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INCIDENCE OF *PAPULASPORA BYSSINA* (BROWN PLASTER MOULD) ON CASING MIXTURE AND COMPOST OF WHITE BUTTON MUSHROOM (*AGARICUS BISPORUS*)

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ABSTRACT
During cultivation of white button mushroom (*Agaricus bisporus*), at Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad heavy infestation of *Papulaspora byssina* was observed on casing mixture and compost during 2012 and 2013. Therefore, an investigation was carried out to manage the brown plaster mould by modifying the casing materials used. Altogether seven treatments were taken up for this study. These treatments were replicated seven times and data collected was analyzed using CRD. *P. byssina* infected compost at very early stage after casing in the Allahabad agro-climatic conditions. The treatment combination of spent mushroom compost with sand and lime (4:1:1) showed highest incidence of *P. byssina* (83.34%) which reduced the yield (.250kg/bag) and biological efficiency (4.46%) as compared with other treatments. While the treatments farm yard manure with garden loam soil (2:1) and farm yard manure with garden loam soil and sand (2:1:1) showed lowest incidence of *P. byssina* (33.00%) which gave the better yield (.750kg/bag), (.875kg/bag) and biological efficiency (18.05%), (23.02%) respectively.

INTRODUCTION

Mushroom cultivation is a potential biotechnological process wherein the waste plant materials or negative value crop residues can be converted into valuable food. Protein conversion efficiency and productivity of mushrooms per unit land area and time is far superior than plant and animal sources. In 2007, the production of edible mushrooms in Japan was estimated to be 4, 23, 224 tones and it is expected that this amount will increase in the future due to market demand. (Shitole, 2014). Recently, mushroom cultivation in India has witnessed a tremendous growth with respect to the type of mushrooms and their productivity. Mushrooms are considerd as valuable health food since they are known for rich proteinacious food, it consists of about 75% proteins and are low in calories, fat, fatty acids, vitamins and minerals. (Sharma, 2013). The mushroom market is growing continuously mainly due to increasing interest in their culinary, nutritional and health benefits. On recognizing the importance of mushroom which can be an eco-friendly alternative for agro-waste recycling, capability to provide better nutrition for the vast vegetarian population, employment generation and a good source of income (AICRP, 2008).

Agaricus bisporus is cultivated in more than 70 countries in the world. The annual world production of button mushroom has reached 3.5 million tones and that of all types of mushrooms is estimated to be over 20 million tones. It contributes about 90 per cent of total country's production as against its global share of about 40 per cent **(Mehta *et al.*,** 2011**)**. Our country has registered twenty-fold increase in production of mushrooms in the last four decades, even though, button mushroom continues to occupy a prominent place and contributes about 85% of the total mushroom production of the country. Mushroom vegetative growth was done in compost or culture bed. In different countries, different materials are used for compost production using different organic wastes which could be useful in increasing the production. Reproductive growth and fruit body production occurred in the layer named casing layer, in which mushroom growth and yield were increased. (Ebadi, 2012). . Many pathogens and pests affect this monoculture. The most important pathogens of *A. bisporus* are green moulds (*Trichoderma* sp.), *Papulaspora byssina*, *Coprinus* sp., *Rhizoctonia* sp., *Lecanicillium fungicola* etc. The number and composition of microorganisms which accompany mushroom cultivation depends on the healthiness of the compost, casing and *A. bisporus* spawns. (Amra *et al*., 2008). *Papulaspora byssina* (Brown Plaster mould) is also reported to cause 90-92% yield loss in *A. bisporus*. This mould has also been reported to cause complete crop failure in oyster mushroom in Kasuali, HP (Anonymous, 2012). The aim of this study was selection of suitable casing materials using different agricultural wastes which can inhibit the enhanced growth and incidence of *P. byssina*

MATERIALS AND METHODS

The experimental trial was conducted at Mushroom Crop Room in Department of Plant Protection, SHIATS, Allahabad with seven treatment combinations *viz*. Farm Yard Manure (FYM) + Garden loam soil (GLS) (2:1), FYM + GLS+ Sand (2:1:1), FYM + GLS + Sawdust (2:1:1), FYM+ Sawdust+

Sand (2:1:1), FYM + GLS + Waste Tea Leaves (2:1:1), FYM + GLS + Vermi-compost (2:1:1) and Spent Mushroom Compost (SMC) + Sand + Lime (4:1:1). These treatments were replicated seven times and data collected was analyzed using CRD. The maximum temperature and relative humidity during October 2012 to February 2013 were 38.2ºC and 97%, respectively while the minimum temperature and relative humidity during this period were 6.2ºC and 32%, respectively. Compost was prepared by long method of composting using wheat straw (Mantel *et al*., 1972).

RESULTS AND DISCUSSION

During the cultivation of white button mushroom, after 15-17 days of casing some light orange coloured patches appeared on casing soil. After 2-3 days the diameter and frequency of patches increased and spread to compost. In the later stage of infection orange colour liquid was observed (Fig. 1). After 28-30 days of infection, the incidence of *Papulaspora byssina* was recorded in the range of 34-84% (Table 1). Isolation of fungus was carried out on Potato Dextrose Agar (PDA) medium and petri plates were incubated for 2-3 days at 25^{0}C and a pure culture of fungus was obtained (Fig. 2). Microscopic observation showed the presence of orangish brown mycelium which produced brown coloured many celled spherical, bulbils which were interwoven with network of hyphae, were set free later with the death of the mycelium (Fig. 3). Maximum average yield and biological efficiency (%) (0.875 kg/bag and 23.02, respectively) were recorded from treatment combination of FYM with GLS and sand (2:1:1) (Table 1) and highest incidence of *P. byssina* (83.34%) was recorded from treatment combination of SMC with sand and lime (4:1:1) (Table 1). This disease has also been reported from India (Munjal and Seth, 1974) causing 90-92% yield loss in *A. bisporus*. The treatment combination of spent mushroom compost with sand and lime (4:1:1) also reduced the yield (.250kg/bag) and biological efficiency (4.46%) as compared with other treatments. Loss in number and weight of fruit bodies as a result of artificial inoculation of the mould has been found 7.7-53.5% and 3.0-50.7% respectively (Sharma, 1990; Sharma and Vijay, 1993). Comparing the results with C.D value, it was found that FYM+ GLS+ Sand (2:1:1) was significantly superior over all treatments.

The probable reason for such finding may be that the primary inoculum of pathogen already existed in the SMC as it was earlier used as casing mixture. The combination of lime and SMC provided appropriate atmospheric conditions for development of pathogen. Carbon di oxide is released by $CaCO_3$ may have favoured the growth of *P. byssina*. Perusal of available literature revealed that incidence of *Papulaspora byssina* on the compost of button mushroom was reported from Ludhiana and Pantnagar (AICRP, 2005-06) and on the substrate of milky mushroom from Allahabad (Uttar Pradesh) (Kumar *et al.,* 2013). This fungus now is frequently found at almost all the mushroom farms in India appearing usually during spawn run (Garcha *et al*., 1987; Kaul *et al*., 1978; Sharma, 1992).

Figure 1: *Papulaspora byssina* on compost of *Agaricus bisporus*

Figure 2: Pure culture of *Papulaspora byssina*

Table 1: Effect of casing materials on the yield and biological efficiency of *A. bisporus* and incidence of *P. byssina* on compost of *A. bisporus*

Treatments	Incidence of*P.byssina** (%)	Yield*(Kg/bag**)	BiologicalEfficiency (%)
Farm Yard Manure (FYM) + Garden loam soil (GLS) (2:1)	33.00	0.750	18.05
FYM+ GLS+ Sand (2:1:1)	33.00	0.875	23.02
FYM+ GLS+ Sawdust (2:1:1)	50.00	0.694	16.50
FYM+ Sawdust+ Sand (2:1:1)	50.00	0.684	16.26
FYM+ GLS+ Waste Tea Leaves (2:1:1)	50.00	0.608	12.16
FYM+ GLS+ Vermi-compost (2:1:1)	66.67	0.4775	8.48
Spent Mushroom Compost (SMC)+ Sand+ Lime (4:1:1)	83.34	0.250	4.46
CD(5%)			0.181

*Average of 7 replications, **Bag- 7 kg compost

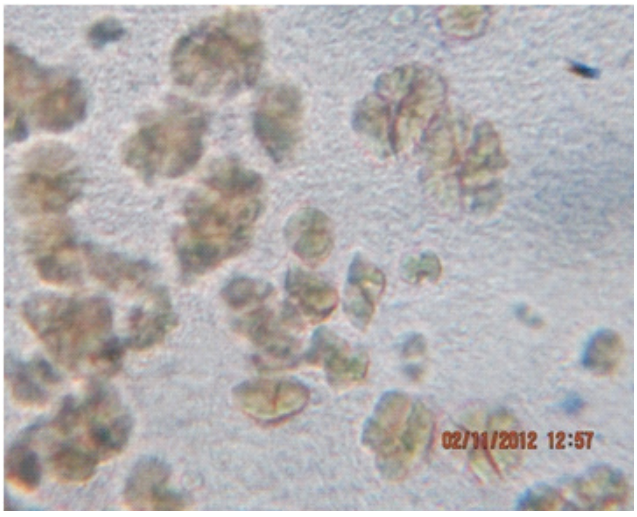

Figure 3: Microscopical examination of bulbils body of *Papulaspora byssina* (40x)

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CONTENTS