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Determination of culture process for obtaining basidiocarp of *Pleurotus eryngii* (DC. ex Fr.) Quel. var. *ferulae* Lanzi : A speciality mushroom

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ABSTRACT

The present study is to investigate the obtained basidiocarp and culture process of *P. eryngii* var. *ferulae* grown naturally in Elazığ region of Turkey. The pure mycelium cultures of *P. eryngii* var. *ferulae* was maintained on malt-extract agar. Wheat grain was used in the production of spawn. Wheat straw was used as substrate for the cultivation. The spawn growing period was 15 days, the first and second primordium formation period was 111 and 146 days, respectively. The first harvest period was 126 days, and the second was 161 days. In the first harvest; yield per 100 g of material (70% moisture) was 24.8 g and the second harvest yield was 7 g (g 100 g^{-1}). Based on the results, *P. eryngii* var. *ferulae* was succesfully cultivated.

Keywords: Basidiocarp, culture process, *P. eryngii* var. *ferulae*, yield.

INTRODUCTION

Naturally growing Basidiomycetes have great use in human societies as sources of food from the old age. It is generally recommended that as diet food because fungi have high level of protein and low levels of fat (Manzi *et al.*, 7). More than 2000 species of mushrooms exist in nature, but only approximately 22 species are intensively cultivated (Manzi *et al.*, 6). In most countries, there is a well-established consumer acceptance for cultivated mushrooms such as *Agaricus bisporus*, *Pleurotus* spp., *Lentinus edodes*, *Volvariella volvacea* and *Auricularia* spp. (Diez and Alvarez, 4).

Pleurotus eryngii (DC. ex Fr.) Quel. species-complex comprises Basidiomycetes, which are defined as different taxa based on the host plant and respective residues colonised in natural stands and found on *Eryngium campestre* (or *Eryngium* spp.) whose distribition extends from France, Spain, Western China and Mediterranean islands (Zervakis and Balis, 11; Venturella *et al.*, 9). *P. eryngii* var. *ferulae* is found essentially on root residues of *Ferulae communis* (or *Ferulae* spp.) (Zervakis and Balis, 11; Lewinsohn *et al.*, 5).

Fruit bodies of *P. eryngii* var. *ferulae*, some of which are hemisphere, are flat, *i.e.* its pilei is at one side of its stipe. The mushroom is white and the surfaces of its pilei have sandy beige stripes. Its flesh is white and most pilei of wild mushrooms are chapping. Thus, the pilei have formed crude squama. The gills, some of which could reach the middle and below part of the stipes. The shape of wild mushroom is smaller than that of manual work planting mushroom. Commonly, the fresh weight of the former is 20-25 g. The diameter of the latter is 6-12, cm while its pileus is 2-4 cm thick. The length of the latter stipe may reach 48 cm while its thickness is 2-5 cm and the latter stipe is solid, mesial or agnate, upside thick and underside thin. *P. eryngii* var. *ferulae* is not known worldwide as it is grown only in some parts of the world, unlike the other species. The culture of *P. eryngii* var. *ferulae* is not done or taken in culture as little absent. It is rather slow in growth, vulnerable to fungal attacks and basidiocarp requires a long time to develop. The purpose of the present study is to investigate the possibility of the cultivation of *P. eryngii* var. *ferulae* grown naturally Elazığ, Turkey.

MATERIALS AND METHODS

The mycelium used in this study were obtained from previous culture work (Akyuz and Kisrbağ, 8). The pure mycelium culture of *P. eryngii* var. *ferulae* was derived from *in vitro* tissue culture, and the culture was maintained on 2.0% malt-extract agar (MEA) at 4°C (Akyuz and Kisrbağ, 1). In this study, sub culturing were done at after every 25-30 days at 25°C in the dark (Fig. 1). The pure mycelium is cultivated by tissue culture it requires special treatment if it is to be stored for more than one month to keep the mycelium for the further studies. In aseptic conditions, propagation of spawn were obtained from extracting pure mycelium

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and preserved as a stock culture (Akyuz and Kisrba ğ, 1). In this study, wheat grain were used for multiplication of pure culture of *P. eryngii* var. *ferulae*. The flask containing grains were inoculated with pure culture of mushroom and incubated at 25 °C for average two weeks (Fig. 1).

For the formation of basidiocarp, wheat straw was used as culture medium. One kilogram of material was placed in plastic buckets and kept for 48 h until compost reached a humidity of 70-75%. The compost was emptied into plastic bowls. To obtain the desired pH values (5.5-6.5), 35 g of lime and gypsum were added to 1 kg compost (Zadrazil, 10; Akyuz and Yildiz, 2). Compost medium was mixed manually, after which, 500 g of compost was placed in a 2-l glass jar, closed and sterilized in an autoclave at 121 °C for 30 min. After cooling, compost medium in the jar was inoculated with 10% spawn per 1 kg of dried material and incubated at 25 °C in the dark for 2 weeks. The jar was opened and the colonized substrate was covered with a 2 cm layer of cooled soil (peat soil). Incubation was performed in a room at 13-15 °C. One air cooler was used 4-5 h daily for aeration to avoid the accumulation of CO_2. In order to maintain a homogenous condition in the incubation room, a ventilator was used 5 h a day. The culture room was provided with light from fluorescent bulbs with an intensity of 200 lux for 12 h a day (Delmas and Mamoun, 3). The culture room was constantly wet to maintain the required relative humidity (75-90%). The culture was irrigated by spraying water once or twice a day.

RESULTS AND DISCUSSION

In this study, the culture was obtained using petri dishes for mycelial growth and glass jar for the fruit body formation (Fig. 1). Mycelium and spawn of *P. eryngii* var. *ferulae*, one of the biological variety in Turkey which was obtained from wild basidiocarp in the laboratory and reserved as a stock culture, but further studies are needed to get basidiocarp of this mushroom (Akyuz and Kirba ğ , 1). In this study, sub - culturing were done after every 25-30 days at 25°C in the dark and grains of wheat were used for multiplication of pure culture of *P. eryngii* var. *ferulae* (Fig. 1). In our previous studies (Akyuz and Yildiz, 2), we tested the suitability for the culture of *P. eryngii* var. *eryngii* (obtained from Hacettepe-Ankara, Turkey) and *P. eryngii* var. *ferulae* (collected from Mazgirt-Tunceli, Turkey) and found that the mycelium growing period was an average of 10 and 23 days on MEA medium, respectively. There were differences in the mycelium growing period for *P. eryngii* var. *ferulae* on MEA medium (Fig. 1).

The flask containing grain were inoculated with pure culture of mushroom and incubated at 25 °C for average two weeks (Fig. 1). In our previous studies, the propagation of spawn was 15 days on wheat and barley grain for *P. eryngii* var. *eryngii* (obtained from Hacettepe-Ankara, Turkey) (Akyuz and Yildiz, 12), and *P. eryngii* var. *ferulae* (collected from Mazgirt-Tunceli, Bingöl and Elaz ğ , Turkey) (Akyuz and Kirba ğ , 1; Akyuz and Yildiz, 12). There were, however, no significant differences in the spawn period for *P. eryngii* var. *ferulae* (Fig. 1).

In compost medium, the spawn run period was 15 days, the first and second primordium formation period was 111 and 146 days, respectively. The first harvest period was 126 days, and the second was 161 days (Fig. 1). In the first harvest; yield per 100 g of material (70% moisture) was 24.8 g and the second yield was 7 g (g 100 g^{-1}). In conclusion, fruit body of *P. eryngii*

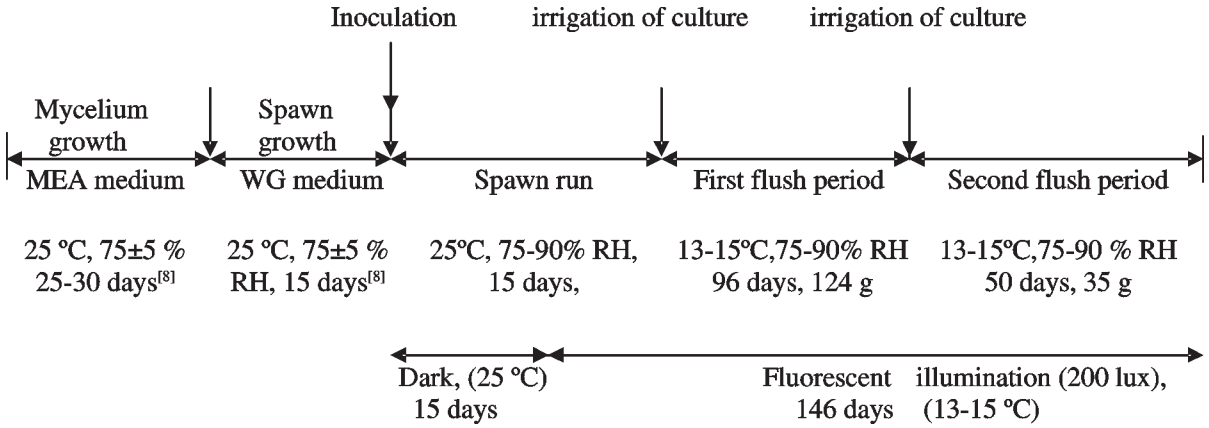

Fig. 1. Culture process of *P. eryngii* var. *ferulae* on malt extract agar, wheat grain and wheat straw substrate (MEA: malt extract agar, WG: wheat grain).

Fig. 2. Fruit bodies of *P. eryngii* var. *ferulae* on wheat straw medium

var. *ferulae* is obtained on the material used (Fig. 2). In our previous study (Akyuz and Yildiz, 2), for *P. eryngii* var. *ferulae* (collected from Mazgirt-Tunceli, Turkey), there was no basidiocarp formation on any trial after mycelium growth on the compost even after 108 days of culture. Basidiocarp of *P. eryngii* var. *ferulae* was not obtained on the material used in our previous study. Therefore, we think that we need to carry out further studies to get basidiocarp of this mushroom (Akyuz and Yildiz, 2), and also, in different compost medium, mycelium growing period was 8-17 days, primordium formation period was 36-95 days, the harvest period was 48-108 days and yield was 2-28 g 100 g^{-1} for *P. eryngii* var. *eryngii*, respectively (Akyuz and Yildiz, 2). When compared with *P. eryngii* var. *eryngii* (Akyuz and Yildiz, 2; Ohga, 8), mycelium growing days, primordium formation period, yield, morphological feature were significant found to be changeable as seen in Fig. 1-2.

In conclusion, basidiocarp of *P. eryngii* var. *ferulae* was obtained on the material used in study (Fig. 2). It is determined that basidiocarp requires a long time to develop, and the optimal temperature range for fruitbody development relatively low (13-15 °C), However, more research needs to be done to obtain regular and homogeneous supply of this mushroom.

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