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Mushroom cultivation on rubber wood wastes: A new approach

R. KOTHANDARAMAN, KOCHUTHRESIAMMA JOSEPH,
JACOB MATHEW, K. JAYARATHNAM

Abstract

A feeler trial was conducted to find out whether rubber wood and its saw dust could be used for growing mushroom and production of spawn. The results indicated the possibilities of growing mushroom on rubber wood. The need for perfecting the technique and selecting a suitable mushroom is emphasised in the paper.

Introduction

Increasing population in India is creating an alarming situation in the food front. Malnutrition in terms of 'Protein' deficiency is becoming a major problem. Exploiting non-traditional food sources can make a substantial contribution to meet the serious food and malnutritional deficit. Mushrooms are rich in proteins, vitamins, amino acids and minerals. Mushrooms also have many medicinal properties and recommended in cases of anaemic condition, diabetics, hypertension and maliganant tumer growth. In these circumstances, popularising mushroom as part and parcel of every day food is of importance especially for vegetarians. Therefore the production of mushrooms from domestic, agricultural and industrial wastes and other ligno-cellulosic materials has assumed importance (Birch et al., 1976; Pettipher, 1988 and Lavie 1988). In countries like Japan, China and Korea varieties of mushrooms are grown using soft wood, hard wood and saw dust. Some of the important mushrooms cultivated on wood are (1)

(1) *Flammulina velupties*
(2) *Kuchneromyces mutabilis*
(3) *Lentinus edodes*,
(4) *Pholiota mameko*
(5) *Pleurotus ostreatus*,
(6) *Auricularia* spp
(7) *Tremella fusiformis*

Some other mushrooms are grown on partlally decomposed wood and wood products (Chang and Hayes 1978). Rubber wood being a light hard wood may meet the requirement of ligno-cellulosic material for mushroom production. It is available regularly in plenty. The availability of rubber wood in our country is estimated to be around 1.2 million cubic metre out of which the rubber wood waste is 0·18 million cubic metre (Haridasan 1989). Saw dust from rubber wood is also available in plenty. With a view to using rubber wood waste for mushroom cultivation and rubber wood saw dust for spawn production, a preliminary study was carried out and the results are presented in this report.

Materials and Methods: Growing mushroom on rubber logs

Rubber wood logs of 6 to 8 cm diameter and 25 cm length were split longitudinally into four equal pieces, soaked overnight in water and sterilized using autoclave for 2 hrs. After cooling they were aseptically charged with 150 gms of spawn made from cholam grains. Three species of oyster mushroom viz *Pleurotus sajor-caju; P. citrinopileatus P. florida* were used. Four logs of rubber wood were used for each species of mushroom. The inoculated wood logs were tied firmly and covered on all the sides with 100 gauge transparant polythene sheet and kept in dark at room temperature 26 ± 2 'c for spawn running. Spawn running was continued till white encrustations were noticed which is an indication of completion of spawn running. The polythene covering of such logs was removed. Watering was done twice daily from 24 hrs of opening, The growth of

mycelium, spawn running time and mushroom development were recorded.

Spawn production using saw dust

Rubber wood saw-dust was soaked in water for 24 hrs. Wet saw dust was squeezed and dried under shade to about 70% moisture level. Calcium carbonate was mixed with semi dried saw dust at 5% level and half filled in saline drip bottles and sterilized in autoclave for 2 hrs. After cooling they were inoculated with 10 grams of mother spawn of three species of mushroom separately. The growth was observed upto 10 days and recorded.

Results and Discussion

All the three species of mushroom started growing on wood logs from the third day of inoculation and the growth was confined to the split surface of the wood only. White encrustations appeared after 10, 12 and 15 days in *P. florida P. citrinopileatus* and *P. sajor-caju* respectively. Two logs in each of *p. citrinopileatus* and *p. sajor-caju* and one log in *p. florida* got contaminated by *Trichoderma* sp. Small mushroom buttons developed on the remaining logs on 4th day. All the buttons on the logs of *p. sajor-caju* and *p. citrinopileatus* and over 90% buttons in P. florida dried on 5th day. Only 5 small mushrooms developed in *p. florida*. All the mushrooms showed typical colour and shape.

The mycelia of all the three fungi grew on saw dust. But it ceased to grow at about 3/4 of the depth. The mycelial mass is also less when compared to grain spawn. The growth of the mycelia of oyster mushroom at split surfaces of the rubber wood indicates that it is capable of supporting wood decaying fungi like *pleurotus* sp. Failure of mushroom mycelium to grow on the entire surface of wood log might be due to lack of drying before sampling or the compactness of the wood. Augmented percentage of contamination can be attributed to readily available nutrients on wood surface which could be overcome by selecting completely dried wethered wood or by carrying out pre-fermentation by various methods as done for other types of mushrooms (Chang and Hayes 1978). Mushroom formation and opening depends on temperature, moisture and carbondioxide concentration in the substrate on which they develop (Zadrazil 1975). Limited number of mushroom that developed in the logs indicate that the conditions in the logs are not favourable and modification of the method is required. Arvind Krishna (1978) reported a new method of producing oyster mushroom on wood logs is worth trying. The drill hole method adopted for growing *Lentinus edodes* (Campbell and Slee 1986) needs testing. This study indicates .that various species of oyster mushroom differ with regard to the formation of mushroom on rubber wood. Besides the three species tested a number of other species are also available which on testing may prove better. *p. ostreatus* is a species mainly grown on stumps, logs and saw dust in Japan (Sang and Hayes 1978) and might be more suitable for rubber wood. The failure of the saw dust to support the mycelial growth of three species of mushroom may be due to non–availability of readily availiable sugar and proteins as found in grains and needs addition of other ingredients like grains. The present study shows an indication of growing mushroom on rubber wood. However a detailed investigation on the technique of mushroom cultivation and selecting most suitable species of mushroom are to be carried out before arriving at a conclusion. At this stage we can say that rubber wood does not inhibit mushroom growth. In addition to getting mushroom, we may get good organic manure by using spent solid wastes of mushroom cultivation on wood and saw dust.

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the wax pick-up and colour of splints made from rubber wood. Wax is generally used as a flame transfer agent in matches. In the absence of a flame transfer agent, on ignition, a match will burn only until the head composltion has been fully consumed, and then the flame goes out. The reason for this is that the head does not supply sufficient heat to kindle the wood fibres. However, when a readily Inflammable material like wax is applied to the splint, the heat from the burning head composition will be sufficient to vapourise and ignite it and as burning continues, additional heat is developed to ignite the splint. Therefore, the pick-up of wax by the splints is of great significance in deciding the quality of matches.

Different chemical treatments were tried to improve colour and wax pick-up. The colour of the splints was assessed visually and its wax pick-up gravimetrically. The results as given in Table-1 indicate that wax pick-up of the splints is improved by treatment with bleaching powder.

Table–1

Wax Pick-up of Treated Rubber Wood Splints

Sl. No.	Material	Treatment	Wax pick-up 95° C 15 seconds (%)
1.	Rubber wood	Nil	21.05
2.	,,	1% Na_2CO_3 (Unwashed)	27.01
3.	,,	1% Na_2CO_3 (Washed)	23.96
4.	,,	1% Na_2CO_3 (Bleached)	26.72
5.	,,	1% NaOH (Unwashed)	23.23
6.	,,	1% NaOH (Washed)	21.61
7.	,,	1% NaOH (Bleached)	24.25
8.	,,	Bleaching with 2% bleaching powder	28.40
9.	Vatta	Nil	28.07

Splints made of Vatta wood (Macaranga Indica) was used as control. The colour of rubber wood splints was found to improve as a result of treatment with bleaching powder. The other treatments were found to be less effective in improving wax pick-up and colour.

The effect duration of treatment was also studied in a separate experiment. It was found that an immersion period of 1 hr in 2% bleaching powder was sufficient to improve colour and wax pick-up.

Further trials, especially on commercial scale, are required to confirm these results and to work out economics.

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