Fostering Waste Management Skill on Coastal Community in Kelan Village Through Organic Fertilizer Production Workshop

Putu Eka Pasmidi Ariari
Universitas Mahasaraswati Denpasar

I Ketut Widnyana
Universitas Mahasaraswati Denpasar

I Made Wahyu Wijaya
Universitas Mahasaraswati Denpasar

Dewa Putu Oka Prasiasa
Universitas Dhyana Pura

Abstract: This research focuses on a training programme conducted in a coastal village to enhance the community's knowledge and skills in producing liquid organic fertiliser. The initiative aimed to increase awareness and proficiency in managing organic waste generated by households and businesses. The training centred on utilising a 200-litre drum for anaerobic fermentation to produce nutrient-rich liquid organic fertiliser. The process harnesses the potential of anaerobic decomposition to transform organic waste into a valuable resource for agricultural purposes. The results displayed a substantial positive shift in the community's understanding of liquid organic fertiliser production, with a remarkable 75% increase in comprehension achieved. This underscores the efficacy of community engagement and practical training in fostering sustainable waste management practises. This research contributes to the field of sustainable waste management by demonstrating an effective approach to empowering coastal communities to repurpose organic waste. The utilisation of locally available resources and the promotion of circular economy principles enhance the practicality and replicability of the approach. The outcomes of this initiative can serve as a model for similar communities facing waste management challenges, ultimately contributing to the broader goal of achieving environmental sustainability.

Keyword: coastal community, organic fertilizer, waste management, workshop

1. INTRODUCTION

The Kelan Village, Kuta District, Badung Regency is a beach tourism village which is positioned side by side with Ngurah Rai International Airport. The length of the Kelan Village beach reaches one kilometers of white sand, which is a very beautiful place to watch the sunset as well as watch airplanes take off and landing. In addition, on the coast there are restaurants and cafes managed by the local community and the Pokdarwis (Tourism Awareness Group) of Kelan Village. The existence of domestic waste reaches four tons per day and during holidays it can reach twelve tons per day. Until now, this waste problem has not been handled properly, while the disposal of waste to the Suwung Landfill as a place for waste disposal for Denpasar, Badung and Gianyar residents is currently no longer accommodated. Piles of waste are increasing in volume along with the increase in population, especially from immigrants whose number has exceeded the native population. This is in addition to having a positive impact on improving the community's economic, it also has an impact on increasing the volume of waste. Until now, the Kelan Village does not yet have a TPS3R, but the TPS (Temporary Disposal Site) building already exists and it seems that it only transfers waste and there is no good management. This makes the waste problem a priority problem for Kelan Village. Bendesa Adat also hopes to develop the potential for costal farming considering that there is still a lot of land belonging to traditional villages that has not been utilized, and at the same time for educational media for school children and the public to see directly the use of organic fertilizer which will be made from organic waste from restaurant or household waste (Lango et al., 2021). The costal farming locations that have been prepared by Kelan Village cover an area of more than one hectare in three locations in the local village area.

The various solutions that are planned to be implemented are in accordance with the needs of partners and are downstream of research results that have been published and also simple patents. Research results Putu Eka Pasmidi Ariati, namely Agro-Entrepreneurship Socialization for Pengani Farmer Groups Towards Environmentally Friendly Agriculture in Kintamani-Bali (Komang Suparyana et al., n.d.), Critical Soil Optimization Strategy Through The Utilization Of Agricultural Waste, Livestock, and Fisheries (Ketut Widnyana, Alit Wiswasta, Eka, & Ariati, 2019). The research results from the proposing team I Ketut Widnyana which have been published include Strategy of Optimization Integrated Waste Management in Sanur Kauh Village – Denpasar (Putu, Adi, Suarna, & Windia, 2015), Critical soil optimization strategy through the utilization of agricultural waste, livestock, and fisheries, Agro-Entrepreneurship Socialization for Mengani Farmer Groups Towards Environmentally Friendly Agriculture in Kintamani-Bali, Empowerment of the Baha Village community, Mengwi sub-district, Badung district in the field of household waste management (Ketut Sumantra et al., 2020), Building community-based agricultural and tourism sector synergy in the Subak Lepud area of Baha Village (Widnyana & Wiswasta, 2019), Preparation of liquid organic fertilizer made from snail mas plus (pocmas plus) and its application to rosella plants in the seedling phase (Sumantra & Widnyana, 2022). In addition to these research results related to the manufacture of liquid organic fertilizer (POC). There are simple patents that are applied, namely Liquid Organic Fertilizer Formulation Registered number S00202103911 on May 27 2021 (Patent No. IDS000006518, 2023), and Bio-charcoal Briquette Formulation for starch starch adhesive Registered number S00202302462 on March 18 2023. Research results from the proposing team member: I Made Wahyu Wijaya, related to waste processing organic matter into compost and briquettes has been published under the titles Refuse Derived Fuel Potential Production from Temple Waste as Energy Alternative Resource in Bali Island (M. W. Wijaya, Wiratama, Putra, & Aris, 2023), Recycling Temple Waste into Organic Incense as Temple Environment Preservation in Bali Island (I. M. W. W. Wijaya et al., 2021), Compost Production through Household Waste Management Using Composter Bag in Ayunan Village, Badung Regency (Cokorda, Wijaya, & Paramita, 2022). The purpose of this activity is to help the indigenous people of Kelan Village in dealing with waste with the 3R program, namely reduce, reuse and recycle.

2. LITERATURE REVIEW AND METHODOLOGY

The implementation of the PDB activities Strengthening Kelan Village, Kuta District, Badung Regency, Bali towards Tangguh and Pro-Environmental Tourism Village specifically prioritized in the environmental sector is carried out by managing household waste and restaurant waste into new products. Methods for implementing this activity include preparation, counseling, training, mentoring, monitoring and evaluation, as well as planning follow-up programs.

Table 1. Mapping community group problems, solution plans and activity achievement indicators.

Priority Issues	Solution Plan	Achievement Indicator
Handling of household waste (PKK Group)	a. Extension of household waste management b. Assistance with household waste processing installation technology c. Training on making liquid organic fertilizer (POC) from household waste	a. 100% of PKK members understand household waste management b. 20 installation units for processing household waste into POC c. 80% of PKK members are skilled in making POC fertilizer
Handling of restaurant waste (culinary/ Restaurant Business Group)	a. Extension of restaurant waste management b. Liquid waste processing installation assistance c. Training on making liquid organic fertilizer (POC) from restaurant waste	a. 90% of culinary managers understand restaurant waste management b. 10 installation units for processing restaurant waste into POC c. 80% of culinary managers are skilled in making POC fertilizer

Education

Extension activities aim to provide information and education for partner groups related to the components of program activities. Education activities were attended by partner groups according to the type of activity with resource persons from the proposing team and experts. There were several outreach activities during the first year namely Education on Organic Waste Management and Education on Making Liquid Organic Fertilizer (POC).

Training

Training activities aim to improve the competence of partner groups so that they can overcome the problems experienced by partners. The training activities will be attended by the waste management group, the Kelan Village PKK and the Kelan tourism awareness group (Pokdarwis). The training activities that will be carried out in this program are as follows: source-based waste sorting training, POC manufacturing technique training, and organic plant cultivation technique training. Making liquid organic fertilizer in this program aims to handle organic waste in households and restaurants. Making POC will be carried out on a household and communal scale at TPS. The process of making POC consists of chopping and fermenting in a drum with a capacity of 200L with an estimated processing time until it is ready to be harvested for 2 months. The harvested POC is then collected and standardized before being used and commercialized. The technological scheme for processing organic waste into POC is presented in Figure 1.

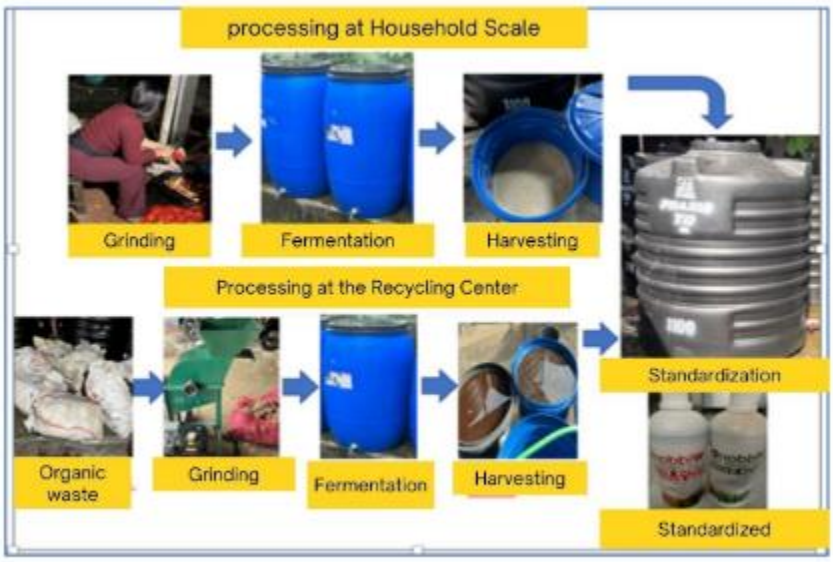

Figure 1. Stages of making liquid organic fertilizer (POC) from household/restaurant organic waste materials

3. RESULT AND DISCUSSION

The Kelan Village area is still in the beautiful category but in environmental management it really needs a touch to be developed. Various problems that are very urgent in nature to be addressed, especially related to tourism, the environment, and the management of waste and organic waste. In carrying out the service activities "GDP Strengthening Kelan Village, Kuta District, Badung Regency, Bali towards a Tangguh and Pro-Environmental Tourism Village" the activity begins by coordinating the initial activities, preparing the tools and materials needed, and implementing the activities. Based on these problems, the activities that have been carried out are: Socialization of Waste Management and Organic Waste, Manufacture of POC Fermentation Installation (Organic Liquid Fertilizer), and Training on making POC based on household and restaurant waste.

Socialization of Waste Management and Organic Waste

Socialization activities for Waste and Organic Waste Management have been carried out by inviting community groups including representatives from the PKK, Pokdarwis, and Restaurant Managers. The number of participants who were given socialization was 20 people plus 3 traditional village administrators. From initial observations of community understanding of the utilization of household waste and restaurant waste, the following data is obtained:

Table 2. Preliminary survey about the participant knowledge

No	Question	Response (%)	
		Yes	No
1	Do you know that household waste and restaurant waste can pollute the environment	100	0
2	Do you experience difficulties in managing household waste and restaurant waste	90	10
3	Do you want Kelan Village to be clean and free of waste?	100	0
4	Do you know that kitchen waste and restaurant waste can be used to fertilize plants	5	95
5	Do you know that kitchen waste and restaurant waste can be used as Liquid Organic Fertilizer (POC)?	5	95
6	Do you know that kitchen waste and restaurant waste have economic value	5	95
7	Have you ever made Liquid Organic Fertilizer (POC) from kitchen and restaurant waste?	0	100
8	Are you willing to make Liquid Organic Fertilizer (POC) from kitchen and restaurant waste	100	0

Based on the analysis of the answers to the questions above, further counseling and training activities are carried out on the utilization of household and restaurant waste into organic liquid fertilizer (POC). Through counseling in the form of utilizing household and restaurant waste in the manufacture of liquid organic fertilizer (POC), there was an increase in the understanding of the Kelan Village community in managing organic waste, this can be seen in the results of the pre-test and post-test carried out during community service activities (Suanda, Budiasa, Suta, Ariati, & Widnyana, 2021). The results of the pre-test and post-test can be seen as follows:

Table 3. Pre-test and post-test results of partners' understanding of liquid organic fertilizer (POC)

No	Question	Pre Test (%)		Post Test (%)	
		Yes	No	Yes	No
1	Do you know that kitchen waste and restaurant waste can be used to fertilize plants	5	95	100	0
2	Do you know that kitchen waste and restaurant waste can be used as Liquid Organic Fertilizer (POC)?	5	95	100	0
3	Do you know what is meant by Liquid Organic Fertilizer (POC)	10	90	100	0
4	Do you know the materials used in the manufacture of liquid organic fertilizer	10	90	100	0
5	Do you know how the process of making liquid organic fertilizer	0	100	100	0
6	Do you know what is called a fermenter and its benefits?	5	95	100	0
7	Do you know what molasses is and its benefits?	5	95	100	0
8	Do you know how to harvest and store liquid organic fertilizer (POC)?	0	100	100	0
9	Do you know how to use liquid organic fertilizer (POC) for plants?	10	90	100	0

The results of the pre-test showed that most of the participants did not know what liquid organic fertilizer (POC) was made from household/restaurant waste, how to make it, how to store it, and how to use it. After conducting socialization and practice regarding the use of organic waste in the manufacture of liquid organic fertilizer, a post test was carried out with very significant results. POC socialization activities are presented in Figure 2.

Figure 2. Workshop on production of Organic Liquid Fertilizer (POC) for household waste and restaurant waste

Liquid Organic Fertilizer (POC) installations were handed over to partners from PKK women's groups, Pokdarwis and Restaurant Managers each with 10 units so that the total assistance reached 30 units. In an effort to maximize the utilization of the installation, training is carried out with the aim that each installation recipient can use the installation properly and according to standards. The installation consists of 3 parts: plastic drums with a capacity of 200 liters, organic material nets, internal supports, faucets and outer supports. This installation is made simply but has maximum function and is very practical for use by the general public. The results of measuring the increase in the skills of community groups in the use of liquid organic fertilizer installation are as shown in the following figure.

4. CONCLUSION

The undertaken activities yield the following conclusions: firstly, the effective management of household and restaurant waste constitutes a primary concern for the Kelan customary village, underscored by the enthusiastic participation of community groups in counseling and training initiatives. Secondly, the counseling sessions have evidenced a commendable improvement, with community knowledge on kitchen and restaurant waste management surpassing a 75% increase. Lastly, after undergoing four training sessions, the proficiency of community groups in employing liquid organic fertilizer installations experienced a full 100% augmentation.

ACKNOWLEDGMENTS

The authors would like to thank the Directorate General of Higher Education, Research, and Technology of the Republic of Indonesia for funding this research through the Empowerment Program for Partnering Villages year 2023. The authors would also like to thank the authorities of Kelan Village.

REFERENCES

Cokorda, J., Wijaya, I. M. W., & Paramita, A. A. I. I. (2022). Produksi Kompos melalui Pengelolaan Sampah Rumah Tangga Menggunakan Composter Bag di Desa Ayunan, Kabupaten Badung. *Lumbung Inovasi: Jurnal Pengabdian Kepada Masyarakat*, *7*(4), 479–488. https://doi.org/10.36312/linov.v7i4.824

Ketut Sumantra, I., Ketut Widnyana, I., Yuesti, A., Ketut Sudiana, A. A., Studi Magister Perencanaan Pembangunan Wilayah dan Pengelolaan Lingkungan Universitas Mahasaraswati Denpasar, P., & Studi Magister Managemen Universitas Mahasaraswati Denpasar, P. (2020). *MEMBANGUN SINERGITAS SEKTOR PERTANIAN DAN PARIWISATA BERBASIS MASYARAKAT KAWASAN SUBAK LEPUD DESA BAHA*. *1*(2), 118–130.

Ketut Widnyana, I., Alit Wiswasta, I., Eka, P., & Ariati, P. (2019). CRITICAL SOIL OPTIMIZATION STRATEGY THROUGH THE UTILIZATION OF AGRICULTURAL WASTE, LIVESTOCK, AND FISHERIES. *International Journal of Research-Granthaalayah*, *7*(12), 77. https://doi.org/10.5281/zenodo.3595289

Komang Suparyana, P., Eka Pasmidi Ariati, P., Ketut Widnyana, I., Nursan, M., Septiadi, D., Fria Utama, A. F., … dan Penyuluhan, P. (n.d.). SOSIALISASI AGRO-ENTREPRENEURSHIP BAGI KELOMPOK TANI MENGANI MENUJU PERTANIAN RAMAH LINGKUNGAN DI KINTAMANI-BALI. *Oktober*, *1*(1), 48–54.

Lango, A. L., Widnyana, K., Sumantra, K., Diah, G. A., Program, Y., Agroteknologi, S., … Denpasar, U. M. (2021). *PENGARUH PERLAKUAN PUPUK CAIR DARI LIMBAH ORGANIK TERHADAP PERTUMBUHAN TANAMAN BUNGA PACAR AIR (Impatiens balsamina L)*. *11*(22), 12–19. Retrieved from http://e-journal.unmas.ac.id/index.php/agrimeta

Putu, N., Adi, M., Suarna, W., & Windia, W. (2015). *PENGELOLAAN LINGKUNGAN HOTEL BERBASIS TRI HITA KARANA DI KAWASAN PARIWISATA SANUR*. *9*.

Suanda, I. W., Budiasa, I. M., Suta, I. N., Ariati, P. E. P., & Widnyana, I. K. (2021). PemberdayaanKelompok Tani Melalui Pelatihan Pestisida Nabati Dan Pupuk Organik Di Dusun Kembang Sari, Desa Tukadaya, Kecamatan Melaya, Jembrana Bali. *Jasintek*, *2*(2), 131–139.

Sumantra, K., & Widnyana, K. (2022). PEMBUATAN PUPUK ORGANIK CAIR BERBAHAN KEONG MAS PLUS (POCMAS-PLUS) DAN APLIKASINYA PADA TANAMAN ROSELLA PADA FASE SEEDLING. *Jurnal Abdi Insani*, *9*(4), 1441–1449. https://doi.org/10.29303/abdiinsani.v9i4.784

Widnyana, I., & Wiswasta, I. (2019). PEMBERDAYAAN MASYARAKAT DESA BAHA KECAMATAN MENGWI KABUPATEN BADUNG DALAM BIDANG PENGELOLAAN SAMPAH RUMAH TANGGA. *Jurnal Abdi Saraswati*, *1*(1), 18–24.

Wijaya, I. M. W. W., Indunil, K. B., Ranwella, S., Revollo, E. M., Ketut, L., Widhiasih, S., … Junanta, P. P. (2021). *Recycling Temple Waste into Organic Incense as Temple Environment Preservation in Bali Island*. *19*, 365–371. https://doi.org/10.14710/jil.19.2.365

Wijaya, I. M. W., Wiratama, I. G. N. M., & Putra, I. K. A. (2023). *Patent No. IDS000006518*. Indonesia.

Wijaya, M. W., Wiratama, G. N. M., Putra, K. A., & Aris, A. (2023). Refuse Derived Fuel Potential Production from Temple Waste as Energy Alternative Resource in Bali Island. *Journal of Ecological Engineering*, *24*(4), 288–296. https://doi.org/10.12911/22998993/161015