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Development of Spawn Culture Material from Reused Spawn for Cultivation Split Gill Mushroom (*Schizophyllum commune*)

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Sawdust was used at main substrate for mushroom cultivation in Thailand. Waste from cultivation was the huge amount at farmer farm. This research trialed to reuse this waste in mushroom cultivation. Split gill mushroom (*Schizophyllum commune*) was mushroom bringing to test for reusing of waste from mushroom cultivation. The ratio of new sawdust: waste material at 100 :0, 75: 25, 50:50, 25: 75, and 0: 100 (w/w) and adding rice bran varied at 0, 5, 10, and 15 % were set to compare the split gill mushroom produce. The result revealed that the formula of spawn which new sawdust only (100: 0) adding 10% of rice bran and the ratio of new sawdust: waste material at 75: 25 and 50:50 adding rice bran 15 % were the highest produce with total yield 82.85, 81.35 and 80.04 g/bag respectively. The both new sawdust: waste material at 75: 25 and 50:50 adding 15 % rice bran did not give produce different from new sawdust. Cost of production of those was30.78, 31.35 and 30.36 Baht/kg and gross benefit was 119.22, 118.65 and 119.64 Baht/kg. The result convinced that waste material can be reused as spawn preparation for split gill mushroom production.

Keywords: spawn culture, reuse, split gill mushroom, waste

Introduction

Mushroomsis one of the most popular healthy food consist of high essential nutrient, high fiber, low fat and low calorie. Moreover, there had many reports of antioxidant, antimicrobial and inducing immune substance, and also several anti-cancer polysaccharides. Several mushroom, *Coriolus versicolor* (Cheng.and Leung. 2008; Cui and Chisti, 2003; Tsang *et al*., 2003), *Lentinula edodes* (Wu *et al*., 2007), *Ganoderma lucidium* (Kao *et al*. ,2013; Lin and Zhang , 2004; Xu *et al*., 2011; Wu *et al*. 2006), *Agaricus blazei* (Cui *et al*., 2013; Firenzuoli*et al*., 2008), and *Grifola frondosa* have been isolated suppressing cancer and tumor polysaccharide(Masuda*et al*., 2010). Lentinan,

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schizophyllan, genodarans, 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 schizophillan (1,3 β glucan) have been confirmed to inhibitsarcoma 180 cancer (Joshi *et al*.,2013; Vincent *et al*.,2000).Normally, *Schizophyllum commune was* collected from natural, but it was not enough. So it must be produced as a commercial farm.In cultivation process, the farmers harvested one time only and leaved old spawn as huge waste at cultivation area. This research objected to adjust the proper ratio of new sawdust and reused spawn culture material for cultivation split gill mushroom (*Schizophyllum commune*) due to reduce waste material and also reduce new sawdust in cultivation process.

Materials and methods

Schizophyllum commune, commercial strain was cultured on PDA and transferred to boiled and sterilized sorghum for preparation mother spawn. The mother spawn was leaved 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). The new sawdust and waste material (reusing cultivated spawn) were varied atratio 100 :0, 75: 25, 50:50, 25: 75, and 0: 100 (w/w) and adding rice bran varied at 0, 5, 10, and 15 %. 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 wereleaved at ambient in incubation room.After incubation for 20 days, mycelium full colonized on substrate, spawn bagscut in 4 vertical stripes (Preecha, 2014) and brought to stimulate basidiocarp in greenhouse. Weigh, size, number of basidiocarp was record to analysis and calculate.Factorial in Completely Randomized Design was statistical analysis to compare produce of new sawdust and reused spawn ratio and varied rice bran. Cost and return were calculated (Preecha, 2010 and Pipathsithee, 2001).

Results and discussions

The result showed that at different ratioofnew sawdust and waste material at 100 :0, 75: 25, 50:50, 25: 75, and 0: 100 (w/w) and adding rice bran varied at 0, 5, 10, and 15 % were significant distinguish yield at several ratio. At new sawdust and waste material at 75: 25(w/w) with 15 % rice bran adding and 50:50 with 15% rice bran adding were the best ratio of yield 81.35 and 80.04 g/bag respectively. They were not different from the normal spawn prepared from new sawdust only with yield 82.85 g/bag (table1). From this research, it revealed that proper ratio of cultivated spawn could be reused to prepare spawn bag again. The optimal ratio of new sawdust: cultivated spawn was 75: 25 and 50: 50 (w/w) and the variation adding of rice bran in this trial was optimum at 15%.When calculated the cost and profit of production, cost per bag of optimal ratio which the highest yield was lowest cost/kg of 31.35 and 30.36 Baht/kg compared with new sawdust at 30.78 Baht (table2). The profit of production of those was 118.65 and 119.64 Baht/kg compared with new sawdust at 119.22 Baht/kg (table 3).At the ratio of sawdust: waste spawn 50: 50 with 10% rice bran adding, yield was not so high of 69.92 g/bag, cost and profit per kilogram were 33.04and116.96 Baht respectively.It was seemly lower than the ratio 50: 50, but in some area which sawdust is rather scare or more expensive; this ratio could reduce cost of production.However, at optimal ratio 50: 50 and 75:25 with high 15 % rice bran adding gave the highest yield and profit, but the high enrich nutrient from rice bran also synergized to growing of several fungi. It caused contamination due to reduce yield in production (data not show). Alsothe risking contaminationof reused spawn, it needed longer sterilization and it cost more in fuel using.

Table1 Yield(g/bag) of *Schizophyllum commune* cultivated on the spawn bag at different ratio of new sawdust and waste material at 100 :0, 75: 25, 50:50, 25: 75, and 0: 100 (w/w) and adding rice bran varied at 0, 5, 10, and 15 % .

Ratio of new sawdust and reusing cultivated spawn	Rice bran (%)				Mean
	0	5	10	15	
100:0	3.65[l]	38.71[e]	82.85[a]	30.02[ghi]	38.81C[2/]
75:25	4.65[l]	34.83[ef]	60.15[c]	81.35[a]	45.24A
50:50	3.59[l]	11.27[k]	69.92[b]	80.04[a]	41.20B
25: 75	3.09[l]	23.21[j]	25.80[ij]	27.83[hi]	19.98E
0:100	2.89[l]	32.54[fg]	31.86[fgh]	50.24[d]	29.38D
Mean	3.57C[2/]	28.11B	54.11A	53.89A	

[1/] = Same letters in the combination indicate that values are not significantly different (*p*> 0.05).
2/ = Same capital letters in main factors(colum/row) indicate that values are not significantly different(p > 0.05).

Table 2 Cost of yield per kg (Baht) of *Schizophyllum commune* cultivated on the spawn bag at different ratio of new sawdust and waste material at 100 :0, 75: 25, 50:50, 25: 75, and 0: 100 (w/w) and adding rice bran varied at 0, 5, 10, and 15 % .

Ratio of new sawdust and reusing cultivated spawn	Rice bran (%)			
	0	5	10	15
100:0	684.93	64.84	30.78	88.61
75:25	511.83	68.62	40.40	31.35
50:50	629.53	201.42	33.04	30.36
25: 75	692.56	92.63	85.27	83.00
0:100	698.96	62.38	65.29	43.59

Table 3 Profit per kg (Baht) of *Schizophyllum commune* cultivated on the spawn bag at different ratio of new sawdust and waste material at 100 :0, 75: 25, 50:50, 25: 75, and 0: 100 (w/w) and adding rice bran varied at 0, 5, 10, and 15 % .

Ratio of new sawdust and reusing cultivated spawn	Rice bran (%)			
	0	5	10	15
100:0	-534.93[1/]	85.16	119.22	61.39
75:25	-361.83	81.38	109.60	118.65
50:50	-479.53	-51.42	116.96	119.64
25: 75	-542.56	57.37	64.73	67.00
0:100	-548.96	87.62	84.71	106.41

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