

**DETERMINATION OF SORGHUM GRAINS FOR SPAWN
GROWTH OF OYSTER MUSHROOM, *PLEUROTUS OSTREATUS*
(JACQ. EX. FR) KUMMER**

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Abstract

Two different varieties of sorghum viz., white turio and red janpuri (having red and white color of grains) were tested for better and early spawn growth of oyster mushroom, *Pleurotus ostreatus* (Jacq. ex. Fr.) Kummer. The spawn growth on red janpuri (red sorghum) grains was significantly higher (38.58 mm) followed by red janpuri and white turio (red and white sorghum) grains used at 1:1 ratio (33.41 mm) and white turio (white sorghum) grains (31.50 mm).

Introduction

The mushroom is a form of plant life without leaves, buds, flowers, and is recognized as fleshy macro-fungi, a group of achlorophyllous organisms. These are sometimes tough and umbrella like sporophore (fruiting body) with spores, naturally grown in fields, forests, on manure heaps, water channels and hilly areas, mostly during and just after rains. Since earliest time, the mushrooms have been treated as special kinds of food. The most popular types of mushrooms are *Agaricus bisporus* (European or white button mushroom), *Pleurotus* spp. (Oyster mushrooms or dhingri), *Volvariella volvacea* (Chinese or paddy straw mushroom), *Lentinus edodes* (Shiitake mushrooms) and *Auricus laria* (Black ear mushroom). According to Bhatti *et al.*, (1987), the oyster mushroom (*P. ostreatus*) is a fleshy, wood inhibiting gilled fungus growing wild in Azad Kashmir and Northern hilly areas of Pakistan. It is the most common amongst the cultivated species. It has been established a new commercial mushroom and easy techniques applicable to rural sector are being developed. This mushroom also has importance owing not only to ease of cultivation but also for its wider ecological distribution. It is now cultivated on commercial scale in many European and Asian countries, using different agricultural and industrial wastes such as wheat straw, corncobs, saw dust, banana leaves and cotton waste.

The chemical composition of the fresh fruiting bodies of oyster mushroom indicates a large quantity of moisture (90.8%), whereas fresh as well as dry oyster mushrooms are rich in proteins (30.4%), fat (2.2%), carbohydrates (57.6%), fiber (8.7%) and ash (9.8%) with 345 K (cal) energy value on 100 g dry weight basis; while vitamins such as thiamin (4.8 mg), riboflavin (4.7 mg) and niacin (108.7 mg), minerals like; calcium (98 mg), phosphorus (476 mg), ferrous (8.5 mg) and sodium (61 mg) on 100 g dry weight basis, are also found present (Pandey & Ghosh, 1996). Rambelli & Menini (1985) reported that this mushroom is reputed to be antitumoural because of its chemical composition.

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Mostly grain spawn is used for cultivation of oyster mushroom. Moorthy & Mohanan (1991) have grown stock spawn on sorghum grains. Mansur *et al.*, (1992) reported that the different spawn substrates showed the order: wheat seeds better than millet seeds better than ground maize cobs. Cangy & Peerally (1995) reported that 10 different species of *Pleurotus* exhibited maximum growth rate (14-15 mm/day) at 25-30°. Marimuthu (1995) reviewed the use of crop residues as growing media for oyster mushroom (*Pleurotus*) production in Tamil Nadu and stated that *Pleurotus* has high potential because of its low-cost production technology, the possibility for direct use of agro-wastes and the suitability of the climate. Spawn base with high N is not recommended, and whole grains of sorghum, bajra (*Pennisetum glaucum*) or maize are recommended. Mathew *et al.*, (1996) evaluated the yield performance of *P. sajor-caju*, *P. citrinopileatus*, *P. florida*, *P. platypus*, and *P. ostreatus* on various substrates, both for spawn production and cultivation. Sorghum, wheat and paddy grains were equally good for spawn production. Fan *et al.*, (2000), recorded 9.68 mm/day mycelial growth and 43.4 mg/plate in 9 days at 24°C biomass production of *Pleurotus ostreatus*. Hafeez *et al.*, (2000) reported that spawn production on sorghum grains was significantly higher than pearl millet, maize and wheat grains. Among these four kinds of the grains, *Pleurotus florida* on sorghum grains (30.83 mm) while the less growth was observed on wheat (17.08 mm) and the second best growth was on pearl millet (36.25 mm) followed by maize grain (26.58 mm). Jiskani *et al.*, (2000) conducted experiments on the effect of different temperatures and grain media on spawn growth of oyster mushroom, *Pleurotus florida* and reported that the optimum temperature for best growth of spawn was 30°C and sorghum grains were found to be best medium for spawn growth followed by maize, wheat and pearl millet grain respectively.

No work has been reported on the effect of different varieties of sorghum, having red and white color of grains, on better and early spawn growth of oyster mushroom, *Pleurotus ostreatus* (Jacq. ex. Fr.) Kummer. Therefore, the present studies were undertaken with a target to find out best variety of sorghum grains for preparation of early and best spawn.

Materials and Methods

The experiment was carried out at the Department of Plant Pathology, Faculty of Crop Protection, Sindh Agriculture University, Tandojam during July 2001. The primary inoculum was prepared from the fresh fruiting body of the mushroom through tissue culture method. For the purpose, potato dextrose agar (PDA) medium was prepared by standard method and formula. The prepared medium was sterilized in an autoclave at 15psi for 20 minutes. About 20 ml of medium was poured aseptically in a clean and sterilized Petri dishes. The inoculation was made on the following day, by cutting small pieces of the mushroom tissues, with a sterile blade under aseptic conditions. Three pieces were plated in each Petri dish. The inoculated dishes were incubated at 28±2°C for 10 days.

The pure culture was prepared, maintained and multiplied by transferring small quantity of the mycelium grown on PDA through mushroom tissues, on sterilized PDA medium in Petri dishes and test tubes and were incubated at room temperature (30±2°C).

The grains of two different varieties of sorghum viz., white turio and red janpuri having red and white color of grains were used separately and by mixing at 1:1 ratio, to study their effect on spawn preparation of oyster mushroom, *Pleurotus ostreatus*. Initially, the grains were half-boiled after which thirty (30) grams of each i.e., white turio (white sorghum) grains alone, red janpuri (red sorghum) grains alone and red janpuri and white turio (red and white sorghum) grains at 1:1 ratio were kept as medium, with three replication per treatment in Petri dishes. These Petri dishes (containing grains) were sterilized in an autoclave at 15 psi for 30 minutes. The inoculation was made on the following day under aseptic conditions provided in isolation chamber. Three mm disk of pure culture prepared by cutting with cork borer was inoculated at the center of each Petri plate. All the inoculated dishes were incubated at room temperature ($30\pm 2^{\circ}\text{C}$). The radial mycelial growth was recorded after every 24 hours, till one of the Petri plate become full with growth.

Results and discussion

Two different varieties of sorghum viz., white turio and red janpuri (having red and white color of grains) were used separately and in combination with 1:1 ratio, for determining the best sorghum grains for spawn growth of oyster mushroom, *Pleurotus ostreatus*. The spawn growth on red janpuri (red sorghum) grains was significantly higher (38.58 mm) followed by red janpuri and white turio (red and white sorghum) grains used at 1:1 ratio (33.41 mm) and white turio (white sorghum) grains (31.50 mm) respectively, after 192 hours (Table 1). Our results are in conformity with other researchers. Solangi (1988) determined that among four different types of grains tested for spawn preparation of *Pleurotus ostreatus*, sorghum grains were the best followed by maize, wheat and pearl millet grains. Lozano (1990), Moorthy & Mohanan (1991), Mansur *et al.*, (1992), Marimuthu (1995), Mathew *et al.*, (1996), Hafeez *et al.*, and Jiskani *et al.*, (2000) also grown spawn on sorghum grains and reported near about similar results.

Table 1. Effect of different sorghum grains on spawn preparation of oyster mushroom, *Pleurotus ostreatus* measured as linear growth (mm).

Interval (Hours)	White turio (white sorghum) grains	Red janpuri (red sorghum) grains	Red + white (red janpuri and white turio) sorghum grains
24	2.25 o	2.58 o	2.41 o
48	5.08 n	5.58 n	5.25 n
72	8.08 m	9.41 l	8.33 m
96	12.91 k	15.41 j	13.33 k
120	17.00 i	21.33 g	18.75 h
144	21.25 g	27.41 d	23.16 f
168	25.92 e	33.41 b	27.16 d
192	31.50 c	38.58 a	33.41 b

Similar letters do not differ from one another at LSD $p < 0.05 = 0.8350$

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