

Fermentation characteristics and examine of cotton waste and oyster mushroom culture with cotton waste using anti-fungal microorganism inhibiting green mold (*Trichoderma* sp.)

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We have surveyed the variation of physical and chemical characteristics of aerobic and anaerobic outdoor fermentation of cotton wastes using for oyster mushroom culture. The inner temperature of cotton wastes fermented aerobically covered with thin cloth and setting pallet at bottom was higher than that of anaerobic fermented cotton wastes covered with P.E vinyl and the maximum temperature was 75°C at 5th day after fermentation. pH of cotton wastes fermented aerobically was increased up to 8.9 after fermentation of 9~12 days, but that of anaerobically fermented was decreased up to 5.0. Total carbon content was decreased but total nitrogen content was increased when fermentation was in progress. Oxygen concentration of cotton waste fermented aerobically was decreased until 6 days after fermentation but increased after 9 days of fermentation. Ammonia concentration of cotton waste fermented aerobically and anaerobically was below 10 ppm and 20~85 ppm respectively. In anaerobic condition the cotton waste was contaminated with mold (15~50%), where no contamination was found in aerobic condition during spawn running stage. Yields of mushroom grown on cotton wastes aerobically fermented for 6~9 days was 23.0~23.6kg per 3.3m² area.

And we have work on develop technique diagnosing fermentation condition of cotton waste using for oyster mushroom bed culture with pH and ammonia indicator. In the range of pH 5~9, Color variation of bromothymol blue 500 ppm solution was remarkable. When inserted anaerobically fermented cotton waste into bromothymol blue (BTB) 500 ppm solution, the color of solution was changed yellowish. The other side, when inserted aerobically fermented cotton waste, the color of solution was changed blueish. Indophenol blue was selected of indicator for measuring ammonia concentration in the fermented cotton waste medium. When the ammonia concentration in the fermented cotton waste medium was bellow the 25 ppm, oyster mushroom mycelium could grew but over the 50 ppm, it could not grew.

The various microorganism multiplied during the cotton waste fermentation for oyster mushroom culture. We have separated 188 microorganism strains from fermented cotton waste. Among the separated microorganism, bacteria were 171 strains, mold were 10 strains and actinomyces were 7

strains. Available bacteria which inhibited *Trichoderma* sp. mycelium from growing but not inhibited mycelium growing were selected. We have extracted 16S rDNA from the available bacteria and carried out PCR, 16S rDNA sequencing for identification. The available bacteria was identified as *Pseudoxandomonas* sp. (KME9001) *Bacillus pumilus* (KME9002), *Paenibacillus* sp, (KME9003). The optimal temperature was 30~40°C and pH was 7~9 for incubation of available bacteria. and they outlived up to 4~5 hour at 90°C.

And we have investigated the effect available microorganism [*Pseudoxandomonas* sp. (KME9001) *Bacillus pumilus* (KME9002), *Paenibacillus* sp, (KME9003.)] promoted oyster mushroom spawn running and inhibited *Trichoderma* sp. mycelium growth. When the cotton waste fermentation was began, the available microorganism was added and low temperature pasteurization was omitted but post fermentation was practiced at 55°C for 12 hours. As the result, mycelium incubation ratio was 100%, It took spawn running 12 days to finish. the yield was 48.1 kg/3.3m². As compared with traditional practice, day for sterilization and post-fermentation was reduced up to 3 day. and at treatment poured available microorganism culture broth, oil volume consumed to pasteurize and ferment cotton waste was 130~150 ℓ per 100~165m². But at traditional method it was 320~400 ℓ. Converted money into oil consumed, oil buying cost was saved 1,560~1,957 thousand won per year at 330m²