



# Farmer's Awareness and Factors Affecting Farmer's Acceptance to Grow Straw Mushroom in Mekong Delta, Vietnam and Central Luzon, Philippines

**NGO THI THANH TRUC\***

*Cantho University, Cantho, Vietnam  
Email: nttruc@ctu.edu.vn*

**ZENAIDA M. SUMALDE**

*University of the Philippines Los Baños, Laguna, Philippines*

**FLORENCIA G. PALIS**

*International Rice Research Institute, Laguna, Philippines*

**REINER WASSMANN**

*International Rice Research Institute, Laguna, Philippines*

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**Abstract** The study aimed to determine the current utilization practices of rice straw, to describe farmers' awareness and perception about using rice straw to produce straw mushroom, to determine factors affecting farmers' acceptance to use this technology, and identify the enablers and constraints in adopting straw mushroom production technology. To achieve these objectives, a survey of 417 respondents and focus group discussions were conducted in four villages in Mekong Delta, Vietnam and Central Luzon, Philippines. Interviews of current adopters and key informants of straw mushroom production were also done at those two study sites. The survey showed that majority of rice straw in Mekong Delta, Vietnam and Central Luzon, Philippines was burned. In Mekong Delta, a small percentage of rice straw was used to grow mushroom, left in the field and used to feed cattle while rice straw in the Central Luzon was left in the field, used as feed for cattle and for mulching. The study found that farmers have good knowledge of this subject even low percentage of adopters. Using the Logit model, yet the significant factors affecting the acceptability of the straw mushroom production in the Mekong Delta, Vietnam include household income and household size whereas in Central Luzon, Philippines are household income, farm size and willingness to attend additional trainings related to straw mushroom production. On the other hand, the key informants and straw mushroom growers identified the requirements to enhance farmers adoption of straw mushroom culture such as 1) good quality of mushroom spore, 2) mushroom production site, 3) supply a whole-year production cycle (if mass production), 4) techniques to grow mushroom, 5) available labor, 6) knowledge in pre-processing mushroom in case farmers are unable to sell fresh mushrooms, and 7) mushroom marketing.

**Keywords** rice straw, rice straw burning, straw mushroom, *Volvariella volvacea*, Mekong Delta, Central Luzon

## INTRODUCTION

Rice straw, a by-product and considered as a waste material in rice, contains 41% C, 0.5 - 0.8 % N, 0.05 - 0.1% P, 0.3 - 2.0% K, 12% silica, and 10% lignin (IRRI Knowledge Bank, 2003). The problem of disposing rice straw is generated during the intensification in rice production and due to limited alternative uses and lack of time and resources to dispose this by-product, it accumulates and becomes wastes.

Straw mushroom (*Volvariella volvacea*) production introduced in Vietnam and Philippines in the last twenty years is a promising strategy to mitigate greenhouse gas emission comparing to other alternative uses of rice straw (Truc, 2011). The questions are on the current usage of rice straw, farmer's awareness of straw mushroom, the factors affecting their acceptance and the benefits/constraints of using rice straw to grow straw mushroom as perceived by non-adopters and faced by adopters. Answering these questions would help identify appropriate recommendations to enhance adoption of this alternative uses of rice straw. Thus, this study was conducted to a) determine the current utilization practices of rice straw; b) describe farmer's awareness and perception about using rice straw to produce straw mushroom; c) determine the factors affecting farmer's acceptance to use this technology; and d) identify the enablers and constraints in adopting straw mushroom production technology.

## METHODOLOGY

### The study sites and methods of data collection

A total of 417 farmer-respondents were interviewed using a structured questionnaire in four villages, namely, Truong Lac Commune, O Mon District, Can Tho City and My Thanh Nam Commune, Cai Lay District, Tien Giang Province in Mekong Delta, Vietnam in June 2008 and Barangay Matingkis, Science City of Muñoz and Barangay Santo Rosario, Santo Domingo Municipality, Nueva Ecija Province, Central Luzon, Philippines in June 2009 (Fig. 1).

The key informant interviews were done by using checklists with face to face interviews of representatives of current adopters of straw mushroom production, local authorities, agricultural extension officers, and other related institutional organizations in the study sites.

The focus group discussions (FGDs) were also conducted in each site after completing the survey and key informant interviews for adopters to provide and share information on straw mushroom production as well as their advantages and disadvantages, to assess the possibility of introducing straw mushroom production and to identify the mechanisms of growing the crop at the studies sites.

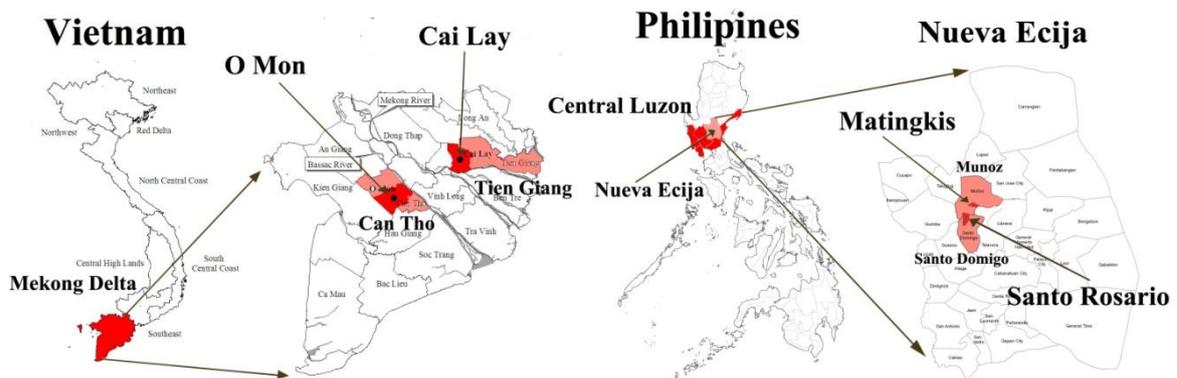


Fig. 1 Map of study sites in Mekong Delta, Vietnam and Central Luzon, Philippines

### Data analysis

The survey data were analyzed descriptively using frequency, descriptive and cross tabulation and mean comparison adapting t-test in SPSS 13.0 (Statistical Package for Social Sciences).

Literatures show that socio-economic characteristics, farmer's awareness and perception of the technologies are major determinants affecting farmer's adoption of agricultural technologies (Palis, 2006; Palis, 1998; Somda et al. 2002; Ghadim and Pannell, 1999; Oladele and Fawolde, 2007; Adegbola and Gardebroek, 2007 and Corrales and Serrano, 1999). Basing on those literature, findings and the information observed at the study sites, the following factors were chosen to

identify the factors affecting farmer's acceptance of straw mushroom (explained in Eq.(1) and Table 1). The factors affecting the probability of adoption were estimated by the logistic regression or the Logit model.

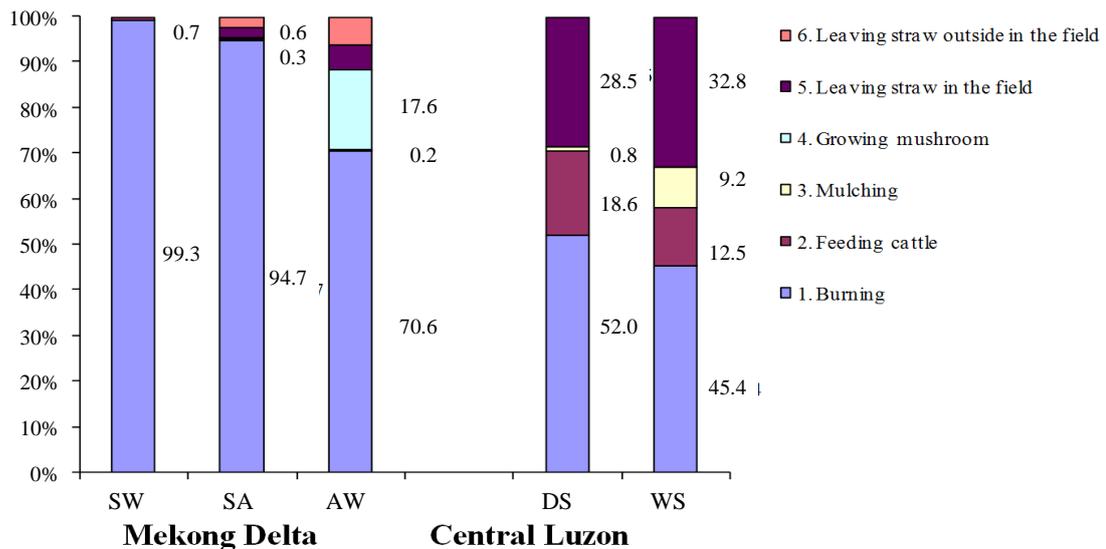
$$A_F = \ln \frac{(P_i)}{(1 - P_i)} = \beta_i X_i + \alpha \tag{1}$$

**Table 1 Descriptions of variables in the Logit model**

Variables	Description	Unit / Value	Expected signs
A <sub>F</sub>	Farmers' acceptance to use the technology (straw mushroom)	A <sub>F</sub> = 1: accept A <sub>F</sub> = 0: not accept	
X <sub>1</sub>	Household income per year	USD/household/year	-
X <sub>2</sub>	Farm size devoted to rice production	Ha/household	-
X <sub>3</sub>	Household size	Persons	+
X <sub>4</sub>	Age of respondent/person involve in rice production	Years	-/+
X <sub>5</sub>	The educational level of respondent/person involve in rice production	Number of years schooling	-
X <sub>6</sub>	Dummy variable of farmers' awareness about straw mushroom	X <sub>6</sub> = 1: aware or have heard about straw mushroom, otherwise X <sub>6</sub> =0	+
X <sub>7</sub>	Dummy variable of farmers' need training about straw mushroom	X <sub>7</sub> = 1: respondent wants to learn about straw mushroom, otherwise X <sub>7</sub> =0	+
X <sub>8</sub>	Dumpy variable of distance (d) from house to the rice field	X <sub>8</sub> = 1 if d < 0.5 km, otherwise X <sub>8</sub> = 0	-
α	Constant		

**RESULTS AND DISCUSSION**

**Rice straw uses in Mekong Delta, Vietnam and Central Luzon, Philippines**



**Fig. 2 Current uses of rice straw in Mekong Delta, Vietnam, 2008 and Central Luzon, Philippines, 2009**

Note: SW: Spring Winter crop, SA: Summer Autumn crop, AW: Autumn Winter crop in Mekong Delta  
DS: Dry Season crop, WS: Wet Season crop in Central Luzon, Philippines

There are differences between Mekong Delta, Vietnam and Central Luzon, Philippines in the cropping pattern. The survey was conducted at the three paddy crops per year in the Mekong Delta (Spring Winter (SW) - October/November – February, Summer Autumn (SA)- February - April and Autumn Winter (AW) - April - July/August). In Central Luzon, there are only two paddy crops per year (Dry Season crop (DS) - January to April and Wet Season crop (WS) - July to October).

Majority of the rice straw in Mekong Delta, Vietnam was burned (SW-99%, SA-95% and AW-71%) while a minimal percentage is used for growing straw mushroom, leaving in the field and feeding cattle. In Central Luzon, rice straw was burned (DS-52% and WS-45%), left in the field (DS-29% and WS-31%), used to feed cattle (DS-19% and WS-23%) while the rest was used for mulching (DS-1% and WS-9%) (Fig. 2).

### Farmer's awareness about straw mushroom production

Straw mushroom has been introduced in Mekong Delta and Central Luzon as a means to augment farmer's income since the 1990s. Thus, the technology is no longer new to farmers. However, more than half (60%) of the respondents in Central Luzon have never heard about straw mushroom. All the farmer-respondents in Mekong Delta knew about straw mushroom since it is their daily vegetables (Table 2). However, about 88% of the total respondents have never grown straw mushroom with only 12% and 7.6% of the households in Mekong Delta and Central Luzon, respectively, stating that they had grown the crop. However, none of the surveyed households in Central Luzon grew straw mushroom in 2008 – 2009.

**Table 2 Farmer's awareness about straw mushroom in Mekong Delta, Vietnam, 2008 and Central Luzon, Philippines, 2009 (% responses)**

ITEMS	VIETNAM			PHILIPPINES		
	O Mon (n=120)	Cai Lay (n=126)	Mekong Delta (n=246)	Muñoz (n=70)	Santo Domingo (n=101)	Central Luzon (n=171)
Never heard about straw mushroom	-	-	-	77.14	48.51	60.23
Heard about straw mushroom but never grown it	75.80	100.00	88.20	14.26	44.59	32.17
Heard about straw mushroom and used to grow the crop	24.20	-	11.80	8.60	6.90	7.60

### Farmer's acceptance of growing straw mushroom

Farmer's attitude towards attending trainings on straw mushroom production and their intent to grow straw mushroom after the training were investigated in the survey. Central Luzon farmers were less likely to attend trainings and to grow straw mushrooms after participating in the trainings with only 57% compared with 76% of the farmers in Mekong Delta (Table 3).

**Table 3 Willingness to attend training in straw mushroom production in Mekong Delta, Vietnam, 2008 and Central Luzon, Philippines, 2009**

ITEMS	VIETNAM			PHILIPPINES		
	O Mon (n=120)	Cai Lay (n=126)	Mekong Delta (n=246)	Muñoz (n=70)	Santo Domingo (n=101)	Central Luzon (n=171)
Willing to attend training and at least one person decided to after attending training	69.17	83.33	76.42	65.71	50.50	56.73
Do not want to attend training or attend training but not grow after training	30.83	16.67	23.58	34.29	49.50	43.37

### Factors affecting farmers' acceptance of growing straw mushroom

The result of the Logit model that analyzes the factors affecting respondent's attitude towards using rice straw for growing mushrooms is shown in Table 4. However, the awareness and information needs variables were deleted in the regression for Mekong Delta since the level of awareness about straw mushroom in this country is already 100%.

Among the six factors tested in Mekong Delta, two factors (household income and household size) appeared to have significant negative effect on farmer's decision to use rice straw in growing mushrooms. Lower income and smaller households were more likely to grow mushrooms than those with higher income and bigger households. The results on the household size relative to the acceptance of mushroom growing were unexpected as the author anticipated the opposite. Mushroom growing is labor-intensive, thus, it would have been logical that bigger households would be more receptive to growing straw mushroom. However, in practice, bigger households tend to send their children to work or study outside the communes. They also might have to take care their children, so they have no more vacant time for straw mushroom growing.

**Table 4 Factors affecting respondents' acceptance of growing straw mushroom in Mekong Delta, Vietnam, 2008 and Central Luzon, Philippines, 2009**

VARIABLES	Xi	$\beta_i$	Mekong Delta		Central Luzon	
			Coefficient	z value	Coefficient	z value
Household income	X <sub>1</sub>	$\beta_1$	-0.0001925 **	-2.22	0.0001574 **	2.19
Farm size	X <sub>2</sub>	$\beta_2$	0.3086298	0.88	-0.759491 0**	-2.41
Household size	X <sub>3</sub>	$\beta_3$	-0.2538631 **	-2.45	-0.1191921	-1.00
Age	X <sub>4</sub>	$\beta_4$	-0.0020682	-0.11	-0.0058102	-0.33
Educational attainment	X <sub>5</sub>	$\beta_5$	0.0499579	0.78	-0.0639080	-0.91
Awareness	X <sub>6</sub>	$\beta_6$			0.2019690	0.52
Need	X <sub>7</sub>	$\beta_7$			2.3617420 ***	5.98
Distance	X <sub>8</sub>	$\beta_8$	-0.4778684	-1.47	-0.5649210	-1.40
Constant		$\alpha$	-2.993046 **	2.48	0.7589256	0.51
Number of observation				242		171
Percent of acceptance (%)				76		57
Pseudo R <sup>2</sup>				0.1187		0.2422

Note: \*\*\*, \*\* and \* indicate statistical significance at 1%, 5% and 10% levels, respectively

Among the eight factors tested for Central Luzon, only three factors significantly affected the decision to grow straw mushroom (household income, farm size and willingness to learn more about straw mushroom). Households with higher income and smaller farm size were more receptive to grow straw mushroom. Growing straw mushroom is considered a small business in Central Luzon rather than a livelihood, as opposed to the culture in Mekong Delta wherein poor farmers engage in mushroom production to augment their household income. This cultural difference in mushroom production may explain why the household income coefficients differed between the two regions. The results show that higher income households in Central Luzon had higher acceptance of mushroom production. Likewise, results showed that households with smaller farm size were more likely to accept the technology as they would want to earn more to compensate for the small income they get from producing rice within their small farm areas.

Further, those who were willing to learn about straw mushroom were also more likely to adopt the technology after training. The results from focus group discussions and interviews highlighted the importance of the product's outcome in promoting mushroom growing. Because of the high perishability of straw mushrooms, farmers need to sell their products within a day in the market, farmers or women union, cooperatives or any group in the commune who help mushroom growers connect with the market within a day and secure their minimum selling price.

With regards to the conditions to learn about straw mushroom, Cai Lay and Muñoz farmers showed more interest than O Mon and Santo Domingo farmers did. Data from the survey, FGDs, and interviews showed that trainings on mushroom growing should be conducted in these two areas. Central Luzon farmers also needed good quality and available supply of spores. This factor may

encourage them to grow mushrooms in this region. Growing mushrooms is simple yet requires a lot of labor. To encourage them, farmers can make use of the free and simple labor available in the commune or can work in groups to help each other to save on labor. Lastly, market access and better selling price were among the most important factors to succeed in promoting straw mushroom to farmers.

### **Enabling factors and constraints in straw mushroom production**

The major motivating factors of growing mushroom cited by farmers in Central Luzon and Mekong Delta were significantly different from each other. For the Mekong Delta, the major advantages of growing mushroom in the two famous growing areas (Thom Rom, Can Tho city and Tan Hoa, Dong Thap province) in Mekong Delta were 1) the availability of materials (rice straw and spore), 2) availability of labor, and 3) ease of production. On the contrary, mushroom production in Central Luzon is still at the infancy stage and farmers were unable to market their products even when the demand was very high in this region. The biggest enabling factor of growing mushroom in Central Luzon was the availability of materials and labor.

Despite the numerous motivating factors in the two main study sites, mushroom growers still encountered several difficulties in mushroom growing such as 1) limited market, 2) limited spore supply, especially in Central Luzon, and 3) increasing labor cost.

### **CONCLUSION**

The holistic approach of determining the factors affecting farmer's acceptance in growing straw mushroom from both non - adopters and adopters as well as related key informants provided a whole picture of straw mushroom adoption in Mekong Delta, Vietnam and Central Luzon, Philippines. This study also confirmed the importance of socio-economic characteristics, their knowledge and perception of the technology significantly affecting their choice.

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