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Increasing the Independence of Oyster Mushroom (*Pleurotus ostreatus*) Entrepreneurs in Seedlings Preparation

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ABSTRACT

Sadam Mushroom House is one of the mushroom producers in Medan Marelan with oyster mushroom production of 7-12 kg/day and can accommodate 7,000 baglogs. The problem of the oyster mushroom business is still very dependent on mushroom nurseries in an effort to provide F2 seedlings because there are still very limited facilities, infrastructure, understanding and skills in providing F0 - F2 seeds. Another problem is that the baglogs waste produced (2,000-3,000 baglogs every 3 months) has not been used properly so that it has the potential to pollute the environment. The purpose of this community service is to increase the independence of partners in providing oyster mushroom seeds, making compost from baglog waste and its use in plant cultivation. The solutions offered in solving these problems are the introduction of appropriate technology in the supply of F0-F2 mushroom seeds, the introduction of technology transfer goods, the management of baglog waste into compost and the use of compost from baglog waste as organic fertilizer for plant cultivation. The results of the community service that have been achieved are the introduction of technology transfer goods in the form of an autoclave, simple laminar air flow and tools for providing F0-F2 seedlings, training and assistance in providing F0-F2 mushroom seedling, training and assistance in making compost from baglog mushroom waste, direct practice of using mushroom compost for cultivating mung bean crop.
Keyword: Independence, Oyster mushroom, Seedling

ABSTRAK

Rumah Jamur Sadam merupakan salah satu produsen jamur di Medan Marelan dengan produksi jamur tiram 7-12 kg/hari dan dapat menampung 7.000 baglog. Masalah pada usaha jamur tiram tersebut masih sangat tergantung kepada pembibitan jamur dalam upaya menyediakan bibit F2 karena masih sangat terbatasnya sarana, pra sarana, pemahaman dan keterampilan dalam penyediaan bibit F0 – F2. Masalah lainnya yaitu limbah baglog yang dihasilkan (2.000-3.000 baglog setiap 3 bulan) belum dimanfaatkan dengan baik sehingga berpotensi mencemari lingkungan. Tujuan pengabdian kepada masyarakat ini yaitu untuk meningkatkan kemandirian mitra dalam penyediaan bibit jamur tiram, pembuatan kompos dari limbah baglog dan pemanfaatannya pada budidaya tanaman. Solusi dalam memecahkan permasalahan tersebut yaitu introduksi teknologi tepat guna dalam penyediaan bibit jamur F0-F2, introduksi barang alih teknologi, pengelolaan limbah baglog menjadi kompos dan pemanfaatan kompos dari limbah baglog sebagai pupuk organik bagi budidaya tanaman. Hasil pengabdian yang telah dicapai yaitu introduksi barang alih teknologi berupa autoclave, laminar air flow sederhana dan alat-alat untuk penyediaan bibit F0-F2, pelatihan dan pendampingan dalam penyediaan bibit jamur F0-F2, pelatihan dan pendampingan dalam pembuatan kompos dari limbah baglog jamur, praktek langsung pemanfaatan kompos jamur untuk budidaya tanaman kacang hijau.
Keyword: Jamur tiram, Mandiri, Pembibitan

1. Introduction

White oyster mushroom (Pleurotus ostreatus) is one of the edible mushrooms commonly cultivated by the people of Indonesia. This mushroom has a fruiting body that grows to resemble a clam shell (oyster). Oyster mushrooms are highly nutritious because they contain 367 calories, 10.5-30.4 percent protein, 56.6 percent carbohydrates, 1.7-2.2 percent fat, 0.20 mg thiamin, 4.7-4.9 mg riboflavin, 77.2 mg niacin, and 314.0 mg of calcium for every 100 grams of mushrooms. The protein in mushrooms contains leucine, isoleucine, valine, tryptophan, lysine, phenylalanine, acid and several other types of amino acids that are important for the body [1]; [2]; [3].

Oyster mushrooms have abundant insoluble carbohydrates, flavonoids, phenolic acids, alkaloids and chitin [4]. The research results showed that oyster mushrooms is efficacious for lowering blood sugar levels in diabetics, and reduce the risk of heart disease [5];[6]; [7], exhibit the activity of antifungal, antimicrobial, antitumor and neuroprotective properties [8].

The current production of oyster mushrooms is only able to meet 50% of domestic consumer demand, so the prospect of developing oyster mushroom agribusiness is very wide open because market absorption is very high and increasing. According to the Central Statistics Agency in 2017, the level of mushroom consumption in Indonesia reached 47,753 tons while its production was only 37,020 tons. The demand for oyster mushrooms every year increases by 10% for the needs of hotels, restaurants and vegetarians [9].

Oyster mushroom agribusiness also has advantages in the form of easy to obtain and cheap raw materials, easy maintenance process, does not require a large area of land, skill requirements are not too high, does not recognize seasons so that it can generate continuous profits throughout the year, does not cause environmental pollution and used media baglogs. Plants can be used to mix animal and fish feed and make compost. With optimal management, the production of this oyster mushroom can be a prospective agribusiness to be developed. Each baglog can produce 0.3-0.8 kg of white oyster mushrooms, so 10 baglogs can produce 3 -8 kg of fresh white oyster mushrooms. The payback period for oyster mushroom cultivation is 2 years and 6 months [10].

Figure1. Rumah Jamur Saddam and it's diversify business.

One of the oyster mushroom producers in Medan Marelan is "Rumah Jamur Sadam" which produces mushrooms ranging from 7-12 kg/day. The mushroom house can accommodate 7,000 baglogs. The oyster mushrooms are marketed in the Marelan traditional market and vegetable stalls around the location of the oyster mushroom agribusiness business, with a selling price of Rp. 20,000/kg. This mushroom house also has a mushroom processing business in the form of crispy mushrooms, mushroom peppers, mushroom satay,

mushroom tofu, with the brand name "Dapur Jamur" which has a halal certificate from Indonesian Religious Leader/MUI (Figure 1).

Until now, the mushroom business is still very dependent on mushroom nurseries in an effort to provide F0-F2 generation seeds because there are still very limited skills and equipment in providing F0-F2 seeds, and partners do not have the understanding and skills in providing seeds. In addition, baglog waste that produces as much as 2,000-3,000 baglogs every 3 months has not been used properly so that it becomes waste that has the potential to pollute the environment. Baglog is a planting medium for placing oyster mushroom seeds. The main ingredient of baglog is sawdust because oyster mushrooms are wood mushrooms. Baglog is wrapped in cylindrical plastic, where one end is given a hole. In the hole the oyster mushroom will grow poking out. Mushroom baglog waste is a growing medium for oyster mushrooms that have exhausted their harvesting period, the resulting waste is in the form of old baglogs and contaminant baglogs. The presence of an abundant amount of waste without any treatment efforts from partners will result in environmental pollution around the waste disposal.

Without good management, baglog waste will only potentially pollute the environment, so management efforts are needed to provide added value to baglog waste so that it can be of use value. Value added is an added value of a commodity because it undergoes several processes, such as: transportation, processing, or storage in a production [11]. Baglog waste produced contains nutrients needed by plants, and for improving soil nutrients. The composition of the waste contains nutrients such as P 0.7%, K20 2%, total N 0.6% and C-organic 49.00% so that it is useful for increasing soil fertility [12]. The composition of the nutrient content provides an opportunity for oyster mushroom baglog waste to have the potential to be reprocessed into organic compost. The results of research by Rahma et al. [13] and Rahmah et al., [14] stated that the C/N ratio contained in the composted oyster mushroom baglog waste was 16.51, in accordance with the C/N value of the compost criteria according to the National Standard (SNI) 19-7030-2004, which ranged from a ratio of 10- 20, and pH 6.8 – 7.49.

Based on the analysis of the situation and partner problems mentioned above, priority issues to be addressed include the introduction of appropriate technology in producing F0 – F2 generation seeds to reduce dependence on seed providers, managing baglog waste as compost (organic fertilizer), and utilizing compost from baglog waste for plant cultivation. All priority efforts to be made have the potential to increase the skills, welfare and income of partners.

2. Methods

Based on the problems faced by partners, it is necessary to make efforts to increase the independence of partners in providing mushroom seeds and utilizing mushroom baglog waste as compost and utilizing the compost for vegetable/palawija cultivation. The approach method taken to support the realization of community service programs for partners is participatory empowerment, which includes training, mentoring, monitoring evaluation, and the introduction of technology transfer goods that are useful for overcoming the partner's problems.

In the training and practice of procuring oyster mushroom seeds for the F0 – F2 generations, training was started from the manufacture of culture media, inoculation of oyster mushroom plantlets (F0), the manufacture of the F1 generation, to the F2 generation. This activity was also given the introduction of technology transfer goods in the form of autoclaves and laminar air flow.

Training on making organic compost from oyster mushroom baglog waste was also carried out. The materials used in making this compost are oyster mushroom baglog waste, EM4, palm sugar solution, and water. This bagolog waste composting process takes ± 33 days. Ripe compost is marked with a dark brown or black color. The results of this composting were continued with research activities on the utilization of the oyster mushroom baglog waste compost on green bean plants

3. Results and Discussion

This community service activity was attended by 20 training participants. Implementation of activities is carried out by providing materials, discussions, direct practice (training), and mentoring and monitoring. The participants were very enthusiastic about the whole series of activities, especially discussions and hands-on practice.

The practice of making oyster mushroom seeds generation F0 – F2:

a. Making PDA media (F0 generation) is done by prepare 300 g of potatoes then peel and clean, then boil the potatoes in a saucepan until the texture is slightly destroyed. Take 500 ml of boiled potato water and mix it with 7 grams of white agar. 15 ml of the media solution was put into a glass bottle, then sterilized by autoclaving for 45 minutes. After that, the media was cooled by lying down and allowed to stand for 1 week.

b. Inoculation of oyster mushroom plantlets by: Oyster mushrooms that are in good condition and have produced spores, take a small portion of the mycelium using tweezers and then place it on PDA media. The work was carried out aseptically and incubated at room temperature until hyphae grew.

c. F1 media (F1 generation) was made by steaming the corn until tender, then draining it, then putting the steamed corn into a sterile bottle until it was full, then sterilizing it with an autoclave for 45 minutes. Aseptically, 1 chip of F0 culture was taken with tweezers and then put into sterile F1 media, and incubated for 1 week.

d. F2 media (F2 generation) was made by mixing sengon sawdust, rice bran, corn bran and lime and then adding sufficient water. After that, put it in a bottle and cover it with cotton and then sterilize it with an autoclave for 45 minutes. The F1 culture was taken with tweezers and then inserted into the F2 medium. The work was carried out aseptically and incubated at room temperature until the mycelium grew

The Practice of Making Compost from Oyster Mushroom Baglog Waste namely

a. Selection of compost raw materials from baglog waste

b. Weighing of compost raw materials to match the formulation of composting based on oyster mushroom baglog waste

c. Composting (refining)

d. Compost mixing, all materials such as sorted mushroom baglog waste, bran, palm sugar solution, Effective Microorganism 4 (EM4), husk charcoal and water are mixed evenly. The dose of the compost mixture follows the formula

e. Compost pile arrangement, the materials that have been mixed evenly are arranged into piles to facilitate composting and control of the composted material, stacking in a circular shape forms a cone with a circumference of 1.5 meters and a height of 1.16 meters.

f. Fermentation, fermentation was done by covering the pile using a tarp, and incubating for 7 days. Covering with tarp aimed to increase the temperature in order to obtain the ideal temperature for microbial growth, generally the temperature ranges from 40-70o C. The initial temperature of composting is the same as the ambient temperature, which is 29-30oC. Temperature control during the fermentation process is carried out every 7 days, with the aim of to determine the increase in temperature in the composted material.

g. Reversal, turning is done once every 7 days by stirring the compost material to remove excess heat, introducing fresh air into the pile of materials, leveling the weathering process on each part of the pile, evenly distributing water (60% moisture content of the material), as well as for smoothing the compost material. which is still coarse grained.

h. Sprinkling, after a few days through the composting process, the compost media will experience water loss (dehydration) due to heat, so it is necessary to add water. Watering is carried out on raw materials and piles that are too dry (humidity < 50%).

i. Cooling, after ± 33 days of composting, the temperature of the pile will decrease until it approaches room temperature. By that time the pile had rotted, dark brown or blackish in color.

a. 

b. 

Figure 2. (a) Training for preparation oyster mushroom F0-F2; (b) Community service team.

a. 

b. 

Figure 3. (a) Training participants and community service team; (b) Participants enthusiastically participated in the training.

3.1. Utilization of Oyster Mushroom Baglog Waste Compost

The service activity for the utilization of oyster mushroom baglog waste was carried out by testing the utilization of baglog waste on green bean plants. From the results of this study, it is known that the addition of oyster mushroom baglog waste compost in soil planting media as much as 75% has a positive effect on the height of mung bean plants (Table 1), and the addition of oyster mushroom baglog waste compost on soil planting media as much as 25% and 50% showed a positive effect on the number of productive branches of green beans (Table 2). This is also in line with Siregar's research [15] and Atini's [16] that the application of baglog compost had a very significant effect on plant height, stem diameter, flowering age, fruit length per sample plant, fruit diameter per sample plant, and fisrt harverst time. Based on the results of this study, the addition of oyster mushroom baglog waste compost can have a positive impact if it is added to the planting media. This will certainly increase the added value of the utilization of oyster mushroom baglog waste. This is in line with previous studies that oyster mushroom baglog waste has the potential to be used for mixed planting media to increase crop production and reduce environmental pollution [17]; [18]; [19]. Besides that, the use of compost is also useful for maintaining and increasing soil fertility, improving structure and texture, soil aeration and drainage, increasing the ability to absorb heat and the ability of the planting medium to absorb water, and adding nutrients [20].

Table 1. Effect of oyster mushroom baglog waste compost on plant height of mung bean.

Treatment	Replication		
	1	2	3
P0 (Top soil 100%)	12.45	16.13	16.95
P1 (Baglog compost 25 %: top soil 75%)	14.13	16.05	16.45
P2 (Baglog compost 50 %: top soil 50%)	17.18	16.23	15.43
P3 (Baglog compost 75 %: top soil 25%)	17.53	15.33	17.73

Table 2. Effect of Oyster mushroom baglog waste compost on Mung bean productive branch.

Treatment	Replication		
	1	2	3
P0 (Top soil 100%)	2	3	4
P1 (Baglog compost 25 %: top soil 75%)	3	4	3
P2 (Baglog compost 50 %: top soil 50%)	4	5	2
P3 (Baglog compost 75 %: top soil 25%)	3	4	2

4. Conclusion

The implementation of service activities at Saddam Mushroom House in the form of training, discussions, hands-on practice, mentoring, monitoring, and the introduction of technology transfer goods can help solve the problems faced by partners. The benefits obtained by partners from this service activity are increasing partner's understanding and capabilities, increasing partner's independence in producing F0-F2 generation oyster mushroom seeds, and increasing partner's agripreunership through the manufacture and utilization of oyster mushroom baglog waste compost.

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