

Enhancing Livelihoods: Mushroom Cultivation Practices and Challenges of Smallholder Farmers in Svay Rieng and Svay Chrum Districts, Cambodia

Chanthan Or^{1*}, Puthesath Sin², Chhun Hong³, Vanchey Ros³, Tithya Kang³, Dina Pen⁴, and Mardy Serey⁵

¹ Faculty of Business Administration, Svay Rieng University, Svay Rieng Province, Cambodia

² Vice Rector, Svay Rieng University, Svay Rieng Province, Cambodia

³ Faculty of Agriculture, Svay Rieng University, Svay Rieng Province, Cambodia

⁴ Faculty of Social Science, Svay Rieng University, Svay Rieng Province, Cambodia

⁵ International Relations Office, Svay Rieng University, Svay Rieng Province, Cambodia

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ABSTRACT

Smallholder farmers in Svay Rieng Province, Cambodia, play a crucial role in the country's agricultural sector, particularly in mushroom cultivation. Despite facing numerous challenges such as limited access to resources, climate change, and market uncertainties, these farmers contribute significantly to the national food security. This study aims to explore the technical knowledge, technical adaptation and practices of mushroom growing, and to analyze the economic efficiency of mushroom growing of smallholder farmers in Svay Rieng and Svay Chrum districts, Svay Rieng province, Cambodia. Eight farmers in three target villages were selected for household surveys (four farmers were the target and others four are non-target). Two types of mushroom were selected to grow by farmers, which are Straw and Oyster Mushroom. Fifty percent of farmers (both target and non-target) experienced in mushroom growing for more than five years and all of target farmers received technical training on mushroom growing from HEQCIP Project while only half of the non-target farmers used to get training from Government project (Provincial Department of Agriculture). At the same time, only one half of interviewed farmers share their technical knowledge and experiences on mushroom growing with their relatives, neighbors, and other farmers in their communities. All farmers apply mushroom growing techniques provided by the project together with their experiences and local knowledge. Even farmers in the targeted communities used natural fertilizers in mushroom growing, but 50% of them still used chemical fertilizers. It is interesting that all farmers sprayed jungle white before start growing, except 25% of the straw mushroom targeted farmers do not do that. The average profits for a targeted farmer gained from mushroom growing per production cycle is 600,250 Riels which is equal to 180% compared with expenses; or 60% compare with the total incomes while the non-targeted farmers profit is about 110% (504,250 Riels) compared with the expense; or 50% compared with the incomes. Even though the profit percentage from mushroom growing is higher than vegetable cultivation, but only 25% of the target and 50% of the non-target farmers who indicated their livelihood have improved a lot while the rest mentioned little improvement. This is because 50% of targeted and 75% of non-targeted farmers used incomes from mushroom production to repay their loan.

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1. INTRODUCTION

Smallholder farmers in Svay Rieng Province, Cambodia, are increasingly turning to mushroom cultivation as a supplementary income source and a means to enhance food security. While the province's agricultural landscape is primarily dominated by rice and vegetable production, mushroom cultivation offers several advantages, including relatively low input costs, short production cycles, and high market demand (Chang, S.T. & Miles, 2004). Mushroom cultivation in Svay Rieng Province is an emerging agricultural practice, gaining popularity among smallholder farmers. While traditionally known for rice and vegetable production, mushroom

cultivation offers a promising alternative income source, particularly for those with limited land and resources. Several factors contribute to the growing interest in mushroom farming in Svay Rieng: 1) high market demand: the increasing demand for organic and healthy food products has created a market for locally produced mushrooms; 2) relatively low investment: mushroom cultivation requires minimal initial investment compared to other agricultural ventures; 3) short production cycle: mushrooms can be harvested relatively quickly, providing a rapid return on investment; and 4) climate suitability: the tropical climate of Svay Rieng is conducive to mushroom cultivation, especially for species like oyster and shiitake mushrooms (Gajanayake, A.J., Samarakoon, M.C., Bundhun, D., Jayawardena, R.S., Luangharn, T., & Hyde, 2021).

However, smallholder mushroom farmers in Svay Rieng face various challenges, including limited access to quality spawn, inadequate technical knowledge, and constraints in post-harvest handling and marketing. These factors often result in low yields, poor quality, and limited market opportunities (Royal Government of Cambodia, 2013). To overcome these challenges, it is crucial to provide targeted support to smallholder farmers, such as training on improved cultivation techniques, access to quality inputs, and assistance in market linkages (Olney, K. D., Talukder, A., Lannotti, L. L., Ruel, M. T., & Quinn, 2009). By addressing these challenges and promoting sustainable mushroom cultivation practices, smallholder farmers in Svay Rieng Province can enhance their livelihoods, contribute to food security, and contribute to the overall economic development of the region (World Bank, 2015).

This study aims to explore the technical knowledge, technical adaptation and practices of mushroom growing, and to analyze the economic efficiency of mushroom growing of farmers in Svay Rieng and Svay Chrum districts, Svay Rieng province, Cambodia.

2. METHOD

Survey method was used in this study. Eight farmers in three target villages were selected for household surveys (four farmers were the target and others four are non-target). Sangkat Chek in Svay Rieng town and three communes (Kampong Chamlang, Tasous, and Chhoeu Teal communes) in Svay Chrum district are the research site. Two types of mushroom were selected to grow by farmers, which are Straw and Oyster Mushroom. Fifty percent of farmers (both target and non-target) experienced in mushroom growing for more than five years and all of target farmers received technical training on mushroom growing from Higher Education Quality and Capacity Improvement Project (HEQCIP) while only half of the non-target farmers used to get training from Government project (Provincial Department of Agriculture) (World Bank, 2023). Questionnaire was designed for interviewing the mushroom cultivators and focus-group discussion was organized to discuss about the technical knowledge, knowledge sharing, technical adaptation and mushroom growing practices among farmers in target and non-target communities such as participatory rural appraisal (PRA), annual reflection workshop, focus group discussion, interview face to face, annual retreat workshop.

The quantitative and qualitative research methodology we had also used such as: **For primary data:** 1 time meeting with district governors, commune chiefs, village chiefs for good cooperation, 10 days Interview to stakeholders, 1 time Meeting with concerning department such as Provincial Agriculture Department (PAD), Provincial Education Department, Provincial of Social Affair, Veterans and Youth Rehabilitation Department for secondary data and other NGOs related. 2 times training for households and SRU student researchers. 2 times exchanges learning visit for households and SRU student researchers to other institute for good practice. 1 time meeting with stakeholders, students, local authority, provincial departments and other NGOs to declaration on research result of report. **For secondary data:** 1 time meeting with district governors, commune chiefs, village chiefs for good cooperation. 1 time Meeting with concerning department such as Provincial Agriculture Department (PAD), Provincial Education Department, Provincial of Social Affair, Veterans and Youth Rehabilitation Department for secondary data and other NGOs related. **Sampling:** The sampling is collected by random within using tool of Yamen Taro 1967 and 1973 (1. Formule of Yamen Taro 1967 and 2. Formule of Yamen Taro 1967) (Stokes, E., Lauff, C., Eldridge, E., Ortbal, K., Nassar, A., & Mehta, 2015).

3. RESULT AND DISCUSSION

3.1 Technical knowledge and sharing

The survey also found that 100% of targeted farmers used to receive the trainings on mushroom growing technics, while only 50% of non-targeted farmers used to obtain such training. Further analysis proved that all the

targeted farmers have obtained the trainings from the project of Svay Rieng University, while 50% of non-targeted farmers used to receive the trainings, and obtain the trainings from Department of Agriculture and another 50% obtain the trainings from demonstrated farmers (Agba, M.I.O., Markson, A.A., Oni, J.O., & Bassey, 2021).

The farmers then have been asked whether they can make mushroom strain for growing or not, 2 out of 4 interviewed targeted farmers replied yes while 1 out of 4 interviewed non-targeted farmer also says yes for the same question. One targeted farmer said that he knows how to make it since 2001 and another one has just recently known in 2015 while one non-targeted farmers knows since 2001 as well. The study also finds that 50% of targeted and non-targeted farmers can grow the mushrooms for more than 5 years already and another 50% of them can grow it for less than 5 years only (FAO, 2014).

About sharing of knowledge and experiences, only fifty percent of the target farmers used to share the technical knowledge on growing mushrooms (both to grow straw and yarn mushroom) to other farmers while all of non-targeted farmers did not (Badshah, K., Ullah, F., Ahmad, B., Ahma, S., Alam, S., & Ullah, 2021).

3.2 Technical Adaptation and Practices

Among eight farmers interviewed (four each target and non-target), only 2 farmers (one each target and non-target) grow yarn mushroom, while five grow straw mushroom and another households grow both types of mushrooms. Related to the mushroom growing technics, all of both targeted and non-targeted farmers mentioned that they used both technical knowledge received from trainings and their existing experiences to grow mushrooms, not just merely followed neither technical nor experiences (Erler, F., Polat, E., Demir, H., Catal, M., & Tuna, 2011).



Photo 1: The targeted Farmer in their straw mushroom farm



Photo 2: The targeted Farmer in their straw mushroom farm

3.2.1 Sources of mushroom strain for growing

25% of targeted farmers said that they made it by themselves while 75% of them bought it from Phnom Penh. At the same time, 25% of non-targeted farmers told that they have got it from their neighbors, 25% of them said they made it by themselves and 50 % of them bought it from Phnom Penh.

3.2.2 Raw materials for mushroom growing

Concerning the materials used in mushroom growing, both targeted and non-targeted farmers have used different raw materials in producing mushroom-yarn and mushroom-straw.

- Straw mushroom production: farmers have used stubble, straw, water hyacinth and others as the raw material. Figure 11 reveals that 100% of targeted farmers have used water hyacinth as the raw material, while 75% have also used straw as the raw material, 50% of them also used stubble and 25% of them used other materials. The non-targeted farmers also used the same materials including water hyacinth, straw and stubble with the proportion of 100%, 100% and 75% respectively.

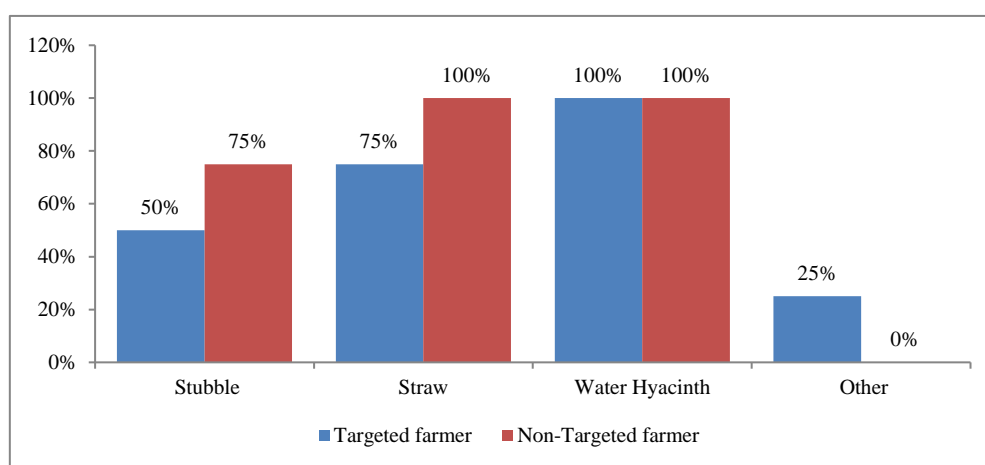


Figure 1: Raw material used by respondents for straw mushroom

- Oyster mushroom production: farmers have used wooden chips, corncob and straw. The study suggests that 33.3% of targeted famers have used only wooden chips as the raw materials for producing mushroom-yarn, 33,3% of them used wooden chips mixing with corncobs and another 33.3% used wooded chips mixing with straw. However, 100% of non-targeted farmers have used only wooden chips to produce mushroom-yarn.

3.2.3. Spray jungle white

The study finds that 50% of targeted farmers and 75% of non-targeted farmers have sprayed the jungle white water for their mushroom-yarn growing while 75% of targeted farmers and 100% of non-targeted farmers have sprayed the jungle white water for their mushroom-straw growing.

3.2.4 Fertilizer usage

According to both targeted and non-targeted farmers, they didn't use any natural and chemical supplement substances for their mushroom growing. All non-targeted and half of targeted farmers used fertilizers for their mushrooms (both straw and yarn mushroom) growing and the fertilizers they have used is natural/organic fertilizers.

3.2.5 Problem Encountered

The result of the survey shows that 75% of both targeted and non-targeted farmers have faced problems during growing process and 25% of them mentioned they didn't face any problems during the growing process. According to the interviewed farmers, the main problems encountered for mushroom growing are diseases, insects, lack of mushroom for growing, lack of raw materials, poor techniques, lack of labors and so forth. Table below presents the proportion of targeted and non-targeted farmers who face the problems in the vegetable production.

Table 1: Problems encountered by respondents

Problems encountered	Targeted farmer		Non-targeted farmer	
	Yes	No	Yes	No
Insect	67%	33%	0%	100%
Disease	33%	67%	67%	33%
Lack of seed or strain of mushroom for growing	67%	33%	67%	33%
Lack of technical	0%	100%	33%	67%
Lack of labor	67%	33%	67%	33%
Lack of raw materials	0%	100%	33%	67%
Others	33%	67%	0%	100%

According to the table above, there are three main problems that both targeted and non-targeted members have mentioned that have occurred very often and strongly affect to the profits of their mushroom growing are insect (included ant, mouse, and other raising animals like pigs, chicken, ducks and so on), diseases and lack of seed or strain of mushroom for growing.

3.3. Family Economic Analysis and Livelihood Improvement

3.3.1 Expense on mushroom growing

Deeper analysis proves that respondents have spent their capitals on various things such as mushroom mycelium for growing, raw material (wooden chips, rice bran and straw, fired wood, gasoline, and so forth. The study finds that the targeted farmers have less average total expenditure than non-targeted farmers, to say that 331,250 Riels against 469,250 Riels per production cycle.

3.3.2 Profit analysis

The average profits for target farmers per production cycle is 600,250 Riels which is equal to 180% compared with the expenses, or 60% compared with the total incomes while the non-target farmers profits is only 110% compared to the expenses or 52% compared to the total income. Table below present the average profit of the target and non-target farmers.

Table 2: Profit gained compared to the expense and incomes

Type of Farmers	Expense (Riels)	Income (Riels)	Profit (Riels)	% Profit vs Expense	% Profit vs Income
Target	331,250	931,500	600,250	180%	60%
Non-Target	469,250	973,500	504,250	110%	52%

3.3.3 Livelihood improvement

Finally, respondents have been asked to express on their family living standard by comparing before and after cultivating vegetable, in result all the target farmer have mentioned that their family living standard is better than before (25% said that it's much better and 75% raised that it's better), while half of non-target said their livelihood improved much and other half little improved.

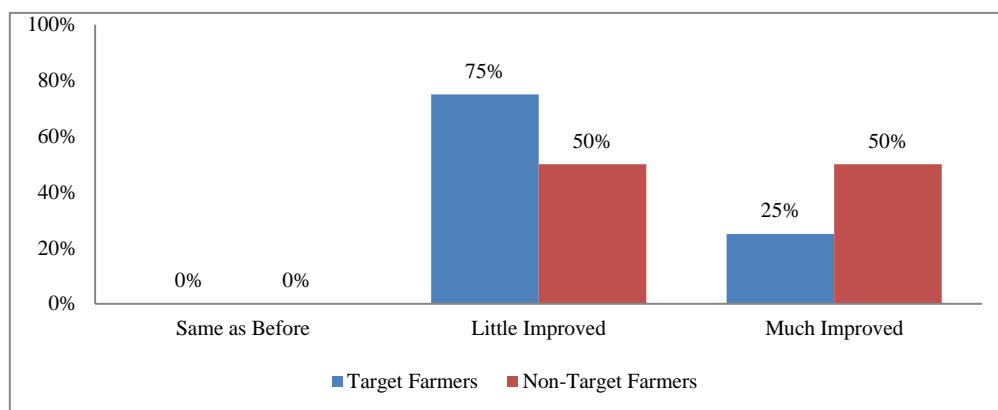


Figure 2: Percentage of farmers whose livelihoods are improved

There are six purposes in income utilizations from vegetable selling. 100% of both targeted and non-targeted farmers use their incomes to buy foods for their family, while 100% of non-targeted and 75% use for household materials/equipment, 75% of targeted and all non-targeted farmers use for health cares, 75% use for business expansion and 50% of targeted and 75% of non-targeted use for repayment of their loans.

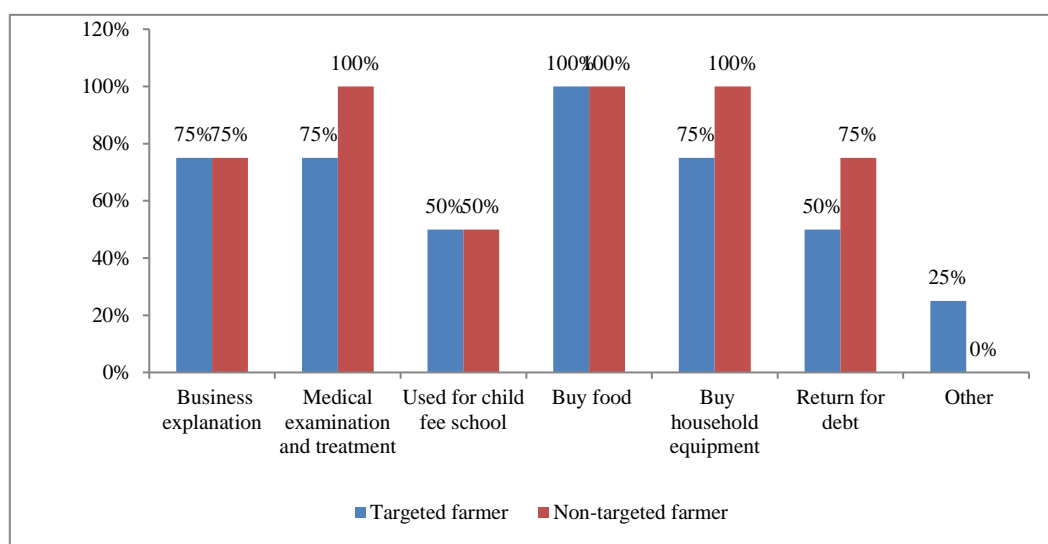


Figure 3: Percentage of Income Utilization

4. CONCLUSION

Through the findings from survey on mushroom cultivation in Svay Rieng and Svay Chrum districts, Svay Rieng province, we can conclude that the sharing of technical knowledge and experiences made by targeted farmers is more widely than non-targeted farmers in which may cause the targeted farmers receive more trainings both technical and spirit of sharing. The appropriate practice that brings higher profits for farmers in growing mushroom is mixing up between technics provided by training and experiences of the farmers. Quality mushroom products and markets to sell their products are main factor to contribute to sustainability among farmers who grow mushrooms .

For recommendation, to improve the technical knowledge and experience among community farmers on mushroom growing, the project team should motivate the knowledge and experiences sharing more widely through conducting farmer exposure visits, field days, or farmer forums. This will allow all interested farmers, both targeted and non-targeted, to learn from and share with each other. Additionally, the project should collaborate with farmers to define appropriate techniques and experiences based on local geographic conditions, weather patterns, soil types, and market dynamics in different target communities. To further enhance farmers' opportunities, the project

can facilitate linkages between targeted farmers and other farmer groups, networks, or cooperatives in the same or nearby communities. This will strengthen collaboration and expand access to profitable markets, easier loan access, and lower interest rates. Finally, ensuring access to quality seeds and markets is crucial for the sustainability of mushroom cultivation. The project should provide training on seed selection and storage, as well as empower farmers to negotiate favorable prices for their products. Furthermore, establishing connections with local technical experts and departments will enable farmers to seek timely advice and support.

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