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SHORT COMMUNICATION

PEST AND DISEASE MANAGEMENT OF OYSTER MUSHROOM CULTIVATION IN SRI LANKA

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INTRODUCTION

Oyster mushroom (*Pleurotus* spp.) cultivation in saw dust was first described by Block *et al.* (1958;1959). However the commercial cultivation of oyster mushrooms did not get established until 1970s (Quimio *et al.*, 1990). It was first introduced to Sri Lanka through a spawn production project by Export Development Board (EDB) in 1980s and later during the decade the Department of Agriculture (DOA) started spawn production and extension of mushroom cultivation techniques to farmers. The cultivation techniques given to farmers in Sri Lanka have been directly adopted from other asian countries and no basic or adaptive research have been conducted in Sri Lanka on oyster mushroom cultivation.

At present oyster mushroom cultivation has become a very popular cottage industry in Sri Lanka. There are large numbers of cultivators in the country and their scale of production varies from few hundred grams to over 50 kg/d. All cultivators, small and large, adopt same cultivation techniques recommended both by the EDB and DOA (DOA, 1997). It is recommended to start cultivation in cheaply built sheltering and accordingly almost all mushroom cultivations at present are housed in temporary or semi-permanent hut like structures.

The extension effort of the DOA has induced many people to start cultivation of oyster mushrooms but a few seem to continue. Others have given up due to various cultivation problems encountered. One of the major problems of oyster mushroom cultivation in Sri Lanka is pest and disease problem (Gnaneswaran, 1997). In addition gradual decrease of yield and deformation of the mushroom heads have frequently been reported. A farmer survey and a research study were initiated in January 2001 to find out the means of pest control in oyster mushroom cultivation in Sri Lanka. During the study it was noted that some agronomic practices adapted by farmers contributed to increase the pest incidence and there are many aspects of cultivation needing research. These studies present the preliminary results of the pest management in oyster mushroom cultivation and discuss observations on some agronomic practices.

MATERIALS AND METHODS

Survey of mushroom farms

A survey of mushroom growing farms in Kandy, Nuwara Eliya Colombo, Ratnapura and Kurunegala Districts was conducted during the year 2001 to observe the pests infestations and farmer practices. Farms were selected with the help of

Deputy Director Extension in Kandy and Nuwara Eliya Districts and from the growers list kept at EDB for Colombo District. Farms were visited at irregular intervals due to practical difficulties.and the pests were collected for identification.

Pest management in mushroom farms

For the management of pests a properly designed mushroom house was established at the In-service Training Institute, Gannoruwa (ISTI). The design consist of a dark room for incubation of mushroom bags, a separate place for mushroom bag preparation and three separate cropping rooms having doors opening outwards and protected with insect proof netting (Figure 1). The rational of the design was to have separate cropping rooms for separate batches of mushroom bags so that a batch of mushroom bags consist of a crop of same age. This isolation of separate batches was to restrict pest and disease movement from old crop to new crop.

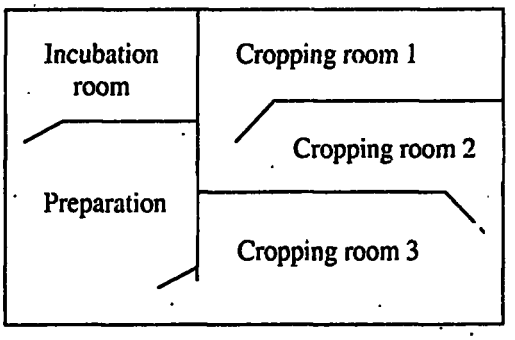

Figure 1. Design of a systematic mushroom production house

To test the effectiveness of pest exclusion by use of insect proof nets, two batches of same age mushroom bags (300 bags each) were kept in protected and unprotected cropping rooms. Yield of mushrooms and build up of diseases, insect and mite pests were monitored in both rooms daily.

Optimum Keeping Time for Mushroom Bags

A typical mushroom bag keeps yielding mushrooms for 3-4 months once they are opened after incubation. However, the yield of mushroom from a bag gradually decreases and the bags tend to get infested by pest and diseases when they get older. To find out the optimum time of keeping the mushroom bags, daily yield of mushroom bags was recorded for four months using same batch of bags used for pest exclusion experiment.

Average Yield of Mushrooms per Bag

In a separate experiment 100 mushroom bags of one kg each were kept in insect proof cropping room and daily mushroom yields were recorded for the purpose of calculating average mushroom yield per bag.

RESULTS AND DISCUSSION

Of these pests most frequent species were *C. bifacies, Gyrophaena* spp., *Bradysia paupera, Mycodrosophila* sp. and the mite *Lasioseius* sp. Although *Gyrophaena* spp. and *Lasioseius* sp. are common they do not seems to do any harm to either mycelium or mushroom bodies (Table 1). But their presence in large numbers is a nuisance. Most of the damage to mushroom cultivation is Sri Lanka is caused by *C. bifacies* and *Bradysia* sp. Gnaneswaran (1997) also reported that the major insect pest of oyster mushroom cultivation in the Central Province of Sri Lanka is *C. bifacies*.

Table 1. Common insect and pest species in mushroom cultivation in Sri Lanka

Order	Pest species
Coleoptera	*Cyllodes bifacies* (Walker)
	Scaphisoma pictum Motschulsky
	Triplex spp
	Gyrophaena spp.
Diptera	*Bradysia ?paupera*
	Megaselia ?halteratha
	Drosophila ?funebris
	Mycodrosophila sp.
Collombola	Unidentified sp.
Lepidoptera	Unidentified noctuid
Acarina (Ascidae)	*Lasioseius* sp.

Pest exclusion

A result of the pest exclusion experiment is graphically shown below. According to these results pest infestation started just four weeks after opening the mushroom bags for cropping in cropping room, which was exposed to the environment. In the cropping room protected with insect proof netting the pest infestation started only after 10 weeks. This experiment was repeated three times at the ISTI mushroom house and each time similar results were obtained.

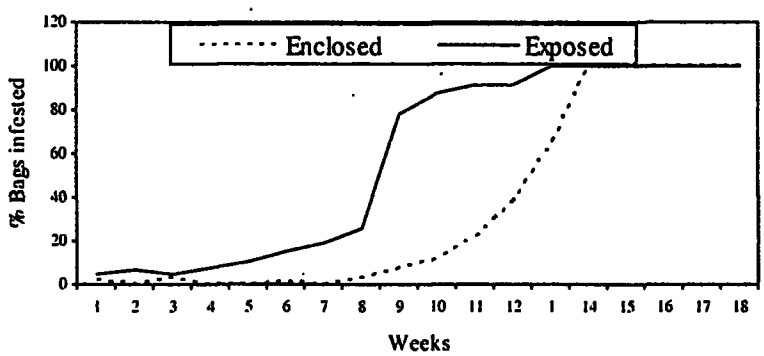

Figure 2. Development of insect pest infestation in pest excluded and non excluded cropping rooms

These results show that it is possible to evade the mushroom pest infestation by protecting the cropping house with insect proof nets. However it is important that only a single batch of mushroom bags is maintained in a cropping room and cleaning the cropping room before placing a new batch of bags for cropping is necessary.

Optimum keeping time for mushroom bags

The results of daily mushroom harvest records indicate that the average yield per bag of mushroom increased. However this increase reduce with time. Figure 3 show the variation in cumulative average yield per bag of mushroom in pest excluded and protected cropping rooms. According to these results 75% to 90% of the total yield per bag is produced within 10 weeks after opening of the bag. During last two months of the 18 weeks period bags yielded only 10-25% of the total yield. From the above observation it was shown that pest infestation begins to initiate even in the enclose cropping rooms eight weeks since opening the bags. Therefore, in this experiment it is observed that the optimum keeping time for mushroom bags is 10 weeks when the profit from the yield and problems of pest infestations are considered.

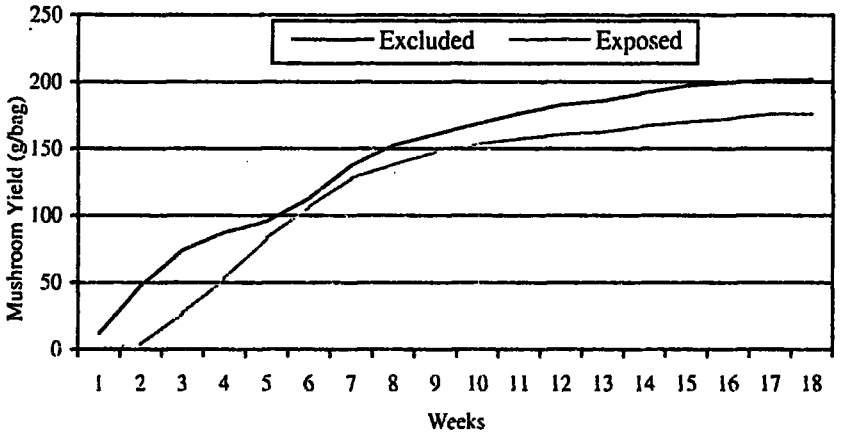

Figure 3. Variation of average mushroom yield per bag in exposed and protected mushroom cropping rooms.

Average yield of mushroom per bag

The mushroom harvest varied from 75g/bag to 280g/bag. The average yield per bag of mushroom was 201.8g. This yield was given over a period of 18 weeks. The average yield given in ten weeks was 176.3g. The above series of observations indicate that it is possible to avoid mushroom pest infestation by making the cropping rooms insect proof. Systematically designed mushroom house with outward opening doors and insect proof separate cropping rooms for different batches of mushrooms helped to keep the pest infestation minimum. It was also evident that keeping the compost bags more than 10 weeks is not advisable as the mushroom yield obtained after 10 weeks was very low and the potential of pest infestation was high. Although it is alleged that the average yield per bag of 1 kg compost is around 500g our experiment indicated that the average yield is much less than that. This indicates that research on compost medium and nutrient addition to compost may be a fruitful exercise.

ACKNOWLEDGEMENTS

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