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Evaluation of fiungicides *in vivo* against *Fusarium oxysporum* causing Fusarium rot of *Pleurotus* spp.

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Introduction:

Three selected fungicides Carbendazim, Bitrertanol and Captan at different concentration(0.025, 0.05, 0.1%) were evaluated for time taken (days) for complete colonization of mushroom mycelium, days for first pin formation, Percent increase in yield over control and disease incidence of *Fusarium* rot (*Fusarium oxysporum*). Out of three fungicides, Carbendazim was found to be most efficient fungicide.

Key words : pleurotus, *Fusarium oxysporum*, fungicides

Introduction:

During the past few decades, mushroom cultivation has spread throughout the world (Chang and Miles, 1982). Total mushroom production worldwide has increased more than 18 fold in the last 32 years, from about 350,000 metric tons in 1965 to about 6,160, 800 metric tones in 1997 (Chang, 1999). Like all other crops, mushrooms are also affected adversely by a large number of biotic and abiotic agents/factors. Fungal contamination is a big problem in cultivation operations of *Pleurotus*. The most common antagonistic and mycoparasitic fungi, hindering the *Pleurotus* cultivation are: a) *Ttrichoderma* spp., *Penicillum* spp., *Aspergillus* spp., *Chaetomium olivaceum*, *Verticillium fungicoli*, *Neurospora*, *Fusarium* spp., *Sitophila*, *Cladobotryium dendroides* etc.

Fusarium rot is reported to be devastating disease in the crop production of mushrooms. It is occurring in almost all countries of world, where cultivation of this crop is in practice including India.in the present investigation, an attempt was, made to evaluate some fungicides against undesirable fungi coming up during cultivation of pleurotus spp.

Materials and methods:

The three fungicides, Carbendazim, Bitrrtanol and Captan were used for *in vivo* study. The three fungicide concentrations were tested: 250, 500 1000 µg/ml. The calculated quantities of fungicides were weighed and added to the water in plastic tubs. The chemicals were properly mixed with water in tubs. The paddy straw after proper washing and draining was soaked in different aqueous fungicides solutions in tubs. The straw was kept in solutions for 5 hours. After that, straw was drained properly keeping moisture content of 60 %. The treated straw was then filled in poly bags at the rate of 1 kg dry substrate per bag. The bags were inoculated with the spawn of *Pleurotus cajor-caju* at the rate of 1 % per bag, in layers. Un-treated (no fungicide), but spawned bags were kept as control. After spawning, the mouth of the bags were closed properly and 10-15 pin holes were made all over the bags for proper aeration. All the treatments including control were replicated six times in CRBD. The bags were kept for spawn running in the dark cropping room for 10-15 days till complete colonization of compost by mushroom mycelium. The temperature (28° C max. and 25° C min.) and relative humidity (80%) was maintained in cropping room. After the mycelia had completely covered the substrate, the poly bags were cut and prepared doses of inocula of 3 ml spore suspension of *Fusarium oxysporum* @ 1×10^3 spores/ml, was inoculated in the middle of the substrate block, with the help of syringe.

Result and discussion

The results of this study were presented under the following heads :

1:1 Time taken for complete colonization/Spawn run

It was evident from the (Table 1) that there was significant difference between the influence of fungicides and their concentrations on time taken for complete spawn-run by the mycelium of *P. sajor-caju*. The average number of days required for spawn-run in *P. sajor-caju* was significantly less (16.1 days) in both Carbendazim and Captan. It was followed by Bitertanol (16.2 days).these were found statistically identical with each other. The average number of the days for spawn-run was significantly more (17.5 days) in control

1:2 Days taken for pin head formation

The data presented in (Table 2) revealed that there was statistically significant difference between the effect of fungicides and their concentrations on time taken for pin head formation by *P. sajor-caju*. Minimum time (6.9 days) was taken by treatment which received Carbendazim as fungicide followed by Captan (7.0 days) and Bitertanol (7.3 days) which were found statistically identical with each other. It was further observed that with the increase in concentration of fungicides, the number of the days for pin head formation decreased. Maximum time (7.6 days) was taken in treatments which received Bitertanol at 0.01%, (7.3 days) in Carbendazim at 0.01%, (7.3 days) in bitertanol at 0.05% concentration, which werte statistically identical. It was followed by both Carbendazim and Captan (7.0 days) at 0.05% concentration. It was followed by Captan (6.6 days) at the lowest concentration of 0.025%. it took (7.5 days) for pin head formation in control

1:3 Per cent increase in yield over control

It was evident from (Table 3) that there was a significant difference between the influence of fungicides on the effect of total yield of *P. sajor-caju*. Maximum increase in yield (37.4%) over control was recorded in treatment which received Carbendazim as fungicide followed by Captan (17.7%). Minimum increase in yield (6.6%) over control was obtained in the treatment which received Bitertanol as fungicide. It was further observed that the mushroom yield increased on increasing the concentration (0.025%, 0.05%, 0.1%) of fungicides. Maximum increase in yield (40.1%) over control was recorded in Carbendazim at a concentration of 0.1%, (37.6%) at 0.05% concentration and (34.7%) at the lowest dose of 0.025%, followed by Captan (18.0%) at 0.05%, Captan (14.4%) at 0.025%, Bitertanol (6.6%) at 0.05%, Bitertanol (10.6%) at 0.1%. Minimum increase in yield (2.6%) over control was obtained in case of Bitertanol at the lowest dose of 0.025%

1:4 Per cent disease incidence

It was evident from the (Table 4) that all the three fungicides at all the three concentrations (0.025, 0.05, 0.1%) were more or less significantly effective in reducing the incidence of *Fusarium* rot of *P. sajor-caju* as compared to the control.The minimum mean disease incidence was recorded in Carbendazim (14.8%) followed by Bitertanol (20.4%) and Captan (27.7%). The disease incidence in control was (77.7%).Furthermore, it was found with increase in concentration of fungicides, the disease incidence was reduced. Minimum disease incidence (11.1%) was recorded in Carbendazim at the concentration of 0.05 and 0.1%,followed by Bitertanol and Captan (11.1%) at the highest concentration of 0.1%. It was followed by Carbendazim (22.2%) at 0.025%, Captan (27.7%) at 0.05% and Bitertanol (27.8%) at 0.025% concentration. Maximum disease incidence (44.4%) was recorded in Captan at the lowest concentration of 0.025% .

In vivo evaluation of selected fungicides, viz., Carbendazim, Bitertanol and Captan against *Fusarium oxysporum* was carried out in mushroom house. All the fungicides reduced the time taken for complete spawn colonizatrion as compared to control. It took (16.1 days) for spawn-run in the treatments of Carbendazim and Captan. It was followed by Bitertanol (16.2 days). Time taken for pin formation was also slightly reduced as compared to control, with (6.9 days) in Carbendazim followed by Captan (7.0 days) and Bitertanol (7.3 days). It was further recorded that with the increase in concentration, the number of days for pin head formation decreased.it was observed that fungicides had a significant effect on yield as well. Carbendazim was found to be superior in expressing the maximum increase in yield (37.4%) over control, followed by Captan (17.7%). The minimum increase in yield (6.6%) over control was shown by Bitertanol. It was further recorded that with the increase in concentration, the percent increase in yield over control also increased.similarly fungicides were effective in reducing the incidence of *Fusarium* rot as compared to control. Carbendazim was the most effective antagonist exhibiting the minimum disease incidence (14.8%) followed by Bitertanol (20.4%) and Captan (27.7%). It was observed that with the increase in concentration of fungicides, the disease incidence was reduced. Kang *et al.* (2002) reported that Hexaconazole gave the best inhibition of *Fusarium pallidoroseum* found on *Agaricus bisporus* cultivated in paddy fields. Parvez *et al.* (2009) evaluated Formalin, bavistin and combination of formalin and bavistin against mycoflora of oyster mushroom substrates. The combination of formalin and bavistin (500 ml + 75 ppm) was found to be the best in inhibiting the radial growth of all the identified fungi. Chakraborty *et al.* (2013) reported that bavistin at the dose of 0.5% provided highly significant inhibition to *Fusarium oxysporum* found to have associated with the fruit beds of *P. sajor-caju* and *Lentina edodes.*

Table-1 : *In vivo* evaluation of fungicides against both *Pleurotus sajor-caju* and

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Fusarium oxysporum

Botanicals \ Conc.	Time taken for complete colonization/ spawn-run			Mean
	0.025%	**0.05%**	**0.1%**	
Carbendazim	17.3	15.6	15.6	16.1
Captan	17.3	15.6	15.6	16.1
Bitertanol	17.0	16.0	15.6	16.2
Control	17.5			

S.Em± =0.20

C.D @ 0.05%=0.86

Table-2 : ***In vivo*** **evaluation of fungicides against both** ***Pleurotus sajor-caju*** **and** ***Fusarium oxysporum***

Botanicals \ Conc.	Days taken for pin head formation			Mean
	0.025%	**0.05%**	**0.1%**	
Carbendazim	7.3	7.0	6.6	6.9
Captan	6.6	7.0	7.0	7.0
Bitertanol	7.6	7.3	7.0	7.3
Control	7.5			

S.Em± =1.99

C.D @ 0.05%=8.57

Table-3 : ***In vivo* evaluation of fungicides against both *Pleurotus sajor-caju* and *Fusarium oxysporum***

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Botanicals \ Conc.	Per cent increase in yield over control			Mean
	0.025%	**0.05%**	**0.1%**	
Carbendazim	34.7	37.6	40.1	37.4
Captan	14.4	18.0	20.9	17.7
Bitertanol	2.6	6.6	10.6	6.6
Control	255.0			

S.Em± =3.75

C.D @ 0.05%=16.16

Table-4 : ***In vivo* evaluation of fungicides against both *Pleurotus sajor-caju* and *Fusarium oxysporum***

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Botanicals \ Conc.	Per cent disease incidence			Mean
	0.025%	**0.05%**	**0.1%**	
Carbendazim	22.2	11.1	11.1	14.8
Captan	44.4	27.7	11.1	27.7
Bitertanol	27.8	22.2	11.1	20.4
Control	77.7			

S.Em± =1.66

C.D @ 0.05%=7.14

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Carbendazim

Captan

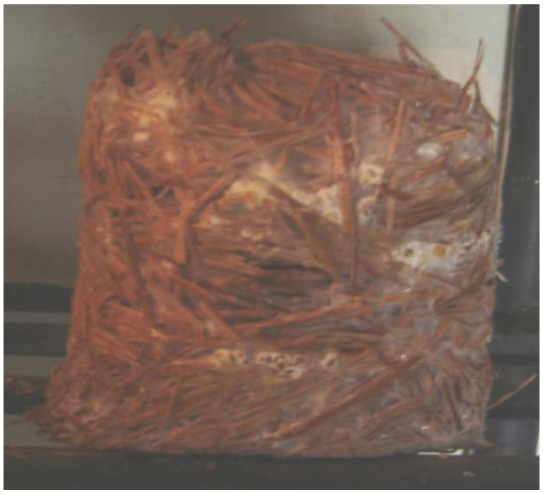
Baycor

Control

Plate-1 : **Evaluation of fungicides on time taken for complete colonization against both** ***Pleurotus sajor caju*** **and** ***Fusarium oxysporum***

Carbendazim

Captan



Baycor **Control**

Plate-2 : **Evaluation of fungicides for pin head formation against both *Pleurotus sajor caju* and *Fusarium oxysporum***

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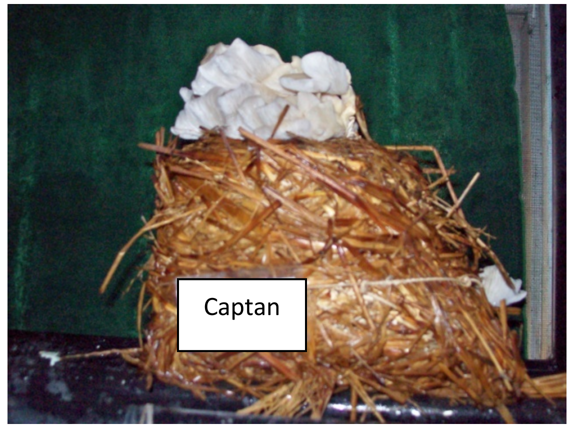

Carbendazim **Captan**

Baycor **Control**

Plate-3 : Evaluation of fungicides on total yield against both *Pleurotus sajor caju* and *Fusarium oxysporum*

Carbendazim

Captan

Baycor

Control

Plate-4 : **Evaluation of fungicides on disease incidence against both *Pleurotus sajor caju* and *Fusarium oxysporum***

REFERENCES

Chakraborty, M.R., Ojha, S., Medda, R.N. and Chatterjee, N.C. 2013. An integrated Approach towards *in vivo* control of mushroom weeds vis – a – vis yield. *J. Agr. Sci. Tech.* **15**: 819-828.

Chang, S. T. and Miles, P.G. 1982. Introduction to mushroom Science. **In** : S.T. Chang and T.H. Quimio (Eds). Tropical mush: Biological nature and Cultivation Methods. *The Chinese University Press.* 3-10.

Chang, S.T. 1999. World production of cultivated edible and medicinal mushrooms in 1997 with emphasis on *Lentinus edodes* (Berk.)

Kang, Xiaohui., He, Xinsheng., Zhang, Ling., Kang, Xh., He, Xs., Zhang, L. 2002. Studies On diseases of *Agaricus bisporus* infected by *Fusarium pallidoroseum*. *Plant protection* 28:1, 15;9.

ISSN 2229-5518

Parvez, Z., Bhuiyan, M.K.A. and Islam, M.S. 2009. *In vitro* control of associated mycoflora of oyster mushroom substrates by the application of fungicides. *Bangladesh Research Pub. J*; **2**(4): 737-741.