

Mushroom: Diseases, Pests and Their Management

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SUMMARY

The nutritional value of mushrooms is high; they are quite rich in protein with a significant content of essential carbohydrates, amino acids, fiber and low in fat. Edible mushrooms also contain substantial levels of vitamins B1, B2, B12, C, D and E. In addition to being a source of nutrients, mushrooms have also been identified as therapeutic foods that are helpful in preventing diseases such as hypertension, diabetes, hypercholesterolemia and cancer (Bobek, 1999). Mushrooms are also adversely affected by a large number of biotic and abiotic variables, like all other crops. Fungi, bacteria, viruses, nematodes, insects and mites are among the biotic agents that directly or indirectly cause damage to mushrooms. In this article we are going to discuss about widely the all causes and their management strategies.

INTRODUCTION

The 'mushroom' that first drew man's attention to fungi. As early as 5000 BC, man, 'the hungry food creature,' soon discovered that these mushrooms were edible and human use of mushrooms. The word mycology actually means the study of mushrooms (mykes = mushrooms, logos = study). Mushrooms in the genus *Agaricus* (button mushrooms, portabellas and criminis), *Pleurotus* (oyster mushrooms), and *Volvariella* (straw mushrooms) are the fleshy fruiting bodies of fungi and include edible species. Depending on their stage of development and variety, mushrooms are highly variable in appearance. The cap is pale grey or brown in colour and is round when immature, but flattens out as it reaches maturity and can reach a diameter of 5-10 cm (2-4 in). *Agaricus* mushrooms have a cap and stem. *Pleurotus* mushrooms may not have a stem and can be attached laterally to a growing substrate such as a tree's bark instead. Smooth and elongated, *Pleurotus* mushrooms can reach 4-15 cm (1.5-6.0 in) in diameter. The mushrooms of *Volvariella* are small, with pink gills at the base of the stem and a characteristic sac-like covering (volva). The diameter of the cap can reach 5-15 cm (2-6 in).

(1) Dry bubble

Pathogen: *Verticillium fungicola*

Common name: *Verticillium* disease, brown spot, fungus spot, dry bubble.

Dry bubble is most common and serious fungal disease of mushroom crop. If it is left uncontrolled, disease can totally destroy a crop in 2-3 weeks.

Symptoms: Muddy brown, often sunken spots on the cap of the mushrooms and greyish, white mouldy growth seen on cap, if infection takes place in an early stage, typical onion shaped mushrooms are produced, remain small. Later stage mushroom becomes dry.

(2) Green Mould

Pathogen: *Trichoderma viride*, *T. hamatum*, *T. harzianum* *T. koningii*, *Penicillium cyclopium*, *Aspergillus* spp.

Common name: Trichoderma spot, Trichoderma blotch, Trichoderma mildew, Green mould

One of the most common and destructive disease in mushroom cultivation is the green mould which induce significant quantitative and qualitative losses.

Symptoms: Pure white growth of mycelium appear on casing surface or in compost which resembles to mushroom mycelium. Later on mycelial mat turns to green colour because of heavy sporulation of causal agent which is a characteristic symptom of the disease.

(3) False Truffle

Pathogen: *Diehliomyces microsperes*

Common name: Truffle disease

False truffle is a limiting factor in the production of *A. bisporus* in India because of its higher temperature requirements.

Symptoms: Initially the colour of the mycelium is white, gradually the mycelial growth become thicker and develops into whitish, solid, wrinkled, rounded to irregular fungal masses resembling like Small Brains. At maturity they become pink, dry and reddish and finally disintegrating into a powdery mass emitting chlorine like odour.

(4) Wet Bubble

Pathogen: *Mycogone pernicioso*

Common name: Wet bubble, White mould, bubble, *Mycogone* disease.

Symptoms: Fungus covers the mushroom with white mat of mycelium, which look like cauliflower and it becomes creamy brown after few days. Small amber (yellowish brown) to dark brown drop of liquid develops on the surface of the undifferentiated tissue in very high humid conditions. At this stage an unpleasant odour comes out from the infected beds.

(5) Bacterial blotch

Pathogen: *Pseudomonas tolaasii*

Common name: Brown blotch, bacterial spot.

Symptoms: Brown spots or blotches on the cap, In case of severe infection on the stipes circular or irregular yellowish spots develop on or near the margins of the cap which enlarges rapidly under favorable conditions and coalesce to form rich chocolate brown blotches.

(6) Mummy disease

Pathogen: *Pseudomonas aeruginosa*.

Symptoms: Fruit bodies have tilted caps and curved stalk. Base of the stem enlarged and tissue of the mushroom becomes spongy giving mummified appearance.

The Viral Diseases

Numerous viruses of various shapes and sizes have been observed on different mushrooms. Virions measuring 29 nm and 35 nm in diameter were found in India associated with button mushroom virus disease.

Nematodes

Nematodes are among the most deadly mushroom pests that cannot be eradicated completely once they enter the beds, until and unless crop beds are completely destroyed and disposed of. A average of 21 species of nematodes were reported to be harmfully involved with the cultivation of fungi from different parts of the world. Occurrences of *Aphelenchoides composticola* and *Ditylenchus myceliophagus* species from mushroom beds have been recorded in India. If the compost is dried gradually, these nematodes survive in a state of anabiosis for up to two years, but they die if the compost is dried quickly.

General Management Practices

Sanitation and Hygiene: To avoid primary infection involving the use of clean compost, pasteurisation or sterilisation of the casing soil, proper hygiene and sanitation are necessary. The floor should be cemented or tiled for compost preparation and wrapped with a roof. After every break before the fruit bodies turn brown and spores are ripe, regular cleaning, removal of cut mushroom stems and young half dead mushrooms also rogue out the weed fungus to avoid its further spread. Initial infection can be checked by treating the affected patches with formaldehyde (2 percent) solution. In controlling the disease, temperature and humidity control helps. Avoid watering excessively.

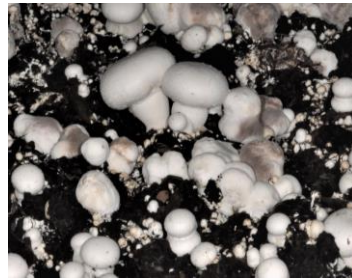
Chemicals Use

Only a limited number of chemicals useful for mushrooms are available. This is because fungi were also mushrooms itself, and most pathogens are also fungi, making it very difficult to choose fungicides. Furthermore due to short planting season, residual toxicity of various chemicals is of significant concern and therefore must be

kept just under the tolerance limit. For management of dry bubble, Pick and destroy infected mushroom to prevent spread, Sanitary conditions in growth house, Lower the temperature to 14oC when disease noticed, Use clean equipment , Control flies and mites, Bubble can destroy with salt. For wet bubble management -Sanitation in growth house, Clean environment around cultivation area, Incorporating Benzimidazole 150 mg/l. in the casing, Benomyl at the rate of 0.95 g/m² , Carbendazim and Thiabendazole at the rate of 0.62 g/m². For bacterial disease management- Sanitation, Lowering humidity, Watering with a 150 ppm chlorine solution (calcium hypochlorite products are used since sodium hypochlorite products may burn caps). If the mushroom stays wet, however, chlorine has little effect since the bacterial population reproduces at a rate that neutralizes the effect of the oxidizing agent.



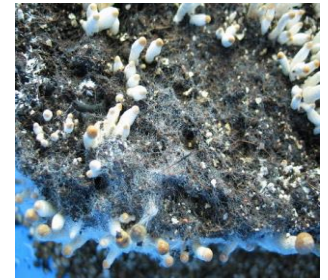
(a) Mites



(b) Dry Bubble



(c) Wet Bubble



(d) Blue Mould



(e) False Truffle



(f) Bacterial Blotch



(g) Mummy Disease

Springtails Management

Use of 0.05 per cent Malathion as spray for disinfection, mixing Diazinon 30 ppm in compost at the time of filling and spray of insecticides like Malathion or Dichlorovos at 0.025–0.05 per cent conc. during spawn run and cropping have been recommended for their control.

Mites Management

Use of Diacophal 50 EC 1- 2ml. Kelthane @ 10 litre to be added and should be sprayed from time to time in the compost and on the wall of mushroom house.

REFERENCES

Ebeling, W. (1978). Urban Entomology. Oakland: Univ. Calif. Div. Agric. Nat. Res.

<http://bugguide.net>

<http://www.nafis.go.ke/>

Koehler, P.G., Oi, F.M. and Aparicio, M.L. (1994). Springtails. Gainesville: Univ. of Fla. Coop. Ext. Service, Inst. of Food and Agric. Sciences.

www.daf.qld.gov.au