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Study on effect of culture medium and growth conditions on Liquid Spawn king oyster mushroom(*Pleurotus eryngii*)

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ABSTRACT: Use of mushroom liquid spawn is one of the ways to reduce costs for the production and automation of mushroom industrial. Kind of culture medium and mycelium growth condition are the most important factors in the mycelium biomass production in liquid culture medium. In this study, the effect of three culture medium (1. Sabouraud's dextrose without agar (SDB) with cycloheximide and chloramphenicol, 2. Czapek's without agar and 3. Brain-heart infusion (BHI) without agar) and three growth conditions (1. Constant condition without shaking, 2. Continuous shaking at 250rpm and 3. 60min in shaking at 250rpm and 23h in constant condition without shaking) were evaluated on the average mycelium dry weight of king oyster mushroom (*Pleurotus eryngii*). Among all treatments, Czapek's without agar medium culture in shaking for 60min at 250rpm and 23h in constant condition without shaking had a significant difference ($P<0.05$) compared against other treatments.

***Keywords*:** liquid spawn, king oyster mushroom, mycelium dry weight and growth condition

INTRODUCTION

Mycelium cultured on liquid medium followed by maceration/homogenizing can also be used for spawning. This is commonly referred as liquid spawn. It can be used for mechanizing inoculation process of spawn multiplication or can be used for inoculating substrates. The adaptation of liquid culture technology to the production of mycelia of higher fungi offers the possibility of industrial scale application to this group of organisms (Humfeld 1948). Such applications extend to the mushroom spawn industry where the production process is currently based on the solid state fermentation of cereal grain. This type of technology has been examined using *Lentinula edodes* on a synthetic sawdust substrate (Kawai *et al.* 1995). Advantages of adapting the liquid culture technology to the spawn production process include: (1) an increase in the level of process control (growth rates and nutritional content), (2) a reduction in the duration of the production cycle time, (3) increased automation in the spawn plant, (4) inoculation of the substrate under more stringent aseptic conditions, (5) more uniform distribution of the inoculum in the substrate (Eyal 1991). A criterion for the production of liquid culture for use in the spawn production process is that it should rapidly and reliably inoculate the given substrate (Leatham & Griffin 1984). To do this it should have a high density of viable inoculum particles. In other words, the culture should be homogeneous and consist of unpelleted mycelia (Itavaara 1993). The purpose of this study was to determine the effect of cultural types in liquid culture on the mycelial morphology of the mushroom strain *Pleurotus eryngii*.

MATERIALS AND METHODS

Fungal strain and culture conditions

Pleurotus eryngii (KS 04) was stored on malt extract/agar slopes at 4 °C and was transferred every 4 months. Cultures were grown on malt extract/agar plates at 25 °C for 14 d.

Liquid culture studies

Completely grown mycelium was used in 6 cm plates to produce liquid spawn. To find the best growth conditions, three culture media (1. Sabouraud's dextrose without agar (SDB) with cycloheximide and chloramphenicol, 2. Czapek's without agar and 3. Brain-heart infusion (BHI) without agar) in three Cultivation conditions (1. Constant condition without shaking, 2. Continuous shaking at 250rpm and 3. 60min in shaking at 250rpm and 23h in constant condition without shaking). Mycelia dry weights were determined by filtration through pre-weighed Whatman No. 1 filter papers (7.0 cm). Filter papers were oven dried at 100 °C to a constant weight for mycelial dry weight determination.

Homogenization of liquid cultures

P. eryngii liquid cultures that grown in different liquid culture medium were hemogenized by a moulinex homogenizer. All of the cultures homogenized for 15 to 20s.

Statistical analysis

Experiments were carried out in triplicate and the mean results are presented. Comparison between means was carried out using a *t*-test or analysis of variance (ANOVA) as appropriate. All statistical analysis was carried out using the statistical package in Excel 5.0.

RESULTS AND DISCUSSION

Comparison of the average mycelium dry weight (Table 1) between culture media showed that Czapek's without agar medium had a dry weight of mycelium more than other liquid culture media. Therefore, the production of mycelium in this medium for use as liquid spawn was higher. Also, Third conditions of culture (60min in shaking at 250rpm and 23h in constant condition without shaking) in experimental treatments in different culture media had the greatest effect on the average dry weight of mycelium. Mycelia or liquid spawn produced by submerged fermentation is as alternative method for generating spawn as it produces higher yield (Stamets,2000).

The most common methods for the disruption of fungal cultures are homogenization with sterile glass beads (Vasdev & Kuhad 1994) and disruption in a sterile Warring blender (Savage & Vander Brook 1946).

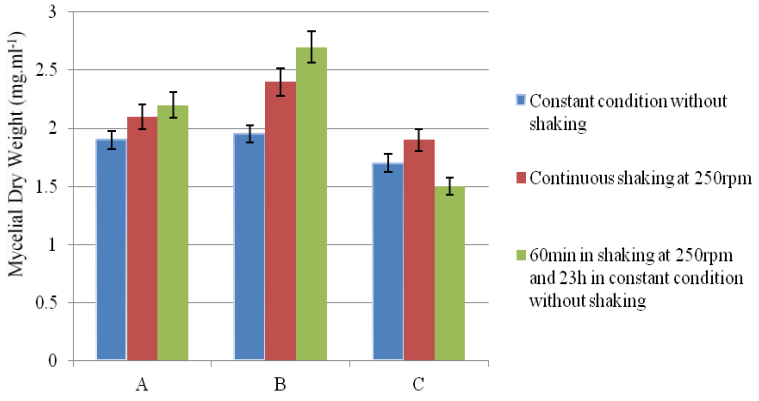

Table 1. Effect of Media culture (A. Sabouraud's dextrose without agar (SDB) with cycloheximide and chloramphenicol, B. Czapek's without agar and C. Brain-heart infusion (BHI) without agar)) and Cultivation conditions on *P. eryngii* growth.

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REFERENCES

Humfeld H (1948) The production of mushroom mycelium (*Agaricus campestris*) in submerged culture. *Science* **107**: 373.

Kawai G, Kobayashi H, Fukushima Y, Ohsaki K (1995) Effect of liquid mycelial culture used as a spawn on sawdust cultivation of shiitake (*Lentinula edodes*). *Mycoscience* **37**: 201–207.

Eyal J (1991) Mushroom mycelium grown in submerged culture– Potential food applications. In: Goldberg I, Williams R, eds. *Biotechnology and Food Ingredients*. New York: Van Nostrand Reinhold, pp. 31–64.

Leatham GF, Griffin TJ (1984) Adapting liquid spawn *Lentinus edodes* to oak wood. *Appl. Microbiol. Biotechnol.* **20**: 360–363.

Itavaara M (1993) Problems associated with the liquid cultivation of shiitake *Lentinula edodes* (Berk.) Pegler. VTT Publications (Technical Research Centre of Finland) **150**: 11–62.

Stamets, P., 2000. Growing Gourment and Medicinal Mushrooms, fourth ed. Ten Speed Press, Toronto.

Vasdev K, Kuhad RC (1994) Induction of laccase production in *Cyathus bulleri* under shaking and static culture conditions. *Folia Microbiol.* **39**: 326–330.