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Occurrence of Different Mycoflora in Oyster Mushrooms and their Management

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Abstract: *The cultivation of mushrooms is a carefully controlled biological system, however contamination with microorganisms, which are in ways, is inevitable. Despite of several advantages of its cultivation, the mushroom cultivation has not picked up to the desired momentum due to occurrence of different fungal flora. The present investigation was taken up with four species of oyster mushroom: Pleurotus florida (white oyster), P,eous (pink oyster), P. sajor-caju (grey oyster) and Hipsizygne almarius (elm oyster) cultivated in every season (January to December). Five beds each of different oyster mushroom species were grown in a replicated trial during rainy, winter and summer season. The predominant mycoflora recorded were Aspergillus niger (10-15%), Aspergillus flavus (10-20%) and Trichoderma spp. (5-10%) in different mushroom species. Mean temperature and mean relative humidity ranged from 24.5-29.6°C and 65-90% respectively. The presence of total fungal flora varied from 11.3-29.7% in three different seasons. Irrespective of seasons, maximum (29.7%) occurrence of fungal flora was recorded in pink oyster mushroom (P.eous). The difference in occurrence of fungal flora in different mushroom species may be attributed to the variations in temperature and relative humidity prevailed during different seasons. Complete elimination of fungal flora was observed in the mushroom beds sprayed with carbendazim @ 0.05%.*

Keywords: *Oyster Mushroom, Pleurotus, Mycoflora, Season*

INTRODUCTION

Oyster mushroom (*Pleurotus* species) belongs to the family of Tricholomataceae and is usually found clustering naturally on dead trees at spring season. Oyster mushroom (*Pleurotus* spp.) is popularly known as 'dhingri' in India. Among all species of mushroom, the oyster mushroom is the second widely cultivated mushroom worldwide followed by *Agaricus bisporus*. The popularity of oyster mushroom has been increasing due to its ease in cultivation, high yield potential and high nutritional value [1, 2]. Oyster mushroom help to remove the toxicity produces by the agro wastes [3-5]. They have high economical, ecological, and medicinal values. A wide range of diseases and pests can cause serious problems in mushroom cultivation, and management of those diseases and pests is a key factor in successful mushroom production. They are damaged directly or indirectly by various bioagents like fungi, bacteria, viruses nematodes, insects and mites. The incidence of different fungi was observed during the spawn running period on the oyster beds during cultivation. Many of these act as competitor moulds there by adversely affecting spawn run whereas others attack the fruiting bodies at various stages of crop growth producing distinct disease symptoms. Studies on various aspects of fungal contaminants and diseases of *Pleurotus* spp. were undertaken by various workers [6-8] and they reported *Trichoderma harzianum*, *Aspergillus* spp., *Penicillium* spp., *Monilia sitophila*, *Stemonitis* spp. and *Coprinus* spp. were the major contaminants of *Pleurotus* spp.

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The use of fungicides for controlling the competitor moulds and diseases in oyster mushroom cultivation is very common in India. Keeping all this in view a study was conducted on the occurrence of different mycoflora and also their management using different fungicides.

MATERIALS AND METHODS

The present study was taken up at Mushroom cultivation Scheme, Department of Plant Pathology, Rajendranagar, Hyderabad, Telangana state. Four types of oyster mushroom viz., *Pleurotus florida, P. sajor caju*, *P. eous* and *Hipsizygne almarius* were used for carrying out the studies. Pure cultures of each oyster species was prepared from healthy matured fruiting bodies by tissue segment method and subsequently the spawn was prepared for the above species using sorghum grains as substrate. Chopped paddy straw was soaked into a solution containing the requisite amount of sterilizing agent for 16-18 hours. Thorough spawning @ 5% by wet weight basis was followed. The spawned substrate was filled in polypropylene bags (14x24 cm). A unit of 1 kg of dry straw was used for each treatment, which was equally distributed in five bags representing each as a replication. The moisture content of the straw at the time of spawning was kept around 72-75%. The filled bags were incubated in a dark room at a temperature ranging between 24-30°C, where 90% relative humidity was maintained till the spawn run was complete. When the straw is fully covered with white mycelium in the bag, it is regarded as complete spawn run, then the bags were cut open and compacted mass of aggregated straw called, as "bed" was ready for cropping. The beds were placed on the iron racks at a distance of 50 cm. Five beds representing one replication for each type of mushroom species were prepared twice in each season throughout the year and examined for the occurrence of mycoflora. Beds were prepared with the spawn @ 50g per bed.

Five beds each of different mushroom species in replicated trial will be grown throughout the year and the different fungicidal treatments of carbendazim @ 0.05%, benomyl @ 0.01%, Carbendazim + Blitox @ 0.01% each, thiram @0.01%, neem oil @ 5% and Bleaching powder @ 0.15% are tested for their efficacy in controlling the predominant mycoflora in oyster mushroom beds.

RESULTS AND DISCUSSION

The results revealed the association of different fungal species viz. *Aspergillus niger* (10-15%), *Aspergillus flavus* (10-20%) and *Trichoderma* spp (5-10%) in different mushroom species (Table-1). Sinden [9] considered the genus *Trichoderma* as species competing with the mushroom or indicator of poor compost, associating their presence to situations with acidic pH or soluble sugar residues.The presence of total fungal flora varied from 11.3-29.7% irrespective of seasons (fig-1). The maximum incidence of fungal flora was recorded in pink oyster mushroom, *P.eous* (29.7%). The difference in occurrence of fungal flora in different mushroom species may be attributed to the variations in temperature and relative humidity prevailed during different seasons.

Complete inhibition of most of the competitor moulds of oyster mushroom was obtained with the application of 50 ppm benomyl + 100 ppm thiram [10,11]. Different concentration of carbendazim (bavistin) and it's combination with formaldehyde (formalin) were evaluated against the major contaminants of *P. sajorcaju, P. flabellatus* and *P. citrinipileatus* [12,13] and they reported complete inhibition of the mould fungi under *in vitro* and/ or *in vivo*. In our study also similar findings were observed and complete elimination of fungal flora

Table 1
Incidence of mycoflora in oyster mushroom beds in three seasons

Type of mushroom species	*Total fungal incidence (%)*		
	Rainy	*Winter*	*Summer*
P. florida	13.1	14.3	25.6
P. sajor caju	16.5	15.5	27.6
P. eous	19.1	18.1	29.7
H.almarius	11.3	12.2	28.4
Mean temp.	25.6	24.5	29.6
Mean RH	84	90	65
CD	1.9	1.1	0.8
CV	9.5	5.6	2.2

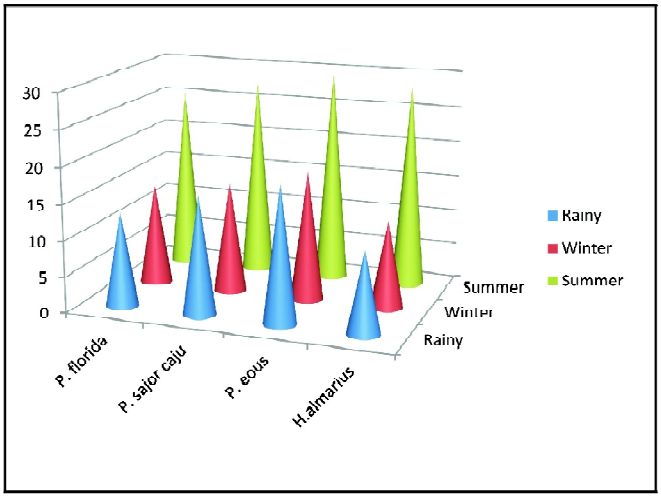

Figure 1: Distribution of mycoflora in four oyster species in different seasons.

was observed in the mushroom beds sprayed with carbendazim @ 0.05% followed by Bleaching powder @ 0.15% and Carbendazim + blitox @ 0.01%. (Table 2).

Table 2
Evaluation of chemicals against the major competitor moulds of oyster mushroom

S. No	*Treatment*	*Fungal incidence (%)*
1	Carbendazim @ 0.05%	0.0(0.00)*
2	Benomyl @ 0.01 %,	18.4 (14.28)
3	Carbendazim + blitox @ 0.01%	12.5 (11.78)
4	Neem oil @ 5%	22.8 (15.99)
5	Bleaching powder @ 0.15%	12.4 (11.71)
	CD	1.19
	CV	5.78

*Figures in brackets are angular transformed values

CONCLUSION

Microbial contamination of oyster mushroom bed is one of the major hindrance in increased yield of *Pleurotus* spp. under the agro-ecological condition of Telangana State. From the studies it was observed that the major contaminants recorded were of fungal species viz. *Aspergillus niger*, *Aspergillus flavus* and *Trichoderma* spp in different mushroom species which were completely eliminated by spraying carbendazim.

As the mushrooms are freshly used for consumption there is a need for going for safe methods rather than chemical means for effectively controlling the pests and diseases as there is a risk of residues of these chemicals in the mushrooms which is not safe for human consumption. Apart from these problems continuous usage of same chemicals may lead towards pest's resistance.

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