Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2021; 9(3): 334-336

Received: 13-03-2021
Accepted: 15-04-2021

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Role of different substract in pest incidence on oyster mushroom

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Abstract
A experiment was conducted to study the role of different substract on pest incidence in oyster mushroom. Paddy straw and wheat straw is used for cultivation of oyster mushroom. Paddy straw contains high moisture as compared to wheat straw and also *P. florida* contained high moisture than *P. sajor caju* and *P. blue*. Hence, incidence of phorid fly, sciarid fly and staphylinid beetle was observed more in treatment T6 (Paddy straw + *P. florida*) and less recorded in treatment T_1 (Wheat straw + *P. sajor caju*), hence yield of treatment T_1 is more than other treatment.

Keywords: oyster mushroom, phorid fly, sciarid fly

Introduction
In India, in spite of varied agro-climate conditions and huge agri and industrial wastes available, the growth of mushroom industry in our country is slow as compared to other mushroom growing nations. Among the several factors, occurrence of various insect pest and disease significantly affect the production and also the interest of growers in the enterprise future, it is because of large number of small and satellite growers who cultivate mushroom either on long method unpasteurized compost or on pasteurized compost under natural climatic conditions. In these farms, hygienic and sanitary measures are rarely followed. As a result, a large number of insect pests like phorids, sciarids, springtails and mites gain easy access to the cropping area. These pests take heavy toll of crop every year. The larvae of mushroom flies feed on mycelium enter into the young primordia and tunnel the well-developed mushroom.

Biological agents have been used to increase digestibility of small quality forages were reported that the biodegradation of sorghum stover using two different fungi resulted in increased crude protein (CP) and decrease in the CF breaking with the consequent result on increase in the digestibility of the substrates. The use of fungi or their enzymes that metabolize lignocelluloses is a potential biological treatment to betterment the nutritional valuation of straw by election delignification.

Mushroom is a nutritious food with high quality protein, low calory, low fat content, high K:Na ratio, valuable minerals like calcium, potassium, sodium, phosphorus and vitamins like B, C, D, and K. Mushroom also contains niacin which is ten times higher than other vegetables and contain an abundance of essential amino acids, therefore, mushroom can be a good supplementation to cereals. Besides this mushrooms are rich in copper and excellent source of selenium. Mushroom is being widely used as food and food supplements from ancient times they are increasingly being recognised as one of the important food item for the significant roles in human health nutrition and disease. Mushrooms are recognised as alternative source of good quality protein and are capable of producing the highest quantity of protein per unit area from the Agrowastes. Mushroom can substain the suffering from malnutrition to some extent because they produce large quantity in a short time and provide more protein per unit area than other crops. However, it is infested by many insect-pests such as phorid flies, scairid flies, springtails and mites. Of these scairid fly, *Bradysia tritici* (Coquillet) and phorid fly, *Megaselia sandhui* (Disney) are the serious pests of white button mushroom, *Agaricus bisporus* in Haryana. Sciarids, cecids and phorids were found to cause 17-26, 26-33 and 46% loss in yield, respectively, Therefore, the economic threshold of the Sciarid, *Lycoriella auripila* is virtual zero. Occurrences of sciarid and phorid flies vary with the prevailing temperatures under seasonal conditions.

Material and Methods

The experiment was conducted during the year 2019-2020 at All India Co-ordinated Research Project on Mushroom, College of Agriculture, Pune, Maharashtra. In all there were six treatments replicated in Complete Randomize Design.

The pure culture of *Pleurotus* species was obtained from AICRP on Mushroom, College of Agriculture, Pune. Wheat straw and paddy straw collected from the farmers field and used for bed preparation, while other required material *viz*., polythene bags, cereal grain (wheat), calcium carbonate, formalin, thread, pin, chemicals and other things were available from AICRP on Mushroom Project and Agriculture Entomology, College of Agriculture, Pune.

The mother spawn was prepared from pure culture of *Pleurotus sp.* The clean, healthy and bold sized wheat grains were taken as substrate (as shown in plate for preparation of mother spawn. These were washed and soaked in water overnight. Then these grains were boiled for 10-15 minutes; feel they become soft and the seed coat remain intact. These grains were air dried by spreading them on the floor. Thereafter, the grains were mixed with 2 per cent calcium carbonate and 2 per cent gypsum on wet weight basis. It was then filled up to half-capacity in 250 ml conical flask and plugged with non-absorbent cotton and sterilized in an autoclave at 121.6 ^{0}C for 2 hours. After cooling, the flasks were inoculated with 5 discs of 5 mm diameter cut from the pure culture of *Pleurotus sp*. and incubated at 25±1 ^{0}C for 15 days for the experiments. The fresh spawn was prepared as and when required from the mother spawn.

Sister spawn prepared using wheat grains on polythene bags @ 200 g grain per bag. These bags were inoculated with one spoonful of mother spawn under aseptic conditions and incubated at 25±1 ^{0}C for 15 days. Incubated bags were frequently examined and those exhibited contamination were soon rejected and those showing white, silky and uniform strands growth covering all the grain were used for experime

The wheat straw and paddy straw obtained from thresher were used as substrates for cultivation of *Pleurotus* sp. The straw substrate was dipped in water (already mixed with 75 ppm Bavistin and 500 ppm formaldehyde) for 16 hours. The excess water was drained by spreading the straw on the sloppy cemented floor till is reduced the moisture level upto 65 to 70 per cent. The formaldehyde was sprinkled on the floor before the spawning then mixed to the substrate by through mixing method @ 3 per cent weight basis. The mixing of spawn to the substrate was done in an open room. The spawned substrate (3 kg) was filled in polythene bags (12" x 18" of 150 gauges) and mouth of beds tied with rubber band is keep it airfree and it avoided the growth of fungus. The perforations were made with the help of nailpin to allow free passage of air within the polyethlene beds.

The total 42 number of beds were prepared by using wheat straw and 42 number of beds were prepared by using paddy straw.

In general, a unit of 1 kg dry straw was used for filling each bag. The filled beds were kept in the cropping room made of thatched materials. The high humidity in the cropping room was maintained by frequent watering of the bags. The polythene covers were removed after completion of spwan run.

The mushroom beds were hanged by nylon strings at a distance of 20 cm apart. These beds were watered thrice in a day and watering was stopped a day before harvesting and again continued. The diffused light and good ventilation was provided during the entire cropping period.

The pinhead started appearing after 5-8 days of the bag removal. The first flush of the mushroom was obtained within 5-7 days of pinhead appearance. Mature sporophores were picked up just before the edges of the pilei begin to fold or curl upwards. The sporophores were picked by slight pulling and twisting.

Two type of straw were used for bed preparations i.e. wheat straw and paddy straw. Moisture contain in wheat straw decreased quickely so in paddy straw moisture contain found more compare to wheat straw, hence occurrence of insect pest high in bed which is prepare by using paddy straw.

Results and Discussion

For this present study, paddy straw and wheat straw is used for cultivation of oyster mushroom. Paddy straw contain high moisture as compared to wheat straw and also *P.florida* contained high moisture than *P. sajor caju* and *P. blue*. Hence, incidence of phorid fly, sciarid fly and staphylinid beetle was observed more in treatment T_6 (Paddy straw + *P. florida)* and less recorded in treatment T_1 (Wheat straw + *P. sajor caju)*, hence, yield of treatment T_1 is more than other treatment.

Table 1: Effect of different substract on yield of oyster mushroom

Tr. No.	Treatment Detail	Yield of mushroom/bed (g)							
		Days after bed opening							
		7	14	21	28	35	42	49	Total yield
T_1	Wheat straw + *P. sajor caju*	64.83	111.83	138.17	162.58	153.33	140.92	94.58	866.18
T_2	Wheat straw + *P. eous*	51.75	104.42	124.58	143.17	140.75	135.25	77.67	777.56
T_3	Wheat straw + *P. florida*	51.08	106.58	122.67	154.00	138.50	136.75	77.17	786.73
T_4	Paddy straw + *P. sajor caju*	51.08	105.08	123.00	157.17	137.25	136.42	77.83	787.78
T_5	Paddy straw + *P. eous*	50.42	104.25	119.00	156.75	135.75	134.58	77.50	778.19
T_6	Paddy straw + *P. florida*	44.75	94.17	107.08	125.67	123.50	115.75	72.00	682.92
	SE ±	0.57	5.06	2.39	1.35	1.32	0.79	1.44	12.88
	C.D. @ 5%	1.71	NS	7.12	4.01	3.92	2.34	4.27	23.31
	C.V.%	2.20	9.71	3.91	1.80	1.91	1.18	3.62	24.29

Plate 1: Mushroom flower on wheat straw

Plate 2: Mushroom flower on paddy straw

Conclusions

Moisture contain in paddy straw and *P. florida* was higher compaired to wheat straw and and *P. sajor caju* and *P. blue*, hence incidence of phorid fly, sciarid fly and staphylinid beetle was more in treatment T_6 (Paddy straw + *P. florida*) than treatment T_1 (Wheat straw + *P. sajor caju*). Hence, yield of mushroom was more in treatment T_1 and less in treatment T_6.

Acknowledgements

The authors wish to thank Head and Faculty members, Department of Entomology Section, College of Agriculture, Pune for their valuable encouragement and kind assistance.

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