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Preliminary Studies on the Cultivation of the European  
Mushroom *Agaricus bisporus* (Lange) Sing.  
in Tamil Nadu

Among the edible mushrooms, extensively cultivated are the paddy straw mushroom, *Volvariella* in the tropics and the cultivated white mushroom, *Agaricus bisporus* (Lange) Sing. in the temperate regions (Singer, 1961). *Volvariella diplasia* (Berk & Br.) Sacc. has been successfully cultivated at Coimbatore during the past two decades (Thomas *et al.* 1943, Ramakrishnan *et al.* 1968). In India Sohi *et al.* (1965) have reported some work on the cultivation of *A. bisporus* at Simla. Results of attempts to cultivate this mushroom in Tamil Nadu are reported here.

Trials were conducted at Coimbatore during 1964 winter and at Ootacamund and Kodaikanal during Summer 1966, with the spawn received from Simla. Ordinary rural compost was found unsuitable. Spawn could not also be produced on rice straw. During November 1966 - January 1967 three trials were laid out at the Mycology Laboratory of this Institute, at Ootacamund and at the Bryant Park, Kodaikanal. The spawn was prepared with a pure culture of *A. bisporus* (Syn. *Psalliota hortensis* (A1 strain) obtained from Simla on special compost, which was prepared modifying the formula by Dr. E. F. K. Mantel, F.A.O. Mushroom Expert.

The compost was prepared as a heap on a cement floor in a covered room with the following ingredients: Paddy straw 300 kg, rice bran 50 kg,  $(\text{NH}_4)_2\text{SO}_4$  9 kg, urea 4 kg, superphosphate 9 kg, calcium carbonate 10 kg, and gypsum 15 kg. The straw was cut into small pieces of 15-20 cm in length in a chaff cutter. Water was sprinkled with a rose-can just to moisten the straw pieces. Fertilisers and rice bran were mixed with a little straw so as to form a homogeneous mixture. The straw was laid in a layer of 15-20 cm in height on the floor in an area of 1.30  $\times$  1.30 metres and a portion of the fertilizer straw mixture was sprinkled over the straw. Then another layer of straw was built over the first and the fertilizer sprinkled. In this manner the layers were built up one over the other till the heap was 1.50 metres in height. It was pressed and compacted on all sides. After six days, the heap was turned a number of times, sprinkling a little water to maintain the moisture. Calcium carbonate

was added to the straw and then it was piled up, compacting the heap on all sides. On the 10th day another turning was given sprinkling a little water. The third turning was given on the 13th day and gypsum was added during this turning. Subsequently three more turnings and heaping up were done on 16th, 19th and 22nd day. The manure was ready for use after four weeks. It was shaken up and air dried. Every time before use the compost was pasteurised in a hot air oven maintained at 58°C for 8 hours.

The spawn was prepared in half litre capacity glass bottles in which 300 g of Cumbu (*Pennisetum typhoides*) grains were taken, as cumbu grains are cheap and they usually do not form lumps on autoclaving. A quantity of 100 ml of water was added just to moisten them and then the grains were mixed with 5 g of calcium carbonate per bottle as to form a coating on the grains. They were then filled in the bottles and autoclaved at 20 lb pressure for one hour. The grain in the bottles were inoculated with the 7 days old culture of the fungus grown on oat meal agar. Incubation was done at room temperature (25°-28°C) for 4 weeks and then the spawn was used for spawning the trays.

The compost was taken in wooden trays of dimensions 45×30×20 cm and filled up to a height of 16 cm. The spawn was broadcast so as to form a single grain layer on the surface of the compost in the boxes and then was stirred and then levelled with the hand. A news paper was spread over the compost sprinkled with water till it became wet. Sprinkling of water was done daily morning and evening and whenever the paper became dry. The trays were left in verandah which were partially opened on one side.

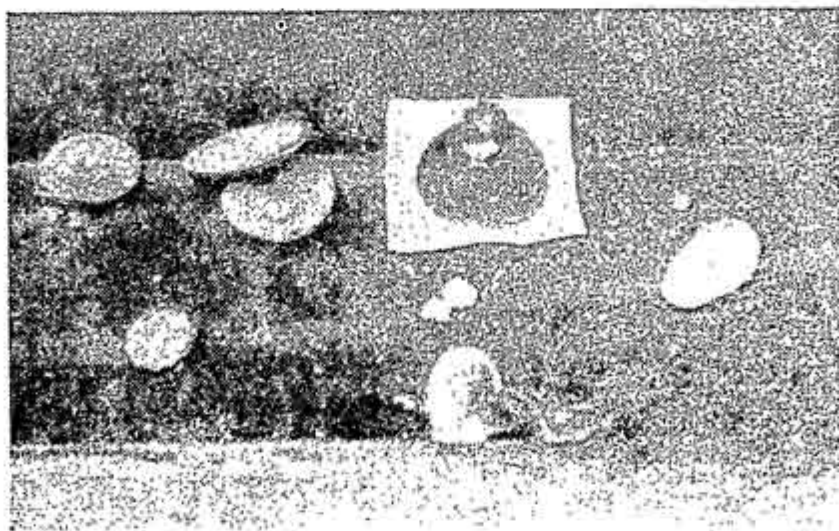


PLATE 1. European mushroom *Agaricus bisporus* (Lange) Sing. on special compost.

Casing was done three to four weeks after spawning with special casing mixture. The casing mixture consisted of 1 part of powdered clay, 1 part of sand and 1 part of saw dust. This mixture was pasteurized for 24 hours in a hot air oven at 65°C. After pasteurization, it was air dried and then applied to

the surface of the compost in the trays to a depth of 2.5 cm. Prior to and after casing, the trays were sparingly watered with a rose can.

Pin heads were observed 10-15 days after casing which developed into buttons of 3 to 5 cm diameter after 15-20 days. Since this was the first observation, the mushrooms were allowed to develop till their pileus completely opened out (Plate 1) though for marketing purposes mushrooms are harvested before they begin to open. The weight of ripe fully opened mushrooms were taken and recorded. The particulars of yield obtained are presented in a Table.

TABLE. Yield of Mushroom

Location	Temperature Range °C				Date of			No. of mush-rooms in two trays of 2700 sq. cm area	Wt. in g of mushroom in two trays of 2700 sq. cm area	Yield (g) per sq. ft.
	Spawning to casing		Casing to harvest		spawning	casing	picking			
	Max.	Min.	Max.	Min.						
Coimbatore	32-27	22-11	32-28	23-15	23-11-66	23-12-66	31-1-67	4	150	50
Ootacamund	22-15	11-4	25-16	11-2	3-11-66	2-12-66	5-1-67	2	104	35
Kodaikanal	20-15.5	15.5-13	21-14	14-11	8-11-66	6-12-66	12-1-67	18	700	233

By usingumbu grain spawn on special compost, it was possible to raise a crop though the yield was low. With the same strain of *Agaricus bisporus*, (*Psalliota hortensis*) (A1) Sohi *et al.*, (1965) have reported an yield of 586 g per sq. ft but this was picked before the veil broke out. In this trial, the picking was done after the mushrooms have completely opened out into umbrella shaped structures and as such there is loss of weight. Even under this condition, the yield comes to 233 g/sq. ft. Temperature is an important and critical factor in the growth and development of this mushroom. The optimum temperature is near 24°-25°C for the mycelial growth (Singer, 1961) and 16° to 18°C during subsequent period (Mantel, 1966). This trial has given good indication that by regulating the temperatures in cellars as in European countries and by suitably modifying the technique, it may be possible to raise *Agaricus bisporus* in Tamil Nadu. Out of the three places tried, it is found that there is greater possibility of growing the mushroom at Kodaikanal which appears to offer optimum temperature requirement for growth even under open conditions of cultivation.

Mushroom either *V. diplasia* or *A. bisporus* are loved by connoisseurs of food only for their delicacy and taste and there may not be much difference in their nutritional values. Large quantities of paddy straw is required for the the cultivation of *V. diplasia* and this can be grown only during summer. A commercial grower in Tamil Nadu can take up cultivation of *Agaricus* during winter and *Volvariella* during summer and to this objective the present studies have opened up a new line of interest.

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