

# CHEMICAL STERILIZATION OF ARECA LEAF SHEATH SUBSTRATE FOR THE CULTIVATION OF *PLEUROTUS SAJOR-CAJU* (Fr.) SINGER

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## ABSTRACT

Chemical sterilization of areca leaf sheath in a solution of formalin + carbendazim for 18 h. was found to be better than steam pasteurization for the cultivation of *Pleurotus sajor-caju*. The average yield of fresh mushroom was the highest (418 g/bag containing 3.5 kg wet weight of leaf sheath) in the treatment formalin 500 ppm + carbendazim 25 ppm, with a biological efficiency of 49.8 per cent. The average time taken for first flush from the day of spawning was 19 days. The results of the study indicate the possibility of adopting chemical sterilization of areca leaf sheath instead of steam pasteurization of the substrate.

## INTRODUCTION

Oyster mushroom is mainly cultivated on steam pasteurized wheat or paddy straw (Jandaik, 1976). A number of other agricultural waste materials have been tried for the cultivation of several species of *Pleurotus*. Steam pasteurized leaf sheaths of freshly fallen areca (*Areca catechu* L.) leaves have been reported as a promising substrate for the cultivation of *Pleurotus sajor-caju* (Chandra Mohanan and Moorthy, 1991). However, pasteurization of the substrate by steaming is a tedious process. Hence, chemical sterilization of dried areca leaf sheath was tried as an alternate method for steam pasteurization.

## MATERIALS AND METHODS

Naturally dried areca leaf sheaths were chopped to a size of about 3.5 x 2.5 cm. After chopping the moisture content of the leaf sheath was determined as 27 per cent. Formalin (Formaldehyde solution) was used at the rate of 1.25 ml/l of water since Vijay and Sohi (1987) reported formalin 500 ppm concentration as the best among the different concentrations of formalin used for sterilizing wheat straw to grow *P. sajor-caju*. Different concentrations of carbendazim Bavistin WP were tried keeping the formalin concentration constant at 500 ppm in all the chemical treatments. The different treatments were: (1) formalin + carbendazim 75 ppm, (2) formalin + carbendazim 50 ppm, (3) formalin + carbendazim 37.5 ppm, (4) formalin

+ carbendazim 25 ppm, (5) formalin + carbendazim 12.5 ppm, (6) formalin + carbendazim 5 ppm, (7) formalin 500 ppm alone, (8) steam pasteurization (after soaking in water for 18h.).

The chopped leaf sheaths in gunny bags were soaked @ 10 kg sheath in 100 l. chemical solution or water. After one h of soaking the gunny bags containing the substrate were taken out and excess water was allowed to drain out. The moisture content of the leaf sheath at spawning stage was determined as 76 per cent. The leaf sheath without any additives was used as substrate.

Eighteen days old sorghum (*Sorghum bicolor*) grain spawn of *P. sajor-caju* was used at the rate of three per cent of wet weight of substrate. Multilayered spawning technique was used to inoculate the substrate with sorghum grain spawn.

The substrate was filled in perforated high density high molecular polythene bags of size 45 cm x 32 cm (100 gauge) keeping the bed (bag) weight to be 3.5 kg at the time of spawning. Twenty bags were prepared for each treatment. After filling, the bags were tied and incubated in a low cost mushroom hut built inside an areca garden (Chandra Mohanan and Moorthy, 1991). The maximum and minimum temperatures inside the hut were recorded daily during the period of cultivation.

After a spawn run period of 15 days, the

polythene covers were removed and from next day the beds were sprayed with water once daily. The relative humidity of the hut was maintained above 80 per cent. The mushroom fruiting bodies were harvested separately from each bed and fresh weight was recorded. In all, three flushes were harvested during a cropping period of 52 days from the day of spawning.

## RESULTS AND DISCUSSION

The mushroom yield and biological efficiency are presented in Table I. The average minimum and the maximum temperatures inside the mushroom hut during the period of study (Aug. - Oct. 1991) ranged from 23.0 - 23.7°C and 28.0 - 30.5°C respectively.

The average yield of fresh mushroom was the highest (418 g/bag) in the treatment formalin + carbendazim 25 ppm reaching a biological efficiency of 49.8 per cent followed by formalin + carbendazim 37.5 ppm. But the average yield was only 260 g per bag in steam pasteurization method. Mushroom yield decreased with the increase in carbendazim concentration. It was the lowest in the treatment formalin + carbendazim 75 ppm. Studies on the chemical treatment of wheat straw for the cultivation of *P. sajor-caju* revealed that the yield was the highest in the treatment Formalin 500

ppm + carbendazim 75 ppm solution (Vijay and Rai, 1991). Jadhav and Jagtap (1991) also observed the highest yield of *P. sajor-caju* on wheat straw treated with formalin 500 ppm + carbendazim 75 ppm.

In the present study when carbendazim concentration was reduced to 12.5 ppm and less the fruiting bodies (single flush) were observed only in a few beds out of the 20 beds. Vijay and Rai (1991) also reported that the yield was the lowest and very poor on wheat straw treated with formalin 500 ppm alone. The present study revealed that treatment of areca leaf sheath with formalin 500 ppm + carbendazim 25 ppm can be considered as the best among all the treatments tried since not only the average yield was high but also the yield of mushroom was more than 300 g in all the beds. In this treatment the average time taken for the first harvest from the day of spawning was 19 days (Table I). Based on the studies on carbendazim content of *P. sajor-caju* fruit of bodies produced on wheat straw treated with formaldehyde 500 ppm and carbendazim 25-75 ppm, Vijay and Rai (1991) reported that the carbendazim content in the fruit bodies was much below the tolerance limit of this chemical in the food stuffs and therefore they suggested that fruit bodies produced by this chemical sterilization method are very much safe for human consumption. The present

**Table I.** Effect of chemical sterilization of areca leaf sheath on the yield of *Pleurotus sajor-caju*

Treatment	Days from spawning to 1st flush		Mushroom yield in g/bed		Biological efficiency (%)	Percentage of beds yielding more than 300 g/bed
	**Average	Range	(Total of 3 flushes) **Average	Range		
*Formalin 500 ppm						
+ Carbendazim 75 ppm	21	19-22	239	113-390	28.5	28
Formalin + Carbendazim 50ppm	20	19-21	284	218-310	33.8	46
Formalin + Carbendazim 37.5ppm	20	19-22	378	285-445	45.0	80
Formalin + Carbendazim 25 ppm	19	19-20	418	350-530	49.8	100
Formalin + Carbendazim 12.5 ppm	20	-	14	in 4 beds only	-	-
Formalin + Carbendazim 5 ppm	19	-	18	in one bed only	-	-
Formalin alone	21	-	20	"	-	-
Steam pasteurization	19	19-25	260	174-392	31.0	33

\*Concentration of formalin (Formaldehyde solution) constant in treatments 1-7  
Wet Weight of substrate per bag = 3.5 kg, dry weight of substrate per bag = 840 g

\*\*Average of 20 bags

results also indicate the possibility of adopting chemical sterilization of leaf sheath for large scale cultivation.

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