

Pest And Disease Problems in Mushroom Cultivation

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MUSHROOM

Mushroom or toadstool is a fleshy, spore-bearing fruiting body of some fungi arising from a group of mycelium buried in the substratum. Most of the mushrooms belong to the Sub-Division: Basidiomycotina and a few belong to Ascomycotina (**Chang and Miles 1992**).

In the botanical sense, mushrooms can be defined as fungi in which mode of nutrition is heterotrophic, lacks chlorophyll and cannot generate nutrients by photosynthesis and for this reason, they need to take nutrients from the outer sources. Most mushrooms are saprophytic; they obtain organic matter from dead plants and recycle carbon in the soil. However, the mushroom can produce a wide range of enzymes like cellulose and hemicelluloses that degrades the complex substrates on which they grow and absorb the soluble substances for their nutrition. This absorptive nutrition is a characteristic of fungus. Mushroom can also be poetically described as a plant “Without Leaves, without buds, without flowers, yet they form fruit.” “As food, as a tonic and as a medicine, Mushrooms are wonderful creations of nature (**Chang and Miles, 2004**)”.

Edible mushrooms have been recognized for a long time not only as a delicacy but also for their use as food in man’s diets. Mushrooms are rich sources of protein, lipids, amino acids, glycogen, vitamins and mineral elements (**Okhuoya et al., 2010**). **Krishnamoorthy, (2014)**, also described mushrooms have rich nutritional values with high contents of proteins, vitamins, minerals, fibres, trace elements, and cholesterol. According to the report of Mushrooms used in traditional medicine are known as medicinal mushrooms (**Ejelonu et al. 2013**). Mushrooms are used as food for nutritive value and medicinal values as dietary supplements which produce high quality and economic value to the world mushroom market. Generally, edible mushrooms possess three essential values for good food - nutrition, taste

and physiological functions (Chang 2007). Mushroom cultivation is the conversion of residual organic matter and lignocelluloses materials into a source of food (Sánchez 2004).

Type of mushrooms:

- 1) Paddy straw mushroom – *Volvariella* sp.
- 2) Oyster mushroom - *Pleurotus* sp.
- 3) Button mushroom - *Agaricus* sp.
- 4) Milky mushroom - *Calocybe* sp.
- 5) Shiitake mushroom - *Lentinus* sp.
- 6) Jew's ear mushroom - *Auricularia* sp.

Major Insect, Pest, Weeds and Diseases of Mushroom

Insect pests:

Many insect pests attack the mushrooms that belong to the Order Diptera. These included the Phorid fly and the Sciarid fly; Mites are also a common problem. Rats are also a problem as they eat the mushroom bags along with the spawn layers (Kashanguraet *al.*, 2005).

a) Flies:

- i) Phorid fly: *Megaselia halterata* and *Megaselia tamilnodolensis*
- ii) Sciarid fly: *Lycoriellamalli*

Damage:

The larvae feed on the mycelium and show rotting patches in the beds. Young buds are also eaten by the larvae. They also tunnel into the grown-up mushroom and cause rotting of the mushrooms. The flies spread the disease from one bed to another.

Favourable conditions:

The temperature of 16-24 is highly favourable and moisture contents of 70 % and above show more incidences. It's more severe in button mushroom cultivation when compared to oyster and milky mushrooms.

b) Beetles:

Black beetle: *Sacphiso manigrofaceatum*

Brown beetle: *Sacphiso mapictummotschulsky* - Golden lines seen on the body of the insect.

Both feed on young buds and grown-up mushrooms by scrapping the tissues. They mainly transmit the bacterial blotch disease from one bed to other.

c) Spring tails / Columbolae:

Tiny insects with stout antennae feed on the mycelium and buds. *Lepidocyrtuscyaneus* and *Isotoma simplex*.

d) Nematodes:

Nematode infestation is more severe in button mushrooms. The following two nematodes are very commonly noticed: *Ditylenchus mycelophagus* and *Aphelenchoides composition*.

e) Mites:

In addition to insect pests, two mites very severely feed on the mushroom spawn as well as on mushroom buttons. They are

- i) Tarsonemid mite- *Tarsonem usmyceliophagu* sand *T. floricultus* feed on mycelium and transmit the diseases.
- ii) Tryoglyphid mite- *Tyrophagus lintneri*, and *Tyrophagus longior*.

Integrated Pest Management:

- Bed moisture content should be around 60- 65%.
- Fix insect-proof nets in the windows.
- In button mushroom, the newspaper should be treated with 0.1 % formalin.
- Fix white insect traps to attract the flies.
- Spray malathion @ 1 ml./ lit. or dichlorvos 0.5 ml/lit. in the floor and sides to kill the flies and beetles, never spray on the mushroom beds and buttons.

Weeds, moulds and Diseases

Viruses, molds and bacteria may also compete with the mushroom mycelium thereby decreasing production (**Chiu et al., 1998**).

i) Ink Cap:

Coprinus comatus is a common weed on mushroom beds. It is favoured by high moisture content of the beds, more compaction of beds and poor ventilation with more ammonia inside the cropping room.

It produces dark blue to violet coloured buds with a long white thin stalk, with opens in a few days and disintegrates as a black mass of tissues, covering the entire bed, thus arresting the growth of spawn, development of young buds. The entire bed becomes black in colour show the rotting of the spawn.

Management:

- Remove and destroy the infected beds immediately.
- Avoid chemical methods of sterilization as this process leads to more weed growth.

b) Green moulds:

Mainly *Trichoderma viride* is severe both in beds and on mushroom buds. In addition, *Penicillium* and *Aspergillus* spp. may also cause mouldy growth on the beds. The infection leads to the development of green colour patches in the beds, which spreads quickly and the entire bed is covered fully with green growth, which completely arrests the spawn from running. This is due to improper sterilization of straw and bed preparation with more moisture.

Management:

- Avoid using damaged and old straw for bed preparation.
- Remove and destroy the infected beds immediately.
- Avoid preparing beds with more than 70 per cent moisture.

c) Fungal diseases:

In addition to the above fungal diseases, some other diseases in the mushroom beds are

- Dry bubble- *Verticillium malthousei* and *V. psalliotae*
- Truffle- *Pseudobalsamiamicrospora*
- Mildew/ Cobweb- *Dactylium dendroides*

Management:

- Avoid using damaged and old straw for bed preparation.
- Avoid preparing beds with more than 70 per cent moisture.

d) Bacterial blotch/ bacterial pit / brown blotch:

This disease is caused by a bacterium, *Pseudomonas tolaasi*. It produces pale-yellow spots on the surface of the pileus, which later turn brown. Pits are often found just below the surface. This disease also causes considerable damage in storage and transit. The incidence is more when the mushrooms are watered heavily in the early bud stage. Because of very high humidity film of water is always present on the surface of buttons leading to browning and rotting, emitting a foul smell. Possibly the *Tyroglyphus* mites carry the pathogen from one bed to other. In addition, the water splash from the infected bed also carries the bacterial inoculum.

Management:

- Keep the population of *Tyroglyphus* mite under control.
- Avoid pouring excess water into the beds.
- Remove the infected beds periodically to avoid further spread.
- Spray water mixed with bleaching powder @ 2g / 10 litres of water.

e) Viral diseases:

Complex viruses cause a disease variously called the Brown disease/ watering stipe/ X- disease or dieback disease. It is difficult to diagnose the disease based on symptoms- drumsticks like mushrooms and premature opening of veils- because similar symptoms can also be caused by certain environmental and cultural conditions. Even the virus infection may be symptomless. Reduction in the yield of mushrooms is perhaps the most reliable symptom. The other symptom commonly associated with the infected crop is the slow and depressed growth of the mycelium isolated from the infected mushroom. Transmission of the virus is through mushroom spores and spawn. In addition, phorid larvae and tarsonemid mites also act as vectors for this complex disease.

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