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Bag Opening Technique for Bag Spawn Culture of Spit Gill Mushroom (*Schizophyllum commune*)

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Schizophyllum commune (spit gill mushroom), the wood decay is the most beneficial mushroom. It has been known as the medicinal mushroom. It contains high essential medicinal compound, anti-oxidant, anti-cancer polysaccharide and producing anti-bacterial secondary metabolites. Bag opening technique was conducing to enhance produce of bag spawn mushroom culture by using sawdust as culture medium. Vertical cutting, 45 degree skew cutting and cutting stripe number were compared for fruiting body productivity. The result reveals that 5 stripe 45 degree skew cutting per bag enhanced the highest produce (fresh weigh) of 187.76 g/ bag. However, it was not significantly different from 4, 5 and 6 stripe vertical cutting of 180.39, 179.39, and 176.67 g/bag respectively but, it was significantly higher than 5 stripe 45 degree skew and 6 stripe vertical cutting of 157.20 and 54.11 g/bag respectively. This technique enhanced mushroom productivity per dry weigh of spawn was 31.29 %. The cost and return per bag were 11.26 and 16.90 baht; and benefit was 8.45 baht/bag with the return on investment 75.09 %.

Key words: spit gill mushroom, *Schizophyllum commune*, bag opening technique, bag spawn culture spit gill mushroom

Introduction

Schizophyllum commune (spit gill mushroom) is normally known as the wood decay. This mushroom was defined as inedible in Europe, but in fact, it is edible at world widely in Mexico, North East India, Sumatra Island of Indonesia and Southern Thailand. *Schizophyllum commune* contain essential element including 17 g protein, 0.5 g fat, 90 mg calcium, 280 mg Iron, and 640 mg phosphorus per 100 g (Thai Traditional Medicine Institute, 1999). It contain inhibition sarcoma 180 cancer polysaccharide schizophillan (1,3 β glucan) (Joshi et al,2013; Vincent et al,2000). As well as *Schizophyllum commune*, several mushroom, *Coriolus versicolor* (Cheng.and Leung. 2008; Cui and Chisti, 2003; Tsang *et al*, 2003), *Lentinula edodes* (Wu *et al*, 2007),

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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* (Masuda *et al*, 2010 have been isolated suppressing cancer and tumor polysaccharide(Miles and, 2004). Even more, it product secondary metabolized to inhibit bacteria (Joel and Bhimba, 2013), anti-fungi (Teoh and Don, 2013), and antioxidant (Murat *e al* 2010) In southern part of Thailand and in Sumatra, Indonesia were popular cooking dish from disk mushroom. It was not enough produce collecting from natural decay wood so it must be culture as the commercial scale. This mushroom was cultivated on saw dust adding rice bran by bag spawn cultivation. Cutting technique for spawn opening to induce basidiocarp was one of technique must be confirm for enhance produce in commercial scale.

Materials and methods

Pure culture preparation: Pure culture of *Schizophyllum commune* was isolated from fruiting body of commercial variety. Pure culture was stored for mother spawn culture. Sorghum seed grain was boiled and dry before bottled and autoclaved. Pure cultured of *Schizophyllum commune* was inoculated on seed grain and incubated for 14 days. Spawn bag was prepared from mixing of rubber tree sawdust, with rice bran, pumice, magnesium sulfate, and water (100: 50: 2: 0.2: 75 kg). It 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. Sorghum grain covering with mycelium from mother spawn was inoculated to spawn bag at the punching well. The inoculated spawn bag was incubated at ambient incubation room.
After incubation for 20 days, mycelium full colonized on substrate, spawn bag was brought for stimulating basidiocarp in greenhouse. Spawn bag was cut in vertical stripe and skew stripe. Skew, vertical stripe cutting and number of stripe were compared for produce. Skew cutting for 4, 5, and 6 stripes were compared with vertical cutting for 4, 5, 6, 7 and 8 stripes. The cutting spawn bag was brought to incubate for basidiocarp produce and harvesting. Weigh, size, number cost and return were collected to analysis and calculate. Completely Randomized Design was statistical analysis to compare produce of opening spawn technique. Return of investment was calculate from equation = (benefit/total cost)x100 (Pipathsithee, 2001).

Result and discussion

Bag opening technique for spawn mushroom cultivation by using sawdust as culture medium was done to enhance produce of *Schizophyllum commune*. The result reveals that 5 stripe 45 degree skew cutting per bag enhanced the basidiocarp produce highest of 112.65g/bag. However, it was not different from 4, 5 and 6 vertical stripe cutting with produce of 108.24, 107.63, and 106.00 g/bag respectively. For number of basidiocarp was not significantly different. Although, wide and length of basidiocarp was seemly significant different but it did not relate to yield (table 1).

Table 1 Yield, productivity, amount, wide and length of basidiocarp of *Schizophyllum commune* cultivation on spawn which different cutting to open for pin initiation.

		Basidiocarp			
Cutting technique	Yield (g)	No	Wide (cm)	Length (cm)	Productivity (%)
4 vertical stripe	108.24ab	57.75	2.43abc	2.73ab	50.34ab
5 vertical stripe	107.63ab	59.75	2.06a	2.34bc	56.09a
6 vertical stripe	106.00ab	62.75	1.91bc	2.3bc	37.45cd
8 vertical stripe	92.46b	63.25	1.99bc	2.03c	45.44abc
4 skew stripe	94.32b	54	2.01abc	2.37bc	34.29cd
5 skew stripe	112.65a	55	2.11abc	2.52ab	42.5bcd

Cost per bag of spawn bag culture of *Schizophyllum commune* prepared from mixing of rubber tree sawdust, with rice bran, pumice, magnesium sulfate, and water was calculated. Cost of spawn bag including substrate, materials equipments were 11.26 Baht/bag (table 3). Return was depended on yield and price in the market. When, we calculated the return at price 150 Baht/kg, the highest return was produce from 5 skew stripes per bag of 16.90 with the highest ROI of 75.09 % (Table 2). This research revealed that 5skew stripe cutting technique for open spawn bag to initiate pin development to be basisidiocarp was the high contrast to other.

Table 2. Cost, return, and return of investment (ROI) of *Schizophyllum commune* cultivation on spawn which different cutting to open for pin initiation.

Cutting technique	Cost/bag	Return/bag	ROI(%)
4 vertical stripe	11.26	16.24	68.22
5 vertical stripe	11.26	16.14	67.28
6 vertical stripe	11.26	15.90	64.74
8 vertical stripe	11.26	13.87	43.70
4 skew stripe	11.26	14.15	46.59
5 skew stripe	11.26	16.90	75.09

Table 3. Cost per bag of spawn bag culture of *Schizophyllum commune* prepared from mixing of rubber tree sawdust, with rice bran, pumice, magnesium sulfate, and water.

No.	List of cost	Price/unit) (B(	Amount	Cost (B)
1	polypropylene bag	77	2 kg.	154.00
2	bottleneck	0.25	160 piece	40.00
3	cover	0.25	160 piece	40.00
4	rice bran) kg(	10	25 kg	250.00
5	lime (kg)	1	6 kg	6.00
6	magnesium sulfate	2.5	2 kg	5.00
7	gypsum(kg)	1	4kg	4.00
8	Firewood (kg)	2	25kg	50.00
9	pumice(kg)	1	2 kg	3.00
10	rubber tree sawdust(kg)	0.95	150 kg	142.50
	spawn bag packing	.7	150 kg	105.00
11	cotton(kg)	250	.20 kg	50
12	mother spawn(bottle)	15	5	75.00
13	Greenhouse	50000	1	555.56[1/]
14	Autoclave	50000	1	208.33[1/]
	total			1689.39[2/]
	Cost per bag			11.26

1/ = fixed depreciation
2/= cost was not including bank rate

Conclusion

The 45 degree skew cutting enhanced the highest produce (fresh weigh) of 187.76 g/ bag. However, it was not significantly different from 4, 5 and 6 stripe vertical cutting of 180.39, 179.39, and 176.67 g/bag respectively. This technique enhanced mushroom productivity per dry weigh of spawn was 31.29 %. The cost and return per bag were 11.26 and 16.90 baht; and benefit was 8.45 baht/bag with the return on investment 75.09 %.

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