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## **Bag Cultivation of Split Gill Mushroom (*Schizophyllum commune*) by Application Coconut Meal Substitute Rice Bran**

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**Chaisit Preecha<sup>\*</sup>, Wethi Wisutthiphaet, Pornsil Seephueak, and Siriwan Thongliumnak**

Tropical Fruit Crop and Tree Research Center, Department of Plant Science, Faculty of Agriculture, Rajamangala University of Technology Srivijaya, Nakhon Si Thammarat, 80110, Thailand

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Rice meal was used as the major nutrition adding on mushroom culture media. This research trial to use coconut meal substituted the higher price rice bran. In vitro test of mycelium growth on medium in Petri dish with different substitution ratio of rice bran by coconut meal was done. Ratio of rice bran: coconut meal was varied to 100: 0, 75: 25, 50: 50, 25: 75 and 0: 100 % respectively. The result showed that mycelium growth diameter after 7 days was 8.96, 7.68, 8.74, 8.94 and 7.07 cm respectively. The same ratio was culture as spawn bag at greenhouse; the result showed that yield of the substitution ratio above was 46.09, 25.96, 32.54, 41.21 and 49.96 g/bag respectively. Although, 100% coconut meal substitution showed the lowest growth in vitro test but it gave the highest yield with the good smell.

**Keywords:** split gill mushroom, coconut meal, rice bran

### **Introduction**

Split gill mushroom, *Schizophyllum commune* was found in worldwide at tropical forest. Normally, it could be collected from natural or cultivated as commercial especially in Thailand. Beside it was food cooking for Mexican and Asian, several report confirmed for medicinal benefit of this mushroom. Lentinan, schizophyllan, genodaran, cordycepin, cordycepic acid and protein-bound polysaccharide were extract from *Schizophyllum commune* (Daba and Ezeronye, 2003; Vincent *et al.*, 2000; Wasser, 2002; Ziaja *et al.*, 2005). Polysaccharide schizophyllan (1,3  $\beta$  glucan) have been confirmed to inhibit sarcoma 180 cancer (Joshi *et al.*, 2013; Vincent *et al.*, 2000). In Thailand, this mushroom was high demand for food cooking because it's testy and healthy

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<sup>\*</sup> **Coressponding Author:** UnartngamJ., **E-mail:** [skpreecha@yahoo.co.uk](mailto:skpreecha@yahoo.co.uk)

information. Some substrate from agricultural byproduct was tested using in culture medium. In culture medium, rice bran was used as source of protein and essential nutrition for mushroom culture (Auetragul, 2008). Rice bran was used in feeding industry and the price was high. In evaluation nutritive value and metabolizable energy of rice bran and coconut meal showed of digestible energy 14.68, and 11.18 MJ ME/kg, metabolizable energy 12.35 and 9.93 MJ ME/kg, nitrogen free extract 42.56 and 41.64 MJ ME/kg (Nantana *et al.*, 2010). Both of them were enriching nutrient composition which favorable for mushrooms growing. In this research was trial to used coconut meal substitute of rice bran on spawn culture medium of *Schizophyllum commune*.

## **Materials and methods**

*Schizophyllum commune* in this research was a commercial strain. *In vitro* test was done by grow mycelium on medium in Petri dish with different substitution ratio of rice bran by coconut meal. The ratio of rice bran: coconut meal was varied to 100: 0, 75: 25, 50: 50, and 0: 100 % respectively. Mycelium cultured on PDA was transferred on Petri dish and incubated at room temperature. Mycelium growth diameter was measured after incubation for 3, 5 and 7 days.

In greenhouse trial, mother spawn was done by transferred mycelium cultured on PDA to sterilized sorghum and incubated for 14 days or until sorghum grain covering with mycelium before transferred to spawn bag. Spawn bag was prepared from mixing of rubber tree sawdust with rice bran, pumice, magnesium sulfate, and water (100: 50: 2: 0.2: 75). Rice bran was substituted with different ratio of coconut meal. Ratio of rice bran: coconut meal was varied to 100: 0, 75: 25, 50: 50, 25: 75 and 0: 100 % respectively. Coconut meal was dried up at 60 C for 48 hours before mixed in media. The mixing media was packed in polypropylene bag (600 g/bag). After sterilization and leaved for 2 days, spawn bag was punched from the top to the middle of bag for mother spawn inoculation. Mother spawn previously prepared was inoculated to spawn bag at the punching well. The inoculated spawn bags were leaved at ambient in incubation room. After incubation for 20 days, mycelium full colonized on substrate, spawn bags cut in 4 vertical stripes (Preecha, 2014) and brought to stimulate basidiocarp in greenhouse. Weigh, size, number of basidiocarp was recorded and submitted to analysis with Completely Randomized Design statistical analysis to compare produce of medium at different ratio substituted of coconut meal. Cost and return were calculated (Preecha, 2010 and Pipathsithee, 2001).

## Results

*In vitro* test for mycelium growth on medium in Petri dish with different substitution ratio of rice bran by coconut meal, the result indicated that mycelium of *Schizophyllum commune* grow well on medium with the highest ratio of rice bran: coconut meal (100:0) of 3.45, 5.99, and 8.96 cm of mycelium diameter after incubation for 3, 5 and 7 days respectively. While, this mushroom cultured on medium with the highest coconut meal (0:100), it grow slowest of 2.74, 4.28, 7.07 cm of mycelium diameter incubation for 3, 5 and 7 days (Table 1).

**Table 1** Mycelium growth diameter of *Schizophyllum commune* cultivated on Petri dish at different substitution ratio of rice bran by coconut meal varied to 100: 0, 75: 25, 50: 50, 25: 75 and 0: 100 % incubation for 3, 5 and 7 days

| Substitution ratio (%)          | Mycelium growth diameter (cm <sup>1/</sup> ) |       |       |
|---------------------------------|--|-------|-------|
|                                 | 3-day  | 5-day | 7-day |
| Rice bran: coconut meal, 100 :0 | 3.45a  | 5.99a | 8.96a |
| Rice bran: coconut meal, 75:25  | 2.98d  | 4.54d | 7.68d |
| Rice bran: coconut meal, 50:50  | 3.01c  | 5.75c | 8.74c |
| Rice bran: coconut meal, 25:75  | 3.10b  | 5.96b | 8.94b |
| Rice bran: coconut meal, 0:100  | 2.74e  | 4.28e | 7.07e |

<sup>1/</sup> =Means with the same letter in the same column are not significantly different at 0.05 DMRT mean comparison

In greenhouse trial, spawn bag prepared from mixing of rubber tree sawdust with rice bran substituted with different ratio of coconut meal, result showed that yield produced on rice bran: coconut meal (0:100) was the highest of 49.96 g/bag. It was higher yield than cultured on medium with the highest ratio of rice bran: coconut meal (100:0) of 46.09 g/bag (Table 2). *In vitro* test, the mycelium cultured on rice bran: coconut meal (0:100) unlikely grow well, but the yield was excellent produced at this ratio. When compared the yield component of mushroom in this ratio, all components (basidiocarp number, wide and length) at Table 2 was lowest, but this medium ratio produced the 2 time thicker basidiocarp (data not shown). Also testy and smell of it was better than other.

**Table 2** Yield component of *Schizophyllum commune* cultivated on different substitution ratio of rice bran by coconut meal varied to 100: 0, 75: 25, 50: 50, 25: 75 25: 75 and 0: 100 %.

| Substitution ratio (%)         | Yield component(/bag) <sup>1/</sup> |                   |           |             |
|--------------------------------|-------------------------------------|-------------------|-----------|-------------|
|                                | Weigh (g)                           | basidiocarp (no.) | Wide (cm) | Length (cm) |
| Rice bran: coconut meal, 100:0 | 46.09b                              | 116.77a           | 1.35d     | 2.02c       |
| Rice bran: coconut meal, 75:25 | 25.96e                              | 93.93b            | 1.37c     | 2.01d       |
| Rice bran: coconut meal, 50:50 | 32.54d                              | 97.72c            | 1.48b     | 2.07b       |
| Rice bran: coconut meal, 25:75 | 41.21c                              | 88.82d            | 1.57a     | 2.17a       |
| Rice bran: coconut meal, 0:100 | 49.96a                              | 53.34e            | 0.95e     | 1.70e       |

<sup>1/</sup> =Means with the same letter in the same column are not significantly different at 0.05 DMRT mean comparison

Cost and return of all medium ratio was calculated to make decision for the proper ratio which gave the high profit. The financial analysis result revealed that culture medium with the ratio of rice bran: coconut meal (0:100) was the lowest cost of 0.04 USD/bag or 0.88 USD/kg of produce with the highest income of 0.29 USD/bag and also gave the highest net profit 4.83 USD/kg. While, culture medium with the ratio of rice bran: coconut meal (100:0) was the highest cost of 0.08 USD/bag or 1.77 USD/kg with net profit of 3.95 USD/kg. It was lower than culture medium with the ratio of rice bran: coconut meal (25:75) and also rice bran: coconut meal (0:100) (Table 3). In this research should be confirmed the farmer to selected coconut meal substitute rice bran for spawn medium.

**Table 3** Cost of yield per kg of *Schizophyllum commune* cultivated on different substitution ratio of rice bran by coconut meal varied to 100: 0, 75: 25, 50: 50, and 0: 100 %. (USD)

| Substitution ratio (%)         | Cost<br>(g/bag) | Income/bag <sup>1/</sup> | Cost/kg | Net profit/kg |
|--------------------------------|-----------------|--------------------------|---------|---------------|
| Rice bran: coconut meal, 100:0 | 0.08            | 0.26                     | 1.77    | 3.95          |
| Rice bran: coconut meal, 75:25 | 0.07            | 0.15                     | 2.78    | 2.93          |
| Rice bran: coconut meal, 50:50 | 0.06            | 0.19                     | 1.93    | 3.78          |
| Rice bran: coconut meal, 25:75 | 0.05            | 0.24                     | 1.30    | 4.41          |
| Rice bran: coconut meal, 0:100 | 0.04            | 0.29                     | 0.88    | 4.83          |

Rate of currency of exchange = 35.01 Thai Baht to 1USD

1/ = Income calculation base on yield of *Schizophyllum commune* at price 5.71 USD/kg (200 Thai B/kg)

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