

Fulfilling the needs of protein-balanced diet through the introduction of Oyster mushroom (*Pleurotus ostreatus*) cultivation in Bojong Koneng village, Sentul, Bogor

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ABSTRACT--A healthy community should be able to support its people by providing them with balanced diets. Communities in developed and underdeveloped regions are unable to fulfil this, mainly because of two reasons. First, people are not well-informed about the importance of nutrition. Second, they usually do not have the budget to buy high-nutrition foods. This study reports a community engagement case in Bojong Koneng, an edutourism village with economic capabilities of villagers ranging from low to middle tier. With that range, people are more than hesitant to buy protein-rich eatables. Cultivation technique of Oyster mushroom (*Pleurotus ostreatus*), an edible mushroom rich in protein content, is integrated into lifestyle of villagers through inclusive participation approach. Evident increase in knowledge of villagers of healthy diets after the integration process was noted. Moreover, villagers in Bojong Koneng successfully imitate the process of Oyster mushroom cultivation on their own. Plentiful harvest of Oyster mushroom was then consumed by their own on a daily basis. Therefore, incorporating the practice of Oyster mushroom cultivation in Bojong Koneng village, Sentul, Bogor, fulfil the needs of protein-balanced diet in the community.

Keywords-- community engagement, mushroom cultivation protein-balanced diets

I. INTRODUCTION

Nutrient gap is a prominent problem in Indonesia, especially in rural areas, underdeveloped regions, and areas that are located far from major cities (Pasandaran *et al.* 2015). Unlike those who lives in the city, people of rural areas depend on local economic activity to sustain day-to-day needs. These local economic activities mainly include agricultural activity, animal husbandry, and selling handicrafts through local traditional market (Elizabeth 2016). The aforementioned activities do give profit, but mostly insubstantial in value that people do not have the luxury to think about healthy diets. Food commodities such as vegetables, fruits, and fish products are most common, while meat products are essentially an arm and a leg for them (Ariningsih 2005).

From nutritional point of view, meat products from cattle, goat, lamb, and fishes have plentiful amount of proteins that are easily processed and absorbed by human digestive system. But with the overall low capacity of income and scarcity of meat products in underdeveloped regions, people usually use vegetable protein as a substitute for animal protein. That being said, the amount of proteins that people of underdeveloped regions

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consume is relatively subpar, mostly because the difference of total proteins per serving of meat products-containing diet and vegetable protein-substituted diet (Ariningsih 2005).

This nutritional gap could be tackled by introducing edible mushrooms diet into the lifestyle of these people. Mushroom is a group of microorganisms from the kingdom Fungi capable of forming macroscopic fruiting bodies. Fundamentally, these fruiting bodies are just aggregates of the hyphae of the fungus (Miles & Chang 2004). Mushrooms have considerable amount of carbohydrates, lipid content, and mostly protein. It is to note that the amount of protein in a mushroom per 100 grams of serving is on par with those of meat products (Kumar *et al.* 2017). Mushrooms are also highly valued food commodities. The only factor preventing people from tapping into this healthy and profitable resource is the knowledge to cultivate the mushrooms. As what's been proven all over the globe, the practice of mushroom cultivation is relatively cost-efficient and easy. And it's not the first time that the introduction of the practice of mushroom cultivation bring forth growth in economy of the underdeveloped regions (Chang 1999; Landry & Chirwa 2011; Grimm & Wösten 2018). Also of note, the agricultural waste produced from the economic activities in the underdeveloped regions may be used as mushrooms growth medium (Ginting *et al.* 2013).

Cikeas village is located in the sub-district of (kecamatan) Bojong Koneng, Pandeglang district (kabupaten), Bogor province. This village also depends on ecotourism as another source of profitable activities besides of agricultural and wood-crafting activities. Despite that, farming is still the most preferable mode of income for overall Bojong Koneng villagers. Accordingly, organic wastes such as rice husks and other agricultural leftovers are of abundance and usually are not used by the villagers. Encouraging the practice of mushroom cultivation, in this case Oyster mushroom (*Pleurotus ostreatus*) cultivation would alleviate the waste problem while boosting overall village profit (Ginting *et al.* 2013).

This study is aimed at changing the way of thinking of Bojong Koneng villagers by educating, training, and demonstrating, the simple practice of Oyster mushroom cultivation. It is done so in order that they would voluntarily utilize agricultural waste for their own nutritional needs (Altman 1999). Hopefully, by taking voluntarily actions into account, sustainable development in Bojong Koneng village might be achieved.

II. METHODS

2.1 Community Service Location

Community service is located in Bojong Koneng Village, Babakan Madang Subdistrict, Bogor Province. The village has an area of 2,477 hectares and is about 25 km from Bogor City. Bojong Koneng is a village where most of its residents rely on animal husbandry and wood products as their main income. This makes Bojong Koneng a partner village that is very suitable for the integration of mushroom cultivation. The mushroom cultivation process is carried out in an indoor area, by using the Bumi Kepanduan Sentul Camping Ground as a meeting point for service members and all villagers.

2.2 Community Engagement Design

2.2.1 Engagements approach

Community service was done by inclusive participation methods (Ahmed & Palermo 2010). In this case, the community service team mingled with the villagers from the initiation process until the technology integration was successfully implemented. The community has the right to do things outside the program that have been planned based on their own interests. This is determined based on the purpose of the community service program that wants the formation of a community with sustainable integrated technology. Through the inclusive participation method, new motivators can emerge then ensure that the technology implemented will still be used even though the community service program period has ended.

2.2.2 Methods to expand communal capacities

Community capacity building is carried out through three main ways, such as socialization, training and demonstration, and evaluation of the results from independent work (Craig 2007). The public's mind becomes open to the integrated mushroom cultivation technology through the socialization process carried out in the initial phase of community service. After the villagers learned about the new technology and knowledge to be applied, the community was invited to do mushroom cultivation directly with guidance and supervision from the Universitas Indonesia community service team. This is different from training in general with naturally passive participants. The results of mushroom cultivation carried out by residents then evaluated together to analyse errors and increase satisfaction arising from the process of mushroom cultivation.

2.2.3 Mushroom cultivation techniques

Mushroom cultivation was held in two phases, supplied and independent. In the supplied phase, the community are given two baglogs for each person with the aim of habituating the mushroom cultivation technique through the finished baglogs. In contrast, in the independent phase, the community conducts mushroom cultivation from the earliest stage, namely making baglog. Baglog making processes are following the protocol of mushroom cultivation that is on Miles & Chang (Miles & Chang 2004).

2.2.4 Data collection

There are several variables that can be observed in the community service process, which are determined to adjust the objectives of the grant program. Data from these variables were collected through direct observation and through questionnaires given to Bojong Koneng villagers.

III. RESULTS AND DISCUSSION

Villagers of Bojong Koneng are well-informed about the varieties of edible mushroom as shown in Figure 1. They are most-informed about Oyster mushroom, because in other area of Bogor, i.e. Gadog, a plentiful of mushroom farmers reside in that area. Even though the villagers of Bojong Koneng were able to recall the diversity of edible mushroom available in Bogor, a relatively big portion of the group (23%) had not had the knowledge just yet.

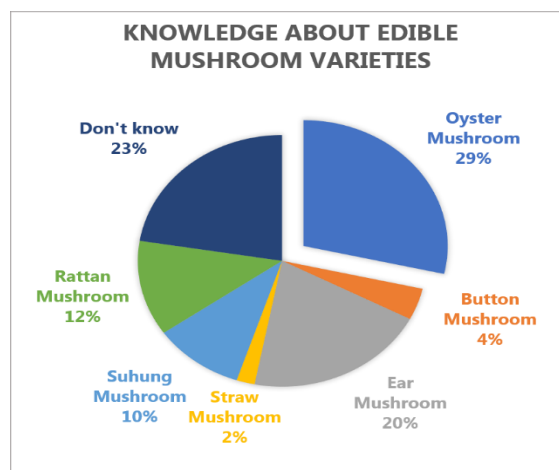


Figure 1: Bojong Koneng knowledge of villagers about edible mushroom varieties.

Villagers of Bojong Koneng were then engaged in a serial workshop provided by our team. The first focused on the benefits of mushroom, especially Oyster mushroom, while the second focused on the practice of mushroom cultivation. Villagers are well pleased with the information provided in each workshop, proven by their comments on the questionnaires results (data not shown). They are most delighted with the information delivered regarding the medical importance of oyster mushroom, which was demonstrated lively with baglog as shown in Figure 2.



Figure 2: Socializing the importance and benefits of oyster mushroom to the villagers of Bojong Koneng.

Two weeks after the first workshop, villagers were given opportunity to cultivate oyster mushroom first-hand from scratch. Starting from making the mushroom growth medium, or as known as baglogs, villagers of Bojong Koneng are learning the essentials and technical aspects of oyster mushroom cultivation. All materials used on this workshop were taken from the literatures mentioned in Methods section.

As expected, weeks after the second workshop was done, villagers of Bojong Koneng had been growing mushrooms on their own, as shown in Figure 3. All the process of oyster mushroom cultivation from making baglog, seeds spawning, fructification, and harvesting were done all by themselves. Harvest were obtained approximately three months after the manufacturing of baglog and may yield around 1,2 kilograms of oyster mushrooms daily.



Figure 3. Villagers of Bojong Koneng doing oyster mushroom cultivation on their own

What caused this high level of enthusiasm that caused the villagers to initiate the cultivation on their own? This level of enthusiasm of villagers for their own mushrooms harvest can be explained biologically by carefully assessing the neurological reward system regarding this oyster mushroom cultivation practices. In the beginning, Bojong Koneng villagers are trained in the premises of the benefits of oyster mushroom cultivation, i.e. gustatory satisfaction, added nutritional value, and medical benefits. Knowledge of these benefits are consolidated through the first-hand experience of tasting oyster mushroom-based food served by our team. This provides cue to a positive feedback loop that make the villagers yearn for the same result when they are practicing oyster mushroom cultivation. This phenomenon is a direct aftereffect of interaction between the neurotransmitter dopamine and its receptor in human brain (Schultz, 2015).

Positive feedback is looped whenever the villagers are assured by themselves, that the work of their hand is also capable of inducing equal or better satisfaction that they once received. This is first confirmed through the villagers' opinion regarding oyster mushroom harvest that they do themselves. Villagers' post-harvest actions also confirm the prior explanation. Out of all participant, all of them voluntarily repeat the practice of oyster mushroom cultivation without prior supervision by our team. Furthermore, as expected, all of the participants have utilized the oyster mushroom harvest to be processed as food for their own family. This phenomenon of satisfactory-induced habit is also consistent with previous research (Berridge & Kringelbach, 2015).

Enthusiasm from villagers of Bojong Koneng is also influenced by the new knowledge that they now possess. Out of all participant, all of them claimed that they understood the practice of oyster mushroom cultivation. This is further confirmed by assessing the growth of mushrooms medium in form of baglog that the villagers produce themselves. As shown in Figure 4, not only they have successfully baglogs with low degree of contamination, the produced baglogs seem to exhibit better level of media of mycelia penetrance capability in relative to the baglogs that are commercially available. As result, the mushroom produced is also of high yield as mentioned before. All of the participant claimed that this knowledge of oyster mushroom cultivation is a novel expertise for them.



Figure 4: Well-manufactured baglogs produced by the villagers of Bojong Koneng

Though we were successful in initiating a good habit by changing the way of thinking of villagers, we would like if this change is not only temporarily, but also self-sustaining. Because as previous experiences of community engagement and services demonstrate, introduction of new technology might not be continued in the long run, causing short or temporary success of community engagement (Paavola, Lipponen, & Hakkarainen, 2004). Therefore, communication between engager and villagers is needed to ensure the continuity and sustainability of the introduced technology. We did this by indirectly supervising Bojong Koneng villagers through the village chief and helping them by troubleshooting the problems that they encountered in the process of oyster mushroom cultivation. As for the date this paper is submitted, Bojong Koneng villagers still maintain the practice of oyster mushroom cultivation all by themselves.

IV. CONCLUSION

Sustainable community development will not be achieved without the change of mindset of its own people. In this case, the mindset of Bojong Koneng villagers has been successfully transformed to independently relying on the practice of oyster mushroom cultivation while producing foods and reducing agricultural wastes. This change of mindset is mainly driven by the satisfaction that the villagers receive while doing the practice of oyster mushroom cultivation. In the future, Bojong Koneng village is planned out to be the major mushrooms baglog producer in the Bogor province.

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