

Reduction of labor in oyster mushroom cultivation by vinyl mulching on mushroom bed

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느타리버섯 비닐멀칭재배법에 의한 노동력 감소

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ABSTRACT : Labor required for managing and harvesting the oyster mushroom bed was evaluated. Although vinyl mulching cultivation method needs more hours for spawning, it saves more than 50% of labor for harvesting and managing of the mushroom bed. Harvesting hour of 1st-3rd flush in vinyl mulching method was 48-50% for *Pleurotus ostreatus* and 36-41% for *P. sajor-caju*. Labor for bed management after harvesting in vinyl mulching method was also 38-50% for *P. ostreatus* compared to conventional method, and 20-35% for *P. sajor-caju*. Vinyl mulching is believed to be a very efficient method for saving labor in oyster mushroom cultivation.

KEYWORDS : labor input, *Pleurotus ostreatus*, *Pleurotus sajor-caju*, vinyl mulching

The wood-decaying and saprophytic fungi of *Pleurotus* spp. has been known as valuable edible mushrooms owing to its peculiar taste and flavour. Oyster mushroom shares about 60% of total mushroom market in Korea. Its cultivation area has steadily increased since 1997, whereas the yield per unit area has declined every year owing to limiting factors in mushroom cultivation. Vinyl mulching method was introduced to crop cultivation in 1970s in Korea, and used widely for cultivation of various crops. A new method for applying vinyl mulching method oyster mushroom cultivation was developed and the effects of mulching technique on mushroom production which are the improved picking efficiency, the quality and productivity of mushroom and controlling mushroom diseases have been evaluated. *P. sajor-caju* was also transformed into bunch type by using vinyl mulching technique. However, no report was published for the effects of this method on labor reduction in oyster mushroom cultivation. This is the first report that the vinyl mulching technique could reduce labor cost in oyster mushroom cultivation compared to the conventional method.

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Materials and Methods

Culture. Two hybrid varieties belonging to *Pleurotus ostreatus* (ASI 2180) and *Pleurotus sajor-caju* (ASI 2333) were obtained from the Breeding Lab., Div. of Applied Microbiology, National Institute of Agricultural Science and Technology (NIAST), RDA. They were cultured on Potato Dextrose Agar (PDA) plates at 25°C.

Farming condition

Three tons (dry weight) of waste cotton were used as a cultivation substrates for *P. ostreatus* and *P. sajor-caju*. The bed area was 198m² for both species. Pasteurization of substrate was carried out at 65°C for 48 hour and around 52~55°C for 7 days.

Spawning

Spawn of the mushrooms was cultivated on the mixture of poplar sawdust (80%) and rice barn (20%). The spawn lump was homogenized with a macerating machine, and then inoculated to the waste cotton substrate in the proportion of 50% for the mixture inoculation with substrate, 10% for surface inoculation, and 40% for the hole inoculation. In conventional method, the substrate was inoculated with the sawdust

Table 1. Comparison of hours of labor input in conventional and vinyl mulching cultivation of oyster mushroom

| Items | Conventional | | Vinyl mulching | |
|--|---------------------|----------------------|---------------------|----------------------|
| | <i>P. ostreatus</i> | <i>P. sajor-caju</i> | <i>P. ostreatus</i> | <i>P. sajor-caju</i> |
| Spawning | | 18* | | 22 |
| 1 st flush picking | 12.5 | 19 | 6 | 6.8 |
| Management after 1 st picking | 4 | 10 | 1.5 | 2 |
| 2 nd flush picking | 8.5 | 13 | 4.5 | 5 |
| Management after 2 nd picking | 3 | 6 | 1.5 | 2 |
| 3 rd flush picking | 9 | 13.5 | 4.5 | 5.5 |
| Management after 3 rd picking | 3 | 6 | 1.5 | 2 |
| In hour of labor | | | | |
| Total labor for picking | 30 | 45.5 | 15 | 17.3 |
| Total labor for management | 10 | 22 | 4.5 | 6 |
| Total labor | 58 | 85.5 | 41.5 | 45.3 |

* Bed area: 198 m²

** This work was estimated in terms of spent hours of an adult

spawn in proportion of 50% for the mixture inoculation and 50% for the bed surface inoculation. After spawning *P. ostreatus* was cultured at about 23°C for 25 days, and *P. sajor-caju* at around 35°C for 15 days.

Labor

Five adults were put into spawning job. One person prepared the spawn. The other four adults inoculated the spawn on the bed. Two adults were put into picking job. Labor was estimated by total input hours for a person's picking. In the mushroom bed management, labor was also calculated just as same way like picking.

Results and discussion

Reduction of labor

By vinyl mulching labor for mushroom picking reduced up to 52% for *P. ostreatus* and 64% for *P. sajor-caju* in the first flush, and 47% for *P. ostreatus*, 61% for *P. sajor-caju* in the second flush, and 50% for *P. ostreatus*, 59% for *P. sajor-caju* in the third flush compared to the control. Labor for bed management in vinyl mulching group was decreased by up to 62% for *P. ostreatus*, 80% for *P. sajor-caju* after the first flush, and 50% for *P. ostreatus*, 65% for *P. sajor-caju* after the second flush, and 50% for *P. ostreatus*, 65% for *P. sajor-caju* after the third flush (Table 1). In total, vinyl mulching method saved 28% and 47% of labor cost in *P. ostreatus* and *P. sajor-caju* cultivation, respectively. In managing conventional bed, the hours of labor were concentrated on the aborted small pins

on the surface of the bed, which could be the site of contamination or infection by pathogens, and in picking mushroom, only a full-grown mushroom was selectively harvested at random. Whereas both picking mushroom and managing the bed were simultaneously solved by harvesting the bunch of mushroom on vinyl mulching bed. The value of the Table 1 summarizes the labor input hour necessary for spawning, picking and bed management without statistical analysis.

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