Training and Mentoring of Manggarai Women Farmers Group to Make Eco-Enzyme from Agricultural Waste as Organic Fertilizer

Halim[1*], Vit Neru Satrah[2], Asniah[3]

[1]Department of Agrotechnology, Faculty of Agriculture, Halu Oleo University, Southeast Sulawesi, Kendari, Indonesia
[2,3] Department of Plant Protection, Faculty of Agriculture, Halu Oleo University, Southeast Sulawesi, Kendari, Indonesia
* Corresponding Author:
Email: haliwu_lim73@yahoo.co.id

Abstract.

The concept of organic farming based on local wisdom to realize the healthy living community movement program is very important to be implemented by referring to the concept of environmentally friendly and sustainable agriculture. One of the wastes that does not get attention to be managed properly is agricultural waste. Unprocessed agricultural waste will become a source of environmental pollution, a source of disease, and disrupt ecological cleanliness. Therefore, agrarian waste needs to be managed properly so that it can provide benefits to the lives of the community in general and farmers in particular. This community-based empowerment activity aims to assist and train the Manggarai Women Farmers Group in making eco-enzymes from agricultural waste as liquid organic fertilizers. Training and assistance activities are carried out with stages of socialization, training and assistance, application of technology, monitoring, and evaluation. The results of the activity show that there has been a change in the mindset of the members of the Manggarai Women Farmers group to utilize agricultural waste as a material for making eco-enzymes as organic fertilizers in plant cultivation.

Keywords: *Agricultural waste, eco-enzyme, organic farming, and organic fertilizer.*

I. INTRODUCTION

Waste is a consequence of human activity. Every human activity can produce waste or waste that has no economic value. The use of organic materials as fertilizer has been widely known since our ancestors farmed but has changed since the introduction of the farming system with the concept of the green revolution. During the green revolution, the use of chemical fertilizers coupled with good land quality can increase agricultural production rapidly. However, when the quality of the land has degraded accompanied by the increasing spread of plant pests, crop production stagnates. Such conditions create opportunities for the use of agricultural waste as a source of organic fertilizer. According to Balittanah (2008), organic fertilizers are environmentally friendly fertilizers and have several advantages, including: improving and maintaining loose soil structure, increasing soil absorption and water retention, improving living conditions in the soil, and reducing phosphate blockage and increasing the availability of beneficial nutrients. In addition, organic fertilizers can increase soil productivity and fertilization efficiency, reducing the need for fertilizers, especially potassium fertilizers (Arafah and Sirappa, 2003); increase soil organic carbon and soil cation exchange capacity (Fischer and Glaser, 2012); and support the creation of conditions that are more favorable for the growth and development of soil microorganisms (Agegnehu *et al*., 2017). The problems faced by the Manggarai Women Farmers Group are: not having the skills and knowledge to make eco-enzymes from agricultural waste as organic fertilizer and botanical pesticides, not knowing the types of agricultural waste that can be processed into eco-enzymes and not knowing the function of organic materials for soil health and fertility.

Waste problems consist of three parts, namely downstream, process, and upstream. The downstream part lies in the continuous increase in waste disposal. The process part lies in the limited resources in managing waste, both from the government and the community. The upstream part lies in the less-than-optimal system applied in the final processing of waste. Therefore, there needs to be good waste management to reduce the occurrence of pollution or environmental damage. Waste management is a

systematic, comprehensive, and continuous activity that includes waste reduction and handling. One of the wastes that does not get attention to be managed properly is agricultural waste. According to Wiswasta *et al.* (2016), unprocessed agricultural waste will become a source of environmental pollution, a source of disease, and disrupt ecological cleanliness. Therefore, agrarian waste needs to be managed properly so that it can provide benefits to the lives of the community in general and farmers in particular. Syamsu *et al*. (2023), that there is an increase in the community in understanding the concept and manufacture of soil conditioners using simple technology, as well as improving the quality of agricultural waste into products that have economic value and these products can improve the community welfare and overcome environmental problems. The results of the research Hasid *et al*. (2020), state that the provision of organic fertilizer from sago dregs can increase the growth and production of peanut plants. Likewise, the research results by Halim *et al.* (2020), state that the application of organic fertilizer independently can increase peanut plant production.

II. RESULT AND DISCUSSION

Training and mentoring activities for making eco-enzymes from agricultural waste as organic fertilizer were carried out from June to September 2024. Training and mentoring activities were carried out with the stages of socialization, training and mentoring, application of technology, monitoring, and evaluation.

Socialization

Socialization regarding waste management is considered to be able to help change community knowledge and behavior in waste management. In addition, socialization is also intended so that government regulations and policies regarding waste management can reach all communities in the local area. In changing community habits, involvement from all parties is needed, one of which is government support or policies regarding waste (UU No.18 Tahun 2008). Public awareness of waste policies, both regionally and centrally, will help in community management efforts. In addition, there is a waste management policy program with a 3R-based approach which includes reducing, reusing, and recycling waste. This should be done together with community participation in managing waste from its source. Regarding community involvement in the implementation of the 3R program, it is expected to help reduce waste accumulation and facilitate the waste recycling process (Ministry of Environment and Forestry, 2019). The socialization activity also coincides with activities to provide awareness to the Manggarai Women Farmers group regarding the benefits of agricultural waste as eco-enzymes. Furthermore, it involves active participation from farmer groups to process agrarian waste into eco-enzymes and institutionalization as an effort to form joint farmer groups or farmer group associations to strengthen networks with the government or social institutions such as non-governmental organizations (NGOs).

Training and Mentoring

The purpose of conducting training and mentoring for the Manggarai Women Farmers Group is to improve knowledge, and skills and directly empower the Manggarai Women Farmers Group regarding the management of agricultural waste as eco-enzymes to produce organic fertilizers and pesticides. Before the training activity is carried out, first handouts related to the material (procedures for utilizing agricultural waste as eco-enzymes) and the delivery of materials by the activity implementation team. During the demonstration, partner members are expected to be able to practice how to make eco-enzymes from agricultural waste. The expected benefits of community service activities are first, as a vehicle to improve the knowledge and insight of the target audience in managing agricultural waste, second to provide alternatives for managing agricultural waste around Padaleu Village, which indirectly also empowers the community to process agrarian waste into eco-enzymes. The training participants were all members of the Manggarai Women Farmers group, representatives of the Padaleu Village government, community leaders, and youth leaders.

Application of Technology

The technology applied in making eco-enzymes from agricultural waste refers to the technology developed by Dr. Rasukon Poompanvong from Thailand as the first inventor of eco-enzymes by processing

unused kitchen waste/organic waste into very useful and environmentally friendly enzymes. This product can be made on a household scale by utilizing leftover vegetables and fruits as well as spices, each of which is made separately in an airtight plastic bucket. The manufacture of eco-enzymes is modified by adding rice-washing water. Furthermore, these ingredients are mixed with water and palm sugar using a ratio of agricultural waste: palm sugar: clean water: rice washing water = 3: 1: 9: 1. The mixture is put in a plastic bucket and fermented anaerobically for three months Yong et al (2021). Stirring is done for the first week and continued once a month for 3 months.

Monitoring and Evaluation

The mentoring activities of the Manggarai Women Farmers group are carried out in 2 forms of activities, namely: a) Non-physical activities such as guidance and counseling on the use of agricultural waste as eco-enzymes for organic fertilizers and botanical pesticides. This activity begins with the presentation of material by the activity implementation team, followed by discussions and questions and answers related to the material that has been presented or other things that are still related to plant cultivation activities, b) Physical Activities, through the practice of making eco-enzymes from agricultural waste as organic fertilizers and botanical pesticides. Evaluation of the activities will be carried out by the Institute for Research and Community Service through internal monitoring and evaluation. While the evaluation is an indicator of the success and level of understanding of partners regarding the activities carried out, tests and direct interviews will be given to the partner group.

Fig 1. Participants listen to the material presented by the community partnership program implementation team

The members of the Manggarai Women group were very enthusiastic in following all stages of the Community Partnership Program (CPM) activities, especially when listening to the presentation of material from the CPM team related to the importance of utilizing agricultural waste as a material for making eco-enzymes for organic fertilizers and pesticides, the importance of living healthily by consuming vegetables and fruits and other agricultural products that are free from chemical pesticides and the use of organic fertilizers (Figure 1).The results obtained from this community service activity are that the community has concern for family health which is marked by a change in mindset and agricultural activities by utilizing eco-enzymes from agricultural waste originating from households and around settlements as organic fertilizers and pesticides.

The making of eco-enzymes was followed by all members of the Manggarai Women Farmers group who cultivate various types of vegetables such as mustard greens, pak choy, spinach, long beans, eggplants, and tomatoes. The members of the Manggarai Women Farmers group were very enthusiastic in participating in the activities carried out by the community service team, this happened because of the large amount of information obtained by farmers from the Community Partnership Program implementation team from the Faculty of Agriculture, Halu Oleo University. Thus, there was a transformation of science and technology about the making of eco-enzymes from agricultural waste as organic fertilizers and botanical pesticides from the community service team to the wider farming community which had an impact on public health in a sustainable or long-term manner (Figure 2).

Fig 2. Assistance in making eco-enzymes from agricultural waste.

In agricultural activities carried out by farmers before the extension and mentoring activities, farmers always depend on chemical fertilizers, so that the costs incurred are relatively very high, while around farmers many resources can be managed as raw materials for making eco-enzymes for organic fertilizers and botanical pesticides such as vegetable waste, fruit waste, and spice waste. The concept of good plant cultivation begins with the use of superior seeds and the use of fertilizers according to plant needs. Thus, it is hoped that the plants that will grow will be able to provide maximum results for farmers and globally be able to increase farmers' income through high selling prices and high competitiveness in traditional, national, and international markets.

III. CONCLUSION

Members of the Manggarai Women's group were very enthusiastic in following all stages of the Community Partnership Program activities, especially when listening to the presentation of material from the Community Partnership Program team related to the importance of utilizing agricultural waste as a material for making eco-enzymes for organic fertilizers and pesticides, the importance of living healthily by consuming vegetables and fruits and other agricultural products that are free from chemical pesticides and the use of organic fertilizers.

IV. ACKNOWLEDGMENTS

The author would like to thank the Ministry of Education, Culture, Research, and Technology cq the Directorate of Research, Technology, and Community Service/Directorate General of Higher Education, Research, and Technology by the Community Service Program Implementation Contract Number: 070/E5/PG.02.00/PM.BARU/2024 dated June 11, 2024, for financing the Community Partnership Program for the 2024 Fiscal Year. The author would also like to thank the Chancellor of Halu Oleo University and the Head of the Institute for Research and Community Service of Halu Oleo University for their excellent administrative services.

REFERENCES

[1] Balai Penelitian Tanah. 2008. Pupuk organik untuk tingkatkan produksi pertanian. Balittanah. Bogor. Soil-fertility@indo.net.id.

[2] Arafah dan M.P. Sirappa. 2003. Kajian penggunaan jerami dan pupuk N, P, dan K pada lahan sawah irigasi. Jurnal Ilmu Tanah dan Lingkungan 4 (1): 1524.

[3] Fischer, D., & Glaser, B. 2012. Synergisms between Compost and Biochar for Sustainable Soil Amelioration. In Management of Organic Waste. https://doi.org/10.5772/31200.

[4] Agegnehu, G., Srivastava, A. K., & Bird, M. I. 2017. The role of biochar and biochar-compost in improving soil quality and crop performance: A review. In Applied Soil Ecology. https://doi.org/10.1016/j.apsoil.2017.06.008.

[5] Wiswasta I. G. N. A., Widnyana I. K., Raka I. D. N., dan Cipta I. W. Mikro. 2016. Organisme Lokal (MOL) Sebagai Pupuk Organik Cair dari Limbah Pertanian dan Kaitannya dengan Ketersediaan Hara Makro dan Mikro. Seminar Nasional Hasil Penelitian dan Pengabdian Kepada Masyarakat. Universitas Mahasaraswati Denpasar. Bali.

[6] Syamsu Alam , Sahta Ginting, Halim, Rachmawati Hasid, Namriah, La Ode Rustam, Rizki. 2023. Pebriansyah. Produksi bahan pembenah tanah berbasis sumber daya lokal sebagai model pemberdayaan masyarakat di Desa Sindangkasih, Konawe Selatan. COMMUNITY EMPOWERMENT. 8(1):1793-1801.

[7] Hasid, R., Aminudin Mane Kandari, Halim, Makmur Jaya Arma, Sarawa, Mani Yusuf. 2020. Effect of Arbuscular Mycorrhizal Fungi and Sago Dregs on Peanut Plants (*Arachis hypogaea* L.) Grown on Southeast Sulawesi Dryland. ***Journal of Agronomy***. 19(1):40-45.

[8] Halim, Rembon, F.S., Resman. 2020. Pengaruh Fungi Mikoriza Arbuskula dan Pupuk Organik Cair terhadap Pertumbuhan dan Hasil Kacang Tanah (*Arachis hypogaea* L.). Jurnal AGRI PEAT. 21(1):26-31.

[9] UU nomor 18 tahun 2008 tentang Pengelolaan Sampah. UU No. 18 Tahun 2008 (bpk.go.id). Tgl Akses 29 Maret 2024.

[10] Kementerian Lingkungan Hidup dan Kehutanan. 2019. REVIT ALISASI SITU TUNGGU DKI. http://perpustakaan.menlhk.go.id. Tanggal akses 29 Maret 2024.

[11] Yong, T. Y. Eco. 2021. Enzyme dan Penyelamatan Darurat: Transkrip Seminar Dr. Joean Oon. Retrieved from PT Medan Tehnik: https://www.ptmedantehnik.com/artikel/4-pengetahuan-/26-ecoenzyme-- dan-penyelamatan-darurat. Tanggal akses 30 April 2024.