



# 8

## INSECT-PESTS MANAGEMENT IN CULTIVATED MUSHROOM

Throughout the world Sciarid flies, phorid flies, cecids, springtails, mites and nematodes are important pests of cultivated mushrooms. These pests damage the crop right from spawning to harvesting of the crop. Mushroom flies damage the crop directly and also help in spreading various mushroom diseases. Therefore, we should take measures to prevent the entry of insect pests, mite and nematode into the cropping rooms.



### OBJECTIVES

After reading this lesson you will be able to:

- identify major insect pests in mushroom;
- identify major flies infecting button mushroom farm unit, viz., sciarid, phorid and cecids flies;
- identify nematodes and control them using various cultural methods;
- identify mites, spring tails and other minor pests;
- control these insect pest by different cultural and chemical methods.

### 8.1 MUSHROOM FLIES

There are three main categories of flies that damage the button mushroom crop viz., Sciarid flies, phorid and, cecid flies. Flies are also a problem in other mushrooms, particularly when these are grown under unhygienic conditions. Flies start affecting right from the spawning stage and if proper care is not taken, it may become difficult to get crop.



Notes

### 8.1.1 Sciarid Flies

Sciarid flies, the small fungal gnats, are mosquito type flies with size varying from 1.5 to 5 mm (Fig. 8.1). Colour of flies varies from brown black to black. Its larvae feed on compost, mycelium and mushrooms. Larvae enter the mushrooms, start feeding and make tunnel within a stipe. Eventually they reach the pileus and feed vigorously. When larval attack occurs at pin head stage, further development of pinheads completely stops and pin heads eventually die.

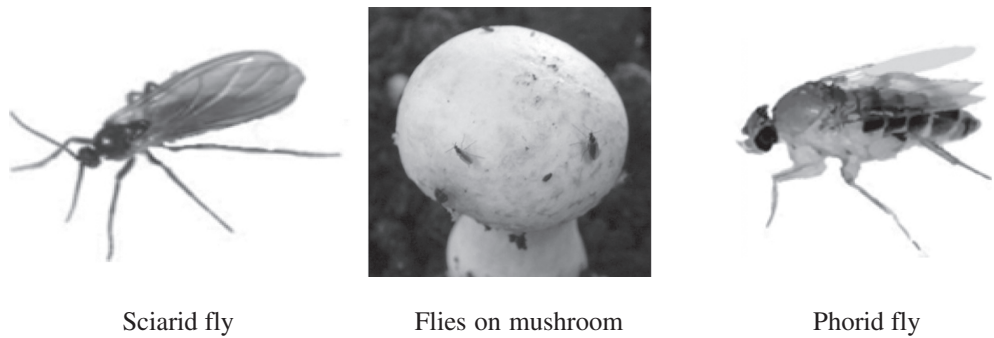


Fig. 8.1: Two most commonly occurring flies in mushroom houses

### 8.1.2 Phorid Flies

Phorid Flies are small hump backed black or light to dark brown flies of size 1.9 to 3 mm (Fig. 8.1). These flies are smaller version of house flies. They move rapidly with jerky movements. Adult phorids are most common in early summer and are attracted to light. These also eat into mushrooms, though phorid flies are less harmful than sciarid flies.

### 8.1.3 Cecid Flies (Gall Midges)

Cecid flies are rarely visible and smaller than even sciarid flies and are dark brown in colour. Larvae feed on mycelium and make vertical grooves in the stipe. They feed on the outside of stipe at the junction of stipe and gills where later on bacteria

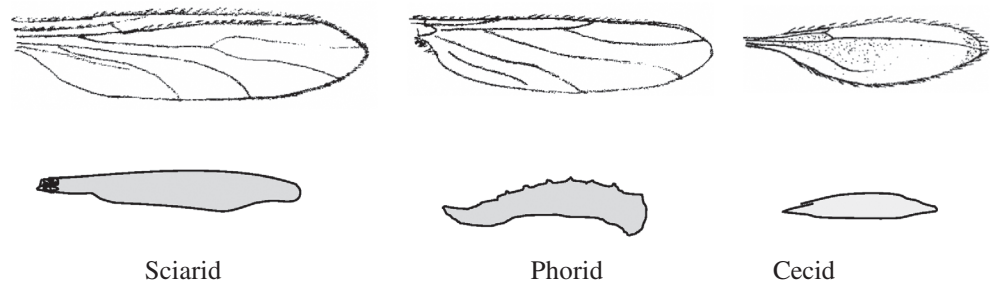


Fig. 8.2: Different type of wing venation (above) and larva (below) in different mushroom flies



may grow and cause discoloration. Infection mainly comes through casing soil and hence it is important to use pasteurized casing soil. Larvae are sticky and may spread through tools, clothes, etc. of workers.

We can also identify the flies based on the wing venation (Fig. 8.2). We can also identify the larvae of different flies. Larva of Sciarid is 5-8 mm long with round black head; larva of phorid is about 3-4 mm with pointed head; and larva of sciarid is only 1.5 to 2.8 mm in length and is spindle shaped (Fig. 8.2).

### 8.1.4 Management Practices and Control

Damage by flies can be minimised by proper hygiene and sanitation. Flies get attracted to the smell of compost and mushrooms. If spawning is not done in clean and protected area, flies may lay eggs at that stage only and multiply along with the spawn. Here damage will start from the very first flush. It is important to keep unit clean, put screen or doors and ventilators (net of 40 mesh as mushroom flies are very small), install light traps along with poison baiting (like Baygon diluted with water (1:10) with addition of little sugar). Such measures will prevent the entry of flies in the cropping rooms. However, proper cookout after completion of the crop (70°C for 4-6 hours) and proper disposal of spent compost (disposal at faraway place) helps in checking the fly breeding.

**Use of UV fly catcher for management of mushroom flies:** Ultra Violet (UV) fly catcher (365nm) may be placed at 5' height. It is effective for trapping and killing of mushroom flies. Placement of UV fly catcher on floor may prove ineffective. Fly catcher is normally operated only during night hours.

In addition to the above physical measures, Chemicals can also be used for control of flies. The problem in use of chemicals for control of fungal, bacterial or insect related diseases is that most of the chemicals mentioned for their control do not have label claim for mushrooms. (You must have seen that with every pesticide there is a brief leaflet mentioning the method of use, on which crops it can be used, precautions, etc.). Lindane, Diflubenzuron, Diazinon and Malathion, Dichlorovos, Chlorfenvinphos, Fenitrothion, Deltamethrin, Kelthane, Furadon are some of the commonly used insecticides. It is important to control flies as in addition to direct damage, these are carriers of spores of various diseases like wet bubble and mites.

**IPM for control of Flies:** We can effectively control major disease (wet bubble) and mushroom flies by integrated use of the following:

- Composting on cemented floor.
- Maintenance of proper moisture in compost and proper pasteurization i.e. 59°C for 6 hours with ample aeration.



Notes

- Proper pasteurization of casing at 65°C with 65% moisture.
- Treatment of empty room with 2% formalin.
- Application of malathion on walls @ 0.01% after 7 day of casing.
- Application of deltamethrin @ 0.01% on walls after first flush.
- Application of dichlorvos @ 0.01% on walls after second flush.
- Spray 150 ppm bleaching powder for controlling bacterial diseases.
- Use light trap for monitoring and controlling fungal gnats.
- Cook out (Chemical/ steam), drenching with 2% formalin before disposing off the bags or Maintaining 70°C temperature inside rooms for 8-10 hours.



**INTEXT QUESTIONS 8.1**

State True or False

- (i) Sciarids, phorids, cecids are the common flies observed during cultivation of button mushroom.
- (ii) Infestation by flies does not take place at the stage of spawning.
- (iii) UV catcher is equally effective at all heights in the cropping room and should normally be kept on floor.
- (iv) Flies are carriers of spores of various diseases and mites.
- (v) Most of the chemicals that can be used for control of insect pests do not have label claim.

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**8.2 MITES**

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Button and other cultivated mushrooms are infested by several groups of mites. The initial infestation of mites in mushroom houses comes through raw material used for the preparation of mushroom beds. occasionally phorid flies also transport mushroom mites. Their presence generally indicates poor compost. These mites are also known to cause allergic reactions to humans.

**8.2.1 Control**

We need to prepare good quality compost and keep hygienic conditions at all stages. Some of the methods for integrated control of mites are:

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- Proper pasteurization of compost and casing material.
- Disinfection of mushroom houses by spraying 0.1% dicofol.
- Cooking out at 70°C.
- Spraying beds with chlorfenvinphos, fenitrothion, fenthion, trithion or metasystox (1.0 g a.i./m<sup>2</sup>) immediately after spawning and before casing.



### INTEXT QUESTIONS 8.2

State True or False

- (i) Presence of mites generally indicates poor compost.
- (ii) Some mites may cause irritation and allergic reactions to humans.
- (iii) The initial infestation of mites in mushroom houses comes through raw material used for the preparation of mushroom beds.

## 8.3 NEMATODES

In mushrooms there are a specific type of nematodes that eat mycelium. If present, these can lead to complete crop failure. These nematodes are normally found in compost made by long method or also in short method where proper phase II is not done and there are pockets/lumps where required temperature does not reach. These also spread from crop to crop and were a common problem when wooden trays were being used. There will be blank areas on casing soil and whitish fungal growth (Botrytis) will occur on casing soil.



Fig.8.3: Nematode

### 8.3.1 Control

Proper pasteurisation of the compost is the best method for control of nematodes. Even though chemicals like furadon can be used but their doses may not be ecologically and economically beneficial. The biological control measures have not become popular in our country.



Notes

**INTEXT QUESTIONS 8.3**

State True or False

- (i) Nematodes in button mushroom cultivation can be effectively controlled by pasteurization of the compost at 60°C for 6 hours.
- (ii) Biological methods of control of nematodes are possible.
- (iii) Use of nematicides (chemicals used to control nematodes) may not be ecologically and economically beneficial.

**8.4 SPRING TAILS**

There are some other insects that may appear on the crop. Mushrooms other than the button are also affected by insect pests. Springtails damage oyster, button, shiitake and milky mushrooms. They feed on mycelium in compost resulting in disappearance of mycelium from spawned compost. They also attack fruiting bodies of button mushroom and cause slight pitting or browning at feeding sites. In oyster and shiitake they feed on gills resulting in destruction of gill linings. Adults springtails are silver grey to ground colour.

**8.4.1 Control**

Hygiene, proper pasteurization of casing and compost, proper disposal of the compost, not keeping the bags on floor and proper cleaning before start of the new crop are some of the measures. We may also spray malathion or dichlorvos at 0.025-0.05% and observe the waiting period of 2 and 5 days respectively

**INTEXT QUESTIONS 8.4**

State True or False

- (i) Springtails damage oyster, button, shiitake and milky mushrooms.
- (ii) They feed on mycelium in compost.
- (iii) Chemicals like malathion or dichlorvos used for control of flies also control springtails.



**WHAT YOU HAVE LEARNT**

Let us recapitulate the important points we have learnt in this lesson:

- Sciarid flies, phorid flies, cecids, springtails, mites and nematodes are important pests of cultivated mushrooms.
- Mushroom flies can be identified based on their size, movement, wing venation and larva.
- Flies start affecting right from the spawning stage and if proper care is not taken, it may become difficult to get crop. In addition to direct damage, they also disperse spores of various diseases.
- It is better to adopt physical measures and maintain hygiene and follow the dictum of prevention is better than cure.
- Even though chemicals can be used for control of flies, but most of these don't have label claim for use on mushrooms. We go for control not only to protect the current crop but also crop in other rooms and subsequent crops during the year.
- Nematodes are serious pests but can be controlled simply by proper pasteurization of the compost and casing.



**TERMINAL EXERCISE**

1. Describe the major flies found in button mushroom cropping units. How these can be identified based on size, movement, wing venation and type of damage done to mushroom?
2. What are the physical methods for control of insect pests?
3. In which type of compost we can find more nematodes. Describe the physical method for control of nematodes in button mushroom compost?
4. What we infer from the presence of mites in the crop. How we can control the mites?
5. What are the commonly used chemicals for control of different types of insects?



Notes



**ANSWERS TO INTEXT QUESTIONS**

**8.1**

- (i) True      (ii) False      (iii) False      (iv) True      (v) True

**8.2**

- (i) True      (ii) True      (iii) True

**8.3**

- (i) True      (ii) True      (iii) True

**8.4**

- (i) True      (ii) True      (iii) True

**SUGGESTED ACTIVITY**

Visit any nearby mushroom unit and try to observe different flies. Collect some mushrooms and cut them to see fly damage by different types of flies.

**Key Learning Outcomes**

- Identify and manage insect-pests affecting mushroom production.