities for expansion in emerging markets, where mushroom consumption is increasing.





Suggested Further Reading

1. Mushroom Market Size, Share & Industry Analysis, By Type (Button, Shiitake, Oyster, and Others), By Form (Fresh, Frozen, Dried, and Canned), and Regional Forecast, 2024-2032 .Source:
[https://www.fortunebusinessinsights.com/industry-reports/mushroom-](https://www.fortunebusinessinsights.com/industry-reports/mushroom-market-)
[market-](https://www.fortunebusinessinsights.com/industry-reports/mushroom-market-)

2. Sridhar, K. R., & Deshmukh, S. K. (Eds.). (2021). Advances in Macrofungi: Industrial Avenues and Prospects. CRC Press.

3. Thakur, M. P. (2020). Advances in mushroom production: Key to food, nutritional and employment security: A review. Indian Phytopathology, 73, 377-395.

4. Samsudin, N. I. P., & Abdullah, N. (2019). Edible mushrooms from Malaysia; a literature review on their nutritional and medicinal properties. International Food Research Journal, 26(1), 11-31.



YOU ARE
STRONGER
THAN YOU
THINK

The image features a stack of four horizontal paper strips in lime green, salmon, orange, and yellow, each with a portion of the motivational phrase 'YOU ARE STRONGER THAN YOU THINK' written in black, uppercase, sans-serif font. The strips are positioned on a dark grey surface. To the right, a white chalk marker lies horizontally, slightly out of focus. On the left, a jagged white line separates the strips from a solid black background.