



## Community Empowerment: Training on Cultivation of Mushroom From Corncob's Waste In Air Terang Village, Central Sulawesi

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### ARTICLE INFO

#### Article history:

Received: 10th May 2021

Accepted: 24th June 2022

Published: 1st December 2022

#### Keywords:

Participatory Action Research, Media, Economy, Pollution.

### ABSTRACT

The community has not utilized the abundant corncob waste in Air Terang Village. Corncob waste can be used as a medium for growing mushrooms. This program service aims to improve the knowledge and skills of the community in Air Terang Village, Tiloan District, Buol Regency in cultivating mushrooms from corncobs. The implementation of this service uses the Participatory Action Research (PAR) method, which consists of three stages: preparation, implementation, and evaluation. The result of this community service program is the community begins to understand and realize the use of corncob waste as a medium for growing mushrooms and can cultivate mushrooms from corncobs. Recommendations for the next service program are mushroom post-harvest processing and training on mushroom marketing strategies.

**How to cite:** Pangestuti, R. F., Wijayanti, E., & Chamami, M. R. (2022). Community Empowerment: Training on Cultivation of Mushroom From Corncob's Waste In Air Terang Village, Central Sulawesi. *Jurnal Pemberdayaan Masyarakat Madani (JPMM)*, 6(2), 273-284. <https://doi.org/10.21009/JPMM.006.2.05>.

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## **INTRODUCTION**

Mushrooms are horticultural commodities favored by all levels of society, from the upper to the lower middle class. There are many types of mushrooms on the market, but there are at least four mushrooms for consumption that are currently the most popular. The four mushrooms are oyster mushrooms, ear mushrooms, straw mushrooms, and champignon mushrooms (Lestari et al., 2018). The development of mushroom farming in Indonesia began in 2003, and oyster mushrooms dominate its production. Based on the amount of production, four provinces are now the largest mushroom producers. The four provinces include West Java, Central Java, Yogyakarta Special Region, and East Java (Wijaya, 2019).

In 2015, the demand for mushrooms was estimated to reach 17,500 tons per year, but this demand could only be fulfilled by 13,825 tons, or about 79% (Yuliawati, 2016). Meanwhile, according to BPS data (2019), mushroom production in Indonesia reaches 33,163 tons and continues to increase in demand every year. Mushroom as a type of edible mushroom grows in tropical areas and requires a high enough temperature and humidity ranging from 30-38°C in a veil or lumbung. Straw mushrooms could naturally grow on empty oil palm bunch waste piles in oil palm plantations. This mushroom was consumed and was known as "palm mushroom" (Fadhilah, 2013). Mushrooms could also often be found in rice straw during the harvest season in rice fields.

The mushroom was still not cultivated evenly in Indonesia, especially in Buol District, Central Sulawesi. The community has not cultivated edible mushrooms because of the limited planting media, resulting in the difficulty of producing quality mushrooms. According to BPS data (2019), the amount of mushroom production in Central Sulawesi was only 355 kg. Another hindering difficulty was the lack of technical knowledge and guidance during the cultivation process. Technical expertise and advice are essential because each mushroom variety goes through different stages, including susceptibility to various diseases (Li, 2014). It is hoped that training and guidance on mushroom cultivation can open up new jobs to reduce poverty.

The poverty rate in Buol in 2016 was 25.3%, and the Open Unemployment Rate (TPT) in February 2020 was 2.98 percent. The majority of people in Air Terang Village, Buol Regency, work as farmers with 3,441 hectares of lowland rice, 299 hectares of rice field, 1188 hectares of corn, and less than 100 hectares of beans and tubers in 2015 (BPS, 2019). Based on these data, it can be concluded that Air Terang village is one of the areas for lowland rice development (Antara, 2016). In the last two years, many farmers have started to cultivate corn as a product of their agriculture. Many farmers who initially only planted rice have now switched to planting corn in their plantation areas. This happened because the planting to harvest time was shorter than planting rice.

During one year, corn farmers can harvest two to three times depending on the type or variety of corn and the supporting growing season. However, currently, the selling price of the harvest is unstable and even tends to be low at the time of the harvest. This is an obstacle in itself for farmers who can only

rely on the corn harvested for their economy. Corn is sold in the form of seeds after going through the grinding and drying process. From the milling process, corncob waste (often called jagged ggel) is usually burned immediately or sometimes used as traditional cooking fuel.

The people in Buol, especially those in Air Terang Village, do not yet know about other benefits of corn cobs. The community needs to be given training to know the use of corn cobs that can be used to improve the economy. Corn cobs, if left alone, will become useless waste, but if used properly, they can become something of high value. One of them is by using corncob as a medium for making mushrooms straw. The resulting mushrooms can be consumed alone or marketed (Nihayah, 2020). The use of waste from the corn harvest can be used to increase income sources and be an alternative way to keep the environment clean from air pollution.

Several studies have been carried out related to the utilization of crop waste, such as the research of Artiyani (2012), which utilizes cassava peel waste in paving blocks; Purnamawati (2014) used cocoa pod waste as an absorber of Rhodamine B dye; Hasanah et al. (2014) utilize corn plant waste and cocoa skin as organic fertilizer; also Nihayah (2020) who also uses corncob waste to become mushrooms' media. From some of these studies, it can be concluded that waste that is used creatively and appropriately can produce something positive and even have high selling value (Sari, 2015).

Seeing the opportunities for utilizing the waste that has been described and the resources available in Buol, it is necessary to conduct Training on the Cultivation of Mushrooms from Corn Cobs Waste. The community service program is carried out based on Participatory Action Research (PAR). This community service program aims to improve the knowledge and skills of the community in Air Terang Village, Tiloan District, Buol Regency in cultivating edible mushrooms from corncobs.

## **LITERATURE REVIEW**

### **Benefits of Mushrooms**

In various parts of the world, many wild mushrooms play a crucial role in human life, especially those living in rural areas (Sarma et al., 2010). Mushrooms are rich in nutritional value, protein, vitamins, minerals, fiber, and essential elements, low in calories, and do not contain cholesterol. In addition, many mushrooms are used as ingredients for traditional medicine for hundreds of years ago (Susan, 2017). The Chinese State has recognized the nutritional content of mushrooms and their function as medicine since 2000 years ago. Mushrooms are part of traditional Chinese medicine, and this is also practiced in Japan and Indonesia. For example, *shiitake* mushrooms (*Lentinula edodes*) in Japan have been used for medicinal purposes since BC (Rahmawati, 2015). The awareness of the Indonesian people about the health benefits of mushrooms has resulted in positive growth and demand that is still higher than the availability of existing mushrooms (Febrianda, 2017).

Mushroom meat contains a lot of protein that is almost the same as animals but is healthier for

consumption. Compared to protein in eggs, mushrooms, especially edible mushrooms, contain all the essential amino acids found in eggs. Even the content of lysine and histidine is higher. (Ministry of Agriculture, 2020). The benefits of consuming corncob mushrooms include a source of nutrients, vitamins, and minerals. Because these mushrooms are stored vitamins B1 - B12, which are good things for the body. This mushroom is also rich in fiber to smooth the digestive system of food and a source of meeting protein needs for the family.

### **Participatory Action Research (PAR)**

PAR is a method that can be used in the implementation of community service programs. Kindon (2010) states that PAR involves collaborative research, education, and an action-oriented towards social change. Researchers/practitioners in PAR activities do not separate themselves from society but, together with the community, work together to solve a problem (Tampubolon, 2013). There are three principles contained in PAR, namely 1) Experience as a source of learning which means that experience can be a source of learning to gain knowledge, 2) Everyone is a teacher, which means that everyone involved can become a teacher for others so that everyone has the same position (Rahmat, et al., 2020).

The difference between PAR and conventional research methods, according to Amaya (2014), is presented in Table 1.

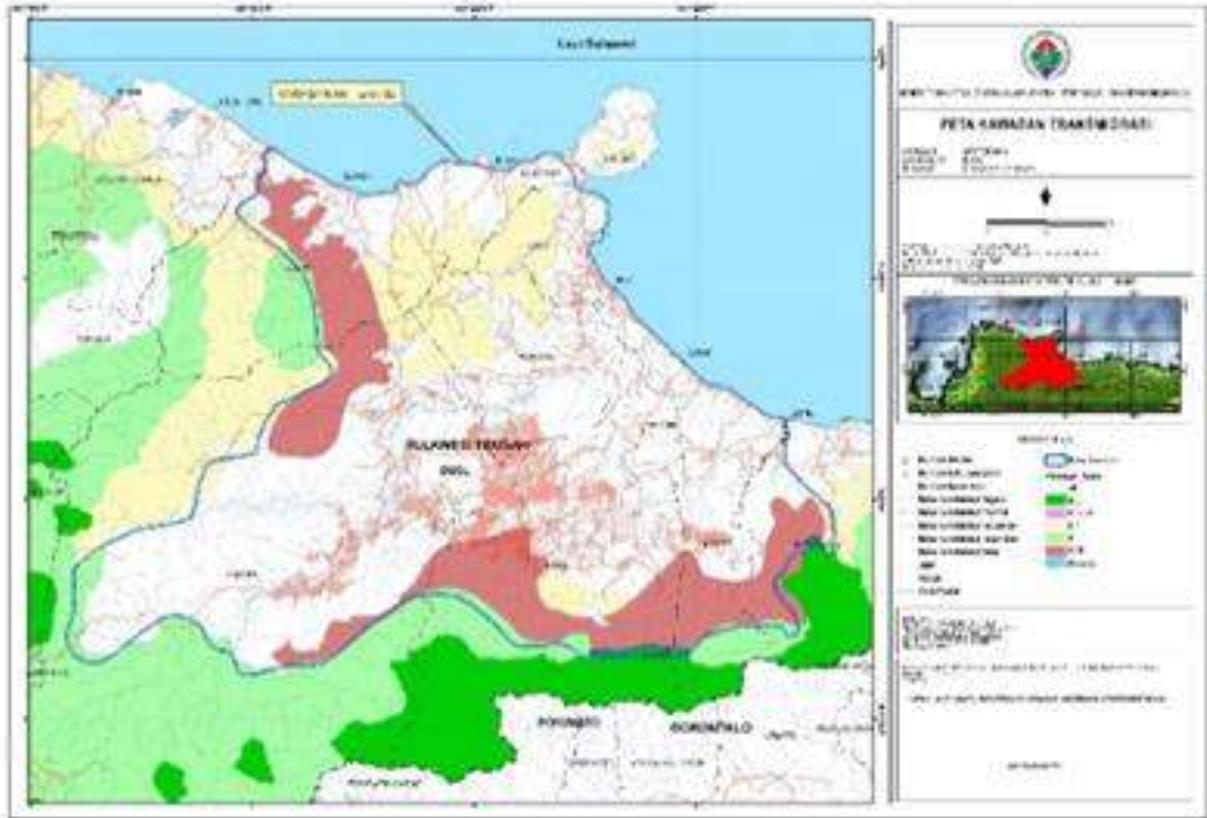
### **MATERIAL AND METHOD**

The area of the Tiloan District is 1,437.70 Km<sup>2</sup> (Regional Government of Buol Regency, 2016). One of the villages in Tiloan sub-district is Air Terang village which can be seen in Figure 1. Demographically, Air Terang Village, Tiloan District, Buol Regency has 1,252, consisting of 630 male and 622 female residents, and consists of 365 family cards. The economic situation of the Air Terang community is seen from the majority of their livelihoods as rice and corn farmers. Then 15% of the people work for oil palm companies because in Tiloan District there is Hardaya Inti Plantations (HIP) company. In addition, 15% of the people are traders of daily necessities (groceries), vegetable traders (entrepreneurship), construction. Home industries such as crackers and chips are only 5%. Map of Air Terang Village could be seen in Figure 1.

The community problem that wants to be resolved in Air Terang Village is the lack of public knowledge of corncob waste as a medium for growing mushrooms. The Community Service Program was implemented in October 2020, with participants being youths in Air Terang village. The community service program uses the PAR method, which consists of 3 stages: preparation, implementation, and evaluation. In the preparation stage, observations and interviews were carried out with the community,

**Table 1. The Difference Between PAR and Conventional Research Methods**

	<b>PAR</b>	<b>Conventional Research Methods</b>
what is the research for?	Action	understanding with perhaps action later.
Who is the research for?	local People	institutional, personal and professional interests.
Topic choice influenced by?	local priorities	funding priorities, institutional agendas, professional interests.
Methodology chosen for?	Empowerment, mutual learning	disciplinary conventions, 'objectivity' and 'truth'
Action on findings	Integral to the process	Separate and may not happen



**Figure 1.**  
Map of Air Terang Village  
(Source: Ministry of Villages, 2020)

especially the youth, to find out more about the local potential of Air Terang Village, community knowledge about mushrooms, and the use of corncob waste to cultivate mushrooms.

The second stage is implementation. This stage is carried out based on the results of observations and interviews conducted in the preparation stage. This stage includes programmed and scheduled training on the introduction of mushrooms, cultivating mushrooms using corncobs, and the benefits of mushrooms as an alternative to food. The following describes the tools and materials used during the training program for mushroom cultivation with corncobs, and how to make and care for them.

### **Tools and materials:**

In this training, corncob mushroom cultivation uses the following tools and materials:

1. Kumpang made of planks measuring 1 x 4 meters
2. Gunny sack
3. Tarpaulin / Plastic mulch
4. Five sacks of corn cobs
5. 5 kg bran
6. Urea 1 kg
7. Yeast tape 6 - 7 grains
8. Enough water

### **How to make:**

The process of making corncob mushrooms is as follows (Figure 2.):

1. Prepare a place to stack the corncobs by making a box from the board provided earlier with 4m × 1m with a board height of 20-25 cm. Place the burlap sack as a base for the corncob. Gunny sacks were chosen because they have hot material and are long enough to absorb water to retain moisture. After the place is ready to use, pile the corncob with a height of approximately 10 cm.
2. Combine all the ingredients that have been prepared, the yeast that has been crushed first, bran and urea together, and mix well. Then sprinkle evenly and taste. Don't finish it, just half of the amount that has been prepared earlier.
3. Cover again using corncobs as high as approximately 5 cm, then sprinkle the yeast, bran, and urea mixture again until evenly distributed. Finish all the mixture.
4. After all is done, flush with clean water until wet, then cover tightly using a tarpaulin / plastic mulch. Mushrooms begin to grow at 12 days of age and harvest at 14 days for two weeks or even three weeks with utmost care. Harvesting is done every evening when the mushroom is round and the mushroom head is brown; although the sizes vary, there are big, normal, and small ones.



**Figure 2.**  
Corncoobs Mushroom Cultivation Practice  
(Source: *Personal Documentation*)

**Care and Pests:**

1. Watering is carried out regularly, ensuring that the media is always in a humid state, not too wet, and not too dry.
2. The watering process can be mixed using one tablespoon of urea fertilizer when the harvest has started to decrease so that it is fertile again.
3. It is better if you water using dry water so that the water falls evenly.
4. Tiny pests appear after one week of the fermentation process; these pests cannot be controlled, and the use of pesticides will undoubtedly damage the fungus. These pests will decrease and disappear on their own after 1 to 2 weeks of harvest.

**RESULT AND DISCUSSION**

Based on the results of the implementation of the community service program, it is known that one of the local potentials of this village is corn. The villagers already know about mushrooms for food but have never cultivated them and even consumed them because they are not available in the market every day. People can only eat mushrooms during the rice harvest season, which grow by themselves in a haystack. In addition, information was obtained that the youths were very enthusiastic about learning more about corn cobs' processing as a medium for growing mushroom straw.

Corn cob waste can be used as a medium for growing mushrooms, a type of edible mushroom, or *Volvarella volvacea* from the *Basidiomycota* Division, which is then known as corn cob fungus (Figure 3). In this training, the media is in a cool place with sufficient light intensity, and the average cob is still intact; the bran mixture is spread evenly over the surface of the corn cob, and lumbungbung is tightly closed. The result is that the mushrooms grow evenly and fully (dense); the size of the mushrooms tends to be normal like that of straw mushrooms; it's just that the stems are taller, easy to pull out, and not dirty.

In addition, by holding training and hands-on practice, this service has educated the community, especially the youth of Air Terang Village, in utilizing one of the agricultural wastes. By using corn cob waste in Air Terang Village, Tiloan Sub-district, Buol District, the community has helped maintain the cleanliness of the environment from untreated waste that causes environmental pollution.

This activity also raises enthusiasm from mothers who, of course, really like mushrooms. Usually, if you want to process mushrooms, people have to wait for the rice harvest season to look for mushrooms in post-harvest straw. Now they don't need to bother anymore; women can make their own in the house with excellent results. Appreciation and full support from the village head and the community in this training, so that mushrooms also start to become a variety of dishes for foods and help improve the residents' economy. Furthermore, the village head will conduct training on a larger scale with



**Figure 3.**  
Corncoobs Mushrooms  
(Source: Personal Documentation)

community members and ask a service team as a training instructor.

Evaluation in the service program is carried out after the implementation stage. This evaluation aims to determine the advantages and disadvantages of implementing the community empowerment program. The advantages of this program are that the community has been educated and can treat corncob waste as a medium for growing mushrooms. In addition, this training program got the full support of village government officials to conduct training for community members on a large scale.

The weakness of this program is that only 10 participants came during the training. The rain that flushed from noon to evening caused several other participants to be constrained from participating in the training. The practice is carried out outdoors in less than optimal weather conditions. However, during the treatment stage, participants who had not had the opportunity to attend the training and people who were curious also reviewed the media. Even at harvest time, the trainees took turns harvesting mushrooms every day. The participants felt the need for further training programs, especially in the post-harvest mushroom processing section and how to sell effectively using both offline and online media.

## **CONCLUSION AND RECOMMENDATION**

The community service program that is carried out can increase the understanding and awareness of the community in Air Terang Village that corncob waste can be used as a medium for growing mushrooms. In addition, this service program can improve the skills of the community in Air Terang Village in cultivating and treating corncob mushrooms. Recommendations for the next service program are mushroom post-harvest processing and training on mushroom marketing strategies.

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