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## Cost and Return of Straw Mushroom Cultivation Comparison between Rice Straw and Oil Palm Bunch

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Rice straw and oil palm bunch were substrates used in straw mushroom cultured in Thailand. This research was carried out to compare cost and return of both substrates using in straw mushroom cultured at Suanhluang sub district, Chalermprahiat district, and at Hintok sub district, Ronphiboon district, Nakhon Si Thammarat province. Ten of each group of famers whom cultured on each material was sampled to interview with questionnaire in 2017. Survey result showed that the cost of cultivation of both rice straw and oil palm bunch were 2,604.09 and 6,231.68 Baht/crop respectively, price of produces were 90.00 and 80.00 Baht/kg, return of each were 11,358.90 and 20,408.00 baht/crop respectively. For financial analysis of different material, the gross profit of straw mushroom cultivation on rice straw and oil palm bunch were 8,754.35 (77.07%) and 14,176.02 (69.46 %) Baht, the operation profit were 5,984.74 (52.69 %) and 11,573.87 (56.71%) Baht, and net profit were 5,962.86 (52.50%) and 11, 565.74 (56.67%) respectively. The analysis was indicated that total cost were 42.75 and 24.66 Baht/kg, production cost were 20.63 and 34.43 Baht/kg, net profit were 47.25 and 45.34 Baht/kg, and return on asset (ROA) were 11.37 and 24.14 % respectively. The result showed that ROA of mushroom producing on oil palm bunch higher than culture on rice straw. This research analysis enhanced the farmer to determine the substrate using on straw mushroom culture.

**Keywords:** cost, return, profit, straw mushroom, rice straw, palm bunch

### Introduction

Edible mushroom is one of the good nutrition food for healthy. Mushroom is the clean technology produce from the waste of agriculture and industry. It normally lives as biological degradation on produce extra cellular enzyme such as peroxidases, ligninase, cellulases, pectinases, xylanases and o

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xidases to degrade polymer/peptide for nutrition (Nyanhongo *et al.*, 2007; VanAcken *et al.*, 1999; Hammel *et al.*, 1991; Johannes *et al.*, 1996). Straw mushroom (*Volvariella volvacea* (Bull. ex Fr.) Sing.) is one of the most optimal cultivation in tropical area. Several substrates was waste product from agricultural processing including rice straw, oil palm bunch, green bean shell, banana stem, soybean straw, bagasse, kapok core, water hyacinth, cassava peel and sawdust (Chatirat, 2004; Mothong, 2009 and Tripathy *et al.*, 2011). Rice is one of cash crop in Nakhon Si Thammarat. The rice growing area in Nakhon Si Thammarat was 78,249.6 hectare, the biggest in southern part of Thailand (Office of Agriculture Economic, 2014). Straw was waste product from harvesting. Oil palm was the new priority economic crop in this area which growing area was 52,099.04 hectares (Office of Agriculture Economic, 2014) the fourth ranking in southern part of Thailand. Bunch of oil palm was waste from 3 palm oil crushing mills at Nakhon Si Thammarat (Department of Agricultural Extension, 2011) and more than 70 mills in southern part (Department of Industry Works,. 2006). Rice straw and oil palm bunch were abundance substrate use to cultivate straw mushroom in this area. The farmers at Hintok sub district, Ronphiboon district, Nakhon Si Thammarat province, they cultivated straw mushroom on rice straw after the rice harvesting period, while at Suanhluang sub district, Chalermprahiat district, the farmers cultivated straw mushroom on oil palm bunch. This research was done to collect data and used financial analysis to inform the farmer for choosing substrate that give higher income and profit from straw mushroom cultivation.

## **Materials and methods**

This research was done to compare cost and return of rice straw and oil palm bunch, substrates using in straw mushroom cultured at Hintok sub district, Ronphiboon district and at Suanhluang sub district, Chalermprahiat district, Nakhon Si Thammarat province.

Samples were selected by purposive sampling from both sub districts above. Ten families were selected from Hintok sub district, Ronphiboon district to be the sample of farmer whom cultivated straw mushroom on rice straw and ten families were selected from Suanhluang sub district, Chalermprahiat district as sample of farmer whom cultivated straw mushroom on oil palm bunch.

Questionnaire was the tool using in data collection. It comprised of 4 complements including general information, cost, return, and problem. Financial analysis was used to compare profit of different substrate following the equation (Preecha, 2010):

$$\text{Gross profit margin} = (\text{gross profit/sales}) \times 100$$

Operation profit margin = (operating profit/sales) x100

Net profit margin = (net income/sales) x100

Return on assets (ROA) = (net income/total asset)x100

Total cost per unit = total asset/total product

Production cost per unit = total cost of production/total product

Profit per unit = net profit/total product

## **Results and discussions**

Data of cost and return collected from different substrates (rice straw using in straw mushroom cultured at Suanhluang sub district, Chalermprahiat district, and oil palm bunch using at Hintok sub district, Ronphiboon district, Nakhon Thammarat province) was processed by financial analysis. Total cost comprised of direct material (rice straw, mother spawn, additional nutrient), direct labor cost (area and material preparation, cultivation and harvesting) and production cost (indirect material, depreciation of house and equipment, and infrastructure). Total cost of cultivation of rice straw and oil palm bunch were 2,604.09 and 6,231.68 Baht/crop respectively. Return was 11,358 and 20,408 Baht/crop when calculated at the price of produces 90.00 and 80.00 Baht/kg respectively (table 1).

**Table 1** Comparison cost, return and profit between straw mushroom cultured on rice straw at Hintok sub district, Ronphiboon district, and cultured on oil palm bunch at Suanhluang sub district, Chalermprahiat district, at Nakhon Si Thammarat province

Issue	Rice straw		Oil palm bunch	
	Baht	%	Baht	%
Return	11,358.90	10.0	20,408.00	10.0
Total cost	2,604.09	22.92	6,231.98	30.54
Direct material: rice straw, mother spawn and additional nutrient	920.40	8.1	3,787.50	18.8
Direct labor: area and material preparation, cultivation and harvesting	946.14	8.3	1,798.89	8.8
Production cost: indirect material, depreciation of house and equipment, and infrastructure	737.55	6.4	645.59	3.1
Gross profit	8,754.81	77.07	14,176.02	69.46
Operation cost : Sale, preparation, fuel, sale labor, plastic bag, vehicle depreciation	2,770.07	24.39	2,602.15	12.75
Managing cost: (telephone)	50.00	0.4	50.00	0.2
Income before interest rate and tax	5,984.74	52.69	11,573.87	56.71
Financial cost	21.88	0.1	8.13	0.0
Net profit	5,962.86	52.50	11,565.74	56.67
Average of produce (kg)/crop	126.21	-	255.10	-
Total cost/kg	42.75	-	34.66	-
Cost/kg	20.63	-	24.43	-
Return/kg	90.00	-	80.00	-
Net profit/kg	47.25	-	45.34	-

For financial analysis of different material, the gross profit of straw mushroom cultivation on rice straw and oil palm bunch were 8,754.35 (77.07%) and 14,176.02 (69.46 %) Baht, the operation profit were 5,984.74 (52.69 %) and 11,573.87 (56.71%) Baht, and net profit were 5,962.86 (52.50%) and 11,565.74 (56.67%) Baht respectively. The analysis was indicated that total cost were 42.75 and 24.66 Baht/kg, production cost were 20.63 and 34.43 Baht/kg, net profit were 47.25 and 45.34 Baht/kg, and return on asset (ROA) were 11.37 and 24.14 % respectively (table2). The result showed that ROA of mushroom producing on oil palm bunch higher than culture on rice straw. This research analysis enhanced the farmer to determine the substrate using on straw mushroom culture.

**Table 2** Comparison financial ratios between between straw mushroom cultured on rice straw at Hintok sub district, Ronphiboon district, and cultured on oil palm bunch at Suanhluang sub district, Chalermprahiat district, at Nakhon Si Thammarat province

Financial ratios	Rice straw (%)	Oil palm bunch (%)
Gross profit margin	77.07	69.46
Operating profit margin	52.69	56.71
Net profit margin	52.5	56.67
Asset profit margin	11.37	24.14
Total cost/kg	42.75	34.66
Production cost/kg	20.63	24.43
Profit/kg	47.25	45.34

From the survey, we found that the farmer which used oil palm bunch to cultivate straw mushroom without cultivation house, so they could produce mushroom per crop more than cultivate on rice straw which it needed house construction, and cost also was reduce. However, rice straw normally was the material resource providing in the area located near their house, while oil palm bunch, farmer bought from the palm oil crushing mills. The rice straw cultivation farmer must have rice straw house stock for long term producing. For oil palm bunch cultivation, they did not need to stock, they could bought from the mill at any time, but sometime, it lack of material due to high price of fuel so the mill use as fuel in electric generation.

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