

EMPOWERING COASTAL COMMUNITIES THROUGH BOKASHI FERTILIZER PRODUCTION AND APPLICATION IN MATA AIR VILLAGE KUPANG REGENCY

Fadlan Pramatana^{1*}, Yusratul Aini², Puspa Sari³, Bertila Avila Delvion⁴,
Rizki Amalia Adinda Putri⁵

^{1,2,3,4} Universitas Nusa Cendana, Kupang, Indonesia

⁵ Natural Resources Conservation Agency of East Nusa Tenggara Province, Kupang, Indonesia

*Corresponding author, email: fadlan.pramatana@staf.undana.ac.id

Received: 24/09/2026

Revised: 03/10/2026

Accepted: 05/10/2026

Abstract. Limited agricultural land and underutilized organic materials remain important challenges for coastal communities in dryland areas. This community service program aimed to strengthen community capacity through the production and application of bokashi fertilizer in Mata Air Village, Kupang Regency, Indonesia. The program was conducted from July to August 2026 in collaboration with the Cemara Sea Turtle Conservation Community Group and involved 35 participants. A participatory community empowerment approach was applied through instruction, demonstration, hands-on practice, technical assistance, product development, and evaluation. Participants' familiarity with bokashi was assessed orally before and after training using a show-of-hands response, while practical involvement was evaluated through direct observation. Before the activity, 17 of 35 participants (48.6%) were familiar with the basic concept of bokashi, and none had previous hands-on production experience. After training, all 35 participants reported familiarity with bokashi and participated directly in group-based production. The program produced an estimated 3 tons of bokashi, including 100 labelled 10-kg packages. Laboratory analysis showed 35.68% organic carbon, 2.22% total nitrogen, 1.21% P_2O_5 , 1.01% K_2O , a pH of 6.81, and a C/N ratio of 16.1. The estimated direct cash cost was approximately IDR 8,997 per 10-kg package, excluding labour and depreciation of reusable assets, while an introductory selling price of IDR 15,000–20,000 was proposed. The program increased participants' familiarity and practical exposure to bokashi production and established an initial basis for continued community-based production and value-added product development. Further evaluation is required to assess production continuity, economic performance, and the effects of bokashi application on soil properties and crop productivity.

Keywords: bokashi fertilizer, coastal community, organic waste, sustainable agriculture

Abstrak. Keterbatasan lahan pertanian dan belum optimalnya pemanfaatan bahan organik merupakan tantangan penting bagi masyarakat pesisir di wilayah lahan kering. Kegiatan Pengabdian kepada Masyarakat (PkM) ini bertujuan meningkatkan kapasitas masyarakat melalui produksi dan penerapan pupuk bokashi di Desa Mata Air, Kabupaten Kupang, Indonesia. Kegiatan dilaksanakan pada Juli–Agustus 2026 bersama Kelompok Masyarakat Pelestari Penyu Cemara dengan melibatkan 35 peserta. Pendekatan pemberdayaan masyarakat secara partisipatif diterapkan melalui penyampaian materi, demonstrasi, praktik langsung, pendampingan teknis, pengembangan produk, dan evaluasi. Tingkat familiaritas peserta terhadap bokashi dinilai secara lisan sebelum dan setelah pelatihan menggunakan respons angkat tangan, sedangkan keterlibatan praktik dievaluasi melalui observasi langsung. Sebelum kegiatan, 17 dari 35 peserta (48,6%) telah mengenal konsep dasar bokashi dan tidak satu pun memiliki pengalaman praktik pembuatan bokashi. Setelah pelatihan, seluruh 35 peserta menyatakan telah mengenal bokashi dan terlibat langsung dalam produksi secara berkelompok. Kegiatan menghasilkan estimasi sekitar 3 ton bokashi, termasuk 100 kemasan berlabel masing-masing 10 kg. Hasil analisis laboratorium menunjukkan kandungan C-organik 35,68%, N-total 2,22%, P_2O_5 1,21%, K_2O 1,01%, pH 6,81, dan rasio C/N 16,1. Estimasi biaya tunai langsung sebesar sekitar Rp8.997 per kemasan 10 kg, tidak termasuk biaya tenaga kerja dan penyusutan aset yang dapat digunakan kembali, sedangkan harga jual perkenalan ditetapkan sebesar Rp15.000–Rp20.000. Kegiatan ini meningkatkan familiaritas dan pengalaman praktis peserta dalam produksi bokashi serta membentuk dasar awal bagi keberlanjutan produksi berbasis masyarakat dan pengembangan produk bernilai tambah. Evaluasi lebih lanjut diperlukan untuk menilai keberlanjutan produksi, kinerja ekonomi, serta pengaruh aplikasi bokashi terhadap sifat tanah dan produktivitas tanaman.

Kata Kunci: bahan organik, masyarakat pesisir, pertanian berkelanjutan, pupuk bokashi

How to Cite: Pramatana, F., Aini, Y., Sari, P., Delvion, B. A., & Putri, R. A. A. (2026). EMPOWERING COASTAL COMMUNITIES THROUGH BOKASHI FERTILIZER PRODUCTION AND APPLICATION IN MATA AIR VILLAGE KUPANG REGENCY. *Mitra Mahajana: Jurnal Pengabdian Masyarakat*, 7(3) 546-557. doi: <https://doi.org/10.37478/mahajana.v7i3.8768>

INTRODUCTION

Agricultural production in dryland regions of Indonesia is constrained by limited productive land, unfavorable climatic conditions, and the need to maintain soil productivity using affordable and locally appropriate technologies (Hikmat et al., 2022; Wulandari & Kurniati, 2025). These challenges are particularly relevant in East Nusa Tenggara Province (Nusa Tenggara Timur/NTT), where semi-arid conditions, relatively low rainfall, and the predominance of dry, rocky, and marginal land limit opportunities for agricultural development (Fick & Hijmans, 2017; Nugroho et al., 2026). For rural and coastal households that depend partly on small-scale farming and horticultural activities, the limited availability of productive land requires more efficient management of existing agricultural resources (Fauziyah, 2026; Sari & Djodding, 2024). Appropriate technologies that are technically simple, affordable, and adaptable to local conditions are therefore important for supporting the sustainable use of small agricultural holdings (Sulartini et al., 2021).

The Kelapa Tinggi Beach community in Mata Air Village, Kupang Regency, reflects these conditions. The partner group involved in this program consists of 16 members from two neighbourhood units (Rukun Tetangga/RT), several of whom are also involved in coastal and sea turtle conservation activities. In addition to conservation activities, group members manage small-scale agricultural land as part of their household livelihood strategies. Based on information provided by the community group, each member generally manages approximately two agricultural plots measuring about 20×25 m each, equivalent to approximately 1,000 m² of cultivated land per member. The available land is commonly divided into six to seven smaller production plots for the cultivation of different crops. Agricultural income fluctuates considerably according to crop performance, commodity prices, and local market supply. Under favorable production and market conditions, members reported earning up to approximately IDR 1,000,000 per month from agricultural activities, whereas income may decline to approximately IDR 250,000 per month when crop production is low or when similar commodities are abundant in the local market. These conditions illustrate the limited scale and variable economic returns of household-level agricultural production and emphasize the importance of optimizing the use of available land and agricultural inputs.

Discussions with the partner group also identified several constraints related to organic fertilizer production and agricultural input management. Prior to the program, the community had limited practical experience in producing bokashi fertilizer, there was no established mechanism for continued group-based bokashi production, and the group had limited experience in packaging and managing fertilizer as a value-added product. Organic materials such as livestock manure, straw, rice residues, and other agricultural residues have the potential to be utilized as raw materials for organic fertilizer production (Irmawati et al., 2025; Tabun et al., 2017). However, these resources had not yet been systematically utilized for bokashi production by the partner group. Their availability may also vary between production cycles, meaning that some materials may be obtained locally while others may need to be purchased. Therefore, the main challenge was not merely the availability of organic materials, but also the community's limited technical experience in processing them into a usable and consistently managed agricultural input.

Bokashi fertilizer represents a practical option for addressing this capacity gap because it can be produced through the fermentation of organic materials using relatively simple production techniques. Previous studies have reported that bokashi can contribute to improved soil properties and support plant growth and crop production under appropriate application conditions (Fitriany & Abidin, 2020; Sadjadi et al., 2017). Community-based bokashi production has also been introduced through training and participatory activities to improve knowledge and practical capacity in processing organic materials into agricultural inputs (Botahala et al., 2022; Wardah et al., 2019). These characteristics make bokashi particularly relevant for communities managing relatively small agricultural areas because the technology can be implemented at the community level and can potentially reduce dependence on externally supplied organic fertilizers. Nevertheless, the present program did not directly evaluate changes in soil properties,

plant growth, or crop yield following bokashi application. Therefore, the use of bokashi in this program was primarily positioned as a community-capacity-building strategy and an initial step toward improving the management of agricultural inputs rather than as direct evidence of increased agricultural productivity.

Based on the partner's needs, the program addressed three interrelated aspects: production capacity, continuity of community-based management, and product development. The production component focused on providing participants with knowledge and direct hands-on experience in the major stages of bokashi production. From a management perspective, the program aimed to establish an initial operational basis for continued community-based production through the provision of reusable production equipment and the introduction of simple production and financial management practices, rather than immediately establishing a formal business entity. From a product-development perspective, packaging and labeling were introduced as initial steps toward creating a value-added bokashi product, while educational materials were provided to support appropriate fertilizer application (Rahmad et al., 2026). This approach allowed bokashi to be positioned both as an agricultural input for the partner community and as a product with potential for gradual development and future local marketing. Previous community-based programs have similarly emphasized the importance of combining technical skills, resource utilization, and product development in strengthening community capacity (Arsita et al., 2024).

Accordingly, this community service program aimed to strengthen the capacity of the partner community and surrounding residents through participatory bokashi production and application activities. The specific objectives were to involve at least 25 participants, comprising members of the partner group and residents of the surrounding community, in bokashi production, provide direct practical experience in group-based bokashi production, establish an initial operational foundation for continued community-based production, produce at least 100 labeled bokashi packages, and provide educational materials to support proper bokashi application. These objectives focused on strengthening technical capacity and developing the initial conditions required for continued production and value-added product development, rather than establishing a formal commercial enterprise or directly demonstrating increases in crop productivity. The program was also aligned with SDG 1 (No Poverty) through the development of productive community activities, SDG 8 (Decent Work and Economic Growth) through practical skills and value-added product initiatives, and SDG 17 (Partnerships for the Goals) through collaboration among Universitas Nusa Cendana, the Mata Air Village Government, and the partner community group.

METHODS

The Community Service Program (Pengabdian kepada Masyarakat/PkM) was conducted from July to August 2026 at Kelapa Tinggi Beach, Mata Air Village, Kupang Regency. The partner involved in this program was the Cemara Sea Turtle Conservation Community Group in Mata Air Village. The activity involved 35 participants consisting of group members and local community residents. The program was implemented using a participatory community empowerment approach, in which the partner community was positioned as the primary actor throughout the learning process and the application of the introduced technology (Efendi et al., 2021; Susanto et al., 2025). Knowledge and technology transfer was carried out through instructional sessions, demonstrations, hands-on practice, discussions, and continuous mentoring during the production and development of bokashi fertilizer products (Ahsan et al., 2026; Sujono et al., 2023).

The implementation of the program was divided into four stages: preparation and identification of partner needs, training and hands-on practice in bokashi fertilizer production, product testing and development, and program evaluation. The preparation stage was carried out through coordination with the village government and the partner group to determine the implementation schedule, participant involvement, required equipment and materials, and the identification of locally available organic materials that could be utilized in bokashi production.

This stage was also used to explain the objectives of the program and to define the roles and responsibilities of the implementing team and the partner group throughout the activity (Botahala et al., 2022).

The second stage consisted of training and hands-on practice in bokashi fertilizer production. The training and initial production were conducted in one main session from 09:00 to 11:30, with a total duration of approximately 2.5 hours. A follow-up activity was conducted 14 days after the fermentation period was completed. Prior to the practical session, participants received an explanation of organic fertilizers, the benefits of bokashi, the utilization of organic materials as raw materials, fermentation principles, and the application of bokashi in agricultural land management. The practical activity was conducted using a participatory approach, allowing participants to be directly involved in material preparation, mixing, application of the fermentation activator, and preparation of the mixture for fermentation (Selan et al., 2023).

One field-scale production batch was prepared using approximately 2,000 kg of solid organic materials, consisting of 1,200 kg of livestock manure, 400 kg of straw, 300 kg of rice husks, and 100 kg of sawdust. These materials represented approximately 60%, 20%, 15%, and 5% of the initial solid mixture by weight, respectively. The raw materials used during the program were purchased from local suppliers and delivered to the activity site. The fermentation activator was prepared using 2 L of EM4 and 2 L of molasses diluted with clean water as needed. The activator solution gradually sprinkled onto the organic material mixture while the materials were continuously mixed until a uniform moisture condition was achieved. Moisture was assessed under field conditions using a hand-squeeze test rather than an instrumental moisture meter. The mixture was considered sufficiently moist when a handful of material formed a compact clump when squeezed but did not release free water. This criterion was used as a practical field indicator of the target moisture condition (Sihaloho et al., 2025).

After mixing, the material was covered with tarpaulins and fermented for approximately 14 days. During the fermentation period, the material was turned every two days to maintain aeration, regulate heat accumulation and moisture distribution, and reduce the risk of anaerobic decomposition. After 14 days, a follow-up activity was conducted to inspect the matured bokashi, transfer the finished product to the partner community, and prepare part of the bokashi for packaging and subsequent use (Hikmah et al., 2025; Kusuma & Hapsari, 2024).

Production expenditures were recorded by separating recurring production inputs from reusable production assets. Recurring expenditures consisted of IDR 1,500,000 for the main organic raw-material mixture, including delivery to the activity site; IDR 54,000 for EM4; IDR 50,000 for molasses; IDR 140,000 for 100 packaging bags; and IDR 225,000 for 100 product labels, resulting in a total recurring expenditure of IDR 1,969,000. Reusable production assets consisted of fermentation tarpaulins (IDR 390,000), one sealing machine (IDR 300,000), and five shovels (IDR 350,000), with a total initial asset value of IDR 1,040,000. Labor costs and depreciation of reusable assets were not included in the simple production-cost calculation; consequently, the economic assessment presented in this study should be interpreted as an estimate of direct cash production requirements rather than a full cost accounting analysis.

To obtain information on the quality of the bokashi produced, a portion of the product was collected as a sample and analyzed at the Soil Chemistry Laboratory, Faculty of Agriculture, Universitas Nusa Cendana. Laboratory testing was conducted to determine the characteristics and nutrient composition of the bokashi as a basis for evaluating the quality of the resulting product. The laboratory analysis results were subsequently used as supporting information for product development and for interpreting and discussing the outcomes of the program (Rinaldi et al., 2021).

The subsequent stage focused on product development through packaging and product identification (Putra et al., 2025). The fully fermented bokashi, which was ready for use, was prepared both for utilization by the community group and for packaging as a value-added product. Assistance at this stage included the preparation of packaging, application of product labels (Ghifari et al., 2025), provision of fertilizer usage information, and an introduction to simple product management practices. These activities were designed so that the practical experience gained by participants could support the group's fertilizer needs and subsequent

productive activities. The implementation of the program was evaluated based on participant involvement, self-reported familiarity with bokashi, practical participation, production outcomes, product development, and prospects for continued community-based production (Hartanti et al., 2025; Wardah et al., 2019).

Participants' familiarity with bokashi and practical involvement were evaluated descriptively through an initial oral assessment and direct observation during the training activities. All 35 participants attended both the initial production session and the follow-up activity conducted 14 days later. Before the instructional session, participants were asked whether they were familiar with bokashi fertilizer and its basic production concept, and responses were recorded based on a show of hands (Berrington et al., 2023). This initial assessment was used to determine the proportion of participants who had prior familiarity with bokashi. After the training, the same oral question was repeated using a show-of-hands response to determine changes in participants' self-reported familiarity with bokashi. Practical involvement was assessed by the implementation team through direct observation during the group-based hands-on activity. Participants were observed while taking part in the main stages of bokashi production, including preparation of raw materials, mixing, preparation and application of the EM4-molasses activator, determination of appropriate moisture using the hand-squeeze test, and management of the fermentation process. Because the activity was conducted collaboratively and no individual skill-scoring rubric was applied, the practical outcome was interpreted as evidence of active participation and acquisition of hands-on experience rather than as a formal individual competency score. The evaluation results were therefore summarized descriptively using the number and percentage of participants involved in each assessment stage.

The program outcomes were further evaluated by documenting the quantity of bokashi packaged and directly weighed, estimating the remaining unpackaged product through field observation, recording the number of labelled products produced, and conducting discussions with the partner group regarding product utilization and continuation plans. Prospects for program continuity were assessed descriptively based on the partner group's willingness and capacity to continue bokashi production, the availability of reusable production equipment, and the expressed support of the Mata Air Village Government for future production activities. At the time of the evaluation, the Village Government's commitment to provide financial support remained verbal and had not yet been formalized through an official document or budget allocation. The evaluation data were analyzed descriptively to characterize participant involvement, production outcomes, product development, and the prospects for continued community-based bokashi production (Fatimah & Muhidin, 2024).

RESULTS AND DISCUSSION

The community service program was implemented in collaboration with the Cemara Sea Turtle Conservation Community Group at Kelapa Tinggi Beach, Mata Air Village, Kupang Regency. The program involved 35 participants, exceeding the initial target of 25 participants. Participants consisted of members of the partner group and residents of the surrounding community.

Changes in Participants' Familiarity and Practical Involvement

The initial oral assessment showed that 17 of the 35 participants (48.6%) were familiar with the basic concept of bokashi, while none had previous hands-on experience in bokashi production. After the training, all 35 participants (100%) responded positively when the same question regarding familiarity with bokashi was repeated. In addition, all participants were directly involved in the group-based production process and attended the follow-up activity conducted after the 14-day fermentation period (Table 1). These findings indicate an increase in participants' self-reported familiarity with bokashi and a clear transition from no previous practical experience to direct hands-on involvement in its production. However, because familiarity was assessed through a simple oral response and practical competence was not measured using an individual scored rubric, the results should be interpreted as evidence of

increased awareness and practical exposure rather than as a formal measurement of individual competency.

Table 1. Participants' familiarity with bokashi and practical involvement

Indicator	Participants (n)	Percentage (%)
Participants familiar with bokashi before training	17	48.60
Participants with previous hands-on bokashi production experience	0	0.00
Participants familiar with bokashi after training	35	100.00
Participants involved in group-based bokashi production	35	100.00
Participants attending the 14-day follow-up activity	35	100.00

To support the continued application of the technology introduced after the program, participants were also provided with informational materials in the form of posters explaining how to use bokashi fertilizer. These materials served as simple reference guides that participants could consult during subsequent bokashi application and production activities. The combination of training, hands-on practice, and supporting informational materials is particularly important in community empowerment programs, as it helps ensure that the information and practical experience gained during the activity remain accessible and applicable after the program has ended.



Figure 1. Informational posters distributed to program participants

Bokashi Fertilizer Production

The field-scale production activity generated an estimated total of 3 tons of bokashi. Of this amount, 100 packages weighing 10 kg each were directly weighed and prepared as labeled products, representing 1,000 kg of packaged bokashi. The remaining unpackaged bokashi was estimated through field observation and was primarily used by group members on their agricultural land or subsequently repackaged according to their needs.

This utilization pattern indicates that bokashi serves two main functions for the partner group. First, bokashi is used as an agricultural input that can be directly applied to support the management of community farmland (Astar et al., 2024; Hala et al., 2023). Second, part of the production was developed into packaged products with potential for value-added product development (Bunga, et al., 2025; Sabat et al., 2025). This utilization pattern therefore suggests two potential benefits: direct use as an agricultural input and gradual development as a packaged product. However, reductions in external fertilizer purchases and realized product sales were not quantified during the program period.



Figure 2. Bokashi fertilizer production practice

Characteristics and Nutrient Content of Bokashi

The bokashi sample was analyzed at the Soil Chemistry Laboratory, Faculty of Agriculture, Universitas Nusa Cendana. The analysis showed a moisture content of 24.21%, organic C of 35.68%, total N of 2.22%, P_2O_5 of 1.21%, K_2O of 1.01%, a pH of 6.81, and a C/N ratio of 16.1. These results indicate that bokashi contained a relatively high proportion of organic matter. The organic C content of 35.68% reflects the substantial organic fraction retained in the final product. Meanwhile, the C/N ratio of 16.1 suggests that the decomposition process produced organic material with a relatively balanced carbon-to-nitrogen relationship. The pH value of 6.81 further indicates that the bokashi was close to neutral, providing chemical characteristics that support its potential use as an organic soil amendment.

The macronutrient content consisted of 2.22% total N, 1.21% P_2O_5 , and 1.01% K_2O . When combined, the total N + P_2O_5 + K_2O content reached approximately 4.44%. These results indicate that the fermentation process produced a material that not only contained substantial organic matter but also supplied major nutrients required to support plant growth. For comparison, the Minimum Technical Requirements for solid organic fertilizers stipulated in the Decree of the Minister of Agriculture No. 261/KPTS/SR.310/M/4/2019 (Kementerian Pertanian, 2019) specify a minimum organic C content of 15%, a maximum C/N ratio of 25, a minimum combined N + P_2O_5 + K_2O content of 2%, and a pH range of 4–9. Based on these criteria, the organic C content, C/N ratio, total macronutrient content, and pH of the bokashi produced in this program were within or exceeded the specified requirements. The nutrient characteristics of bokashi have also been discussed in previous studies (Iswahyudi et al., 2020).

Product Development and Economic Value

In addition to being applied directly to the agricultural land of group members, part of the bokashi was developed into a packaged product. A total of 100 packages, each weighing 10 kg, were prepared and equipped with product labels. Product labeling provided a distinct identity and represented an initial step toward value-added product development. A simple direct-cost assessment was conducted using the production expenditures recorded during the program. The main organic raw materials, EM4, and molasses required IDR 1,604,000 per production batch. Based on the estimated total production of 3 tons, the direct raw-material cost was approximately IDR 5,347 per 10 kg of bokashi. Packaging and labeling added approximately IDR 3,650 per package, resulting in an estimated direct cash cost of approximately IDR 8,997 per 10-kg package.

Informal local price observations indicated that comparable 10-kg organic fertilizer products were commonly offered at approximately IDR 20,000–25,000. However, because the bokashi produced in this program represented the partner group's first production cycle, the Mata Air Village Government and the partner group recommended an introductory selling price of IDR 15,000–20,000 per 10-kg package. This lower introductory price was intended to facilitate initial market acceptance while the product was being introduced locally. The availability of product labels and laboratory information on nutrient characteristics also provided supporting information for the product's initial market introduction. At the proposed price range of IDR 15,000–20,000, the estimated contribution margin was approximately IDR 6,003–11,003 per package before accounting for labor and depreciation of reusable production assets. Reusable assets, including fermentation tarpaulins, a sealing machine, and shovels, had an initial value of IDR 1,040,000 and could be used in subsequent production cycles. Labor costs and depreciation of reusable production assets were excluded from this simplified calculation. Therefore, the estimated contribution margin should not be interpreted as net profit.

If all 100 initial packages were sold, the potential gross sales value would range from IDR 1,500,000 to IDR 2,000,000. However, this amount represents a sales scenario rather than realized income because part of the bokashi was prioritized for agricultural use by the partner group and actual sales had not yet been systematically recorded. Accordingly, the economic outcome should be interpreted as an initial indication of value-added product potential rather than evidence of established business profitability. Further production cycles with systematic records of sales, labor requirements, asset depreciation, and other operating expenses are required before profitability and break-even performance can be assessed more reliably.

The program was not solely oriented toward commercialization, as a substantial portion of the bokashi was intended for direct use by group members on their agricultural land. Product development was therefore introduced gradually, with packaging, labelling, and introductory pricing serving as initial steps toward value-added product development. At this stage, these activities should be interpreted as preparation for future community-based enterprise development rather than evidence of an established commercial operation. This gradual approach allows the partner group to strengthen its production and product management capacity before expanding marketing activities (Aini et al., 2024; Banu et al., 2025; Patawaran et al., 2025).



Figure 3. Bokashi products

Prospects for Program Sustainability

The program created several conditions that may support the continuation of bokashi production after the community service activities. All 35 participants attended both the initial production session and the follow-up activity after the 14-day fermentation period and gained direct hands-on experience in group-based bokashi production. In addition, several reusable production assets, including fermentation tarpaulins, a sealing machine, and shovels, were transferred to the partner group to support subsequent production cycles. The main raw materials, such as livestock manure, straw, rice husks, and sawdust, can potentially be obtained from local community sources or purchased when necessary. These conditions provide an operational basis for continued bokashi production, although long-term continuity has not yet been evaluated.

The Mata Air Village Head also verbally expressed willingness to support the initial financing of future bokashi production as part of efforts to encourage productive community activities. However, at the time of the program, this support had not yet been formalized through a written agreement, village budget allocation, or other official document. Therefore, the village government's support should be interpreted as an indication of institutional interest rather than as confirmed financial commitment. Further follow-up is required to determine whether this support is translated into formal planning and whether community-based production can be maintained over subsequent production cycles.

Overall, the program resulted in increased exposure to bokashi technology, direct practical involvement of participants, the production of an estimated 3 tons of bokashi, and the preparation of 100 labeled 10-kg packages. These achievements indicate that the program established an initial technical and operational foundation for continued community-based bokashi production. However, because individual competency, long-term production continuity, and economic performance were not evaluated over multiple production cycles, the results should not yet be interpreted as evidence of established program sustainability or business viability (Apriandi et al, 2025).

CONCLUSION

The community empowerment program in Mata Air Village strengthened participants' familiarity with bokashi and provided direct practical experience in its production through a participatory approach combining instruction, hands-on practice, and technical assistance. All 35 participants took part in the group-based production process, and the activity produced an estimated 3 tons of bokashi, including 100 labelled 10-kg packages. Laboratory analysis indicated favourable chemical characteristics of the product, supporting its potential use as an organic soil amendment. Packaging, labelling, and introductory pricing also provided an initial basis for value-added product development. However, the program did not quantitatively evaluate changes in soil properties, plant growth, or crop yield; therefore, the results should not be interpreted as evidence of increased agricultural productivity. Overall, the program established an initial technical and operational foundation for continued community-based bokashi production and utilization.

ACKNOWLEDGMENT

The authors gratefully acknowledge Universitas Nusa Cendana for providing financial support for this community service program through Contract No. 521/UN15.22/PM/2026. The authors also extend their appreciation to the Mata Air Village Government for its support and facilitation during the implementation of the activities. Sincere thanks are conveyed to the partner community group and all participating community members for their active involvement, cooperation, and commitment, which contributed to the successful implementation of the program.

REFERENCES

- Ahsan, M., Maulana, M. R. R., Khoirani, A. W. P., Putra, S. M., & Abrori, M. U. (2026). Pemberdayaan Petani yang berkelanjutan Masyarakat Desa Wonokerso melalui Pelatihan dan Praktik Pembuatan Pupuk Bokashi Plus. *Journal of Digital Community Services*, 3(2), 88–95. <https://doi.org/10.69693/dcs.v3i2.63>
- Aini, K. N., et al. (2024). Pendampingan UMKM Candaria dalam Branding dan Promosi Produk Olahan Nanas melalui Media Sosial. *Welfare: Jurnal Pengabdian Masyarakat*, 2(3), 531–536. DOI: <https://doi.org/10.30762/welfare.v2i3.1765>
- Apriandi, M. C., Ardiansyah, J. M., & Mardika, L. (2025). Fisheries Business Diversification Strategies to Enhance the Welfare of Coastal Communities. *Jurnal Ekonomi Laut Dan Air Tawar*, 1(1), 43–48. <https://ejournal.utmj.ac.id/jelawat/article/view/910>
- Arsita, R. V., Tsamara, V. Q., Triharyanti, F., Aryanto, S. P., Atasa, D., & Putra, C. A. (2024). Pendampingan Pembuatan Pupuk Bokashi pada Kelompok Tani di Desa Talang Kecamatan Rejoso Kabupaten Nganjuk. *PROFICIO*, 5(2), 1061–1068. DOI: <https://doi.org/10.36728/jpf.v5i2.3812>
- Astar, I., Suci, I. A., & Suryani, R. (2024). Pelatihan Pembuatan Pupuk Bokashi Sebagai Media Tanam Organik pada Lahan Pekarangan. *Jurnal Abdi Insani*, 11(2), 2169–2176. <https://doi.org/10.29303/abdiinsani.v11i2.1617>
- Banu, M., Sahala, J., Dethan, A. A., Neonbeni, E. Y., Tabenu, O., Mambur, Y. P. V., & Sendow, C. J. B. (2025). Pemberdayaan Petani Melalui Pembuatan Pupuk Bokashi dari Sumberdaya Lokal di Desa Suanae. *AKM: Aksi Kepada Masyarakat*, 6(2), 539–546. <https://doi.org/10.36908/akm.v6i2.1590>
- Berrington, H., Karapiperi, A., & Kastis, E. (2023). An Updated Show of Hands. *MSOR Connections*, 21(1), 18. DOI: 10.21100/msor.v21i1.1375
- Botahala, L., Manimoy, H., Karbeka, M., Pen'au, T., & Karmani, A. (2022). Pelatihan pembuatan pupuk bokashi di desa luba. *Jurnal Pustaka Mitra (Pusat Akses Kajian Mengabdikan Terhadap Masyarakat)*, 2(4), 244–250. DOI: <https://doi.org/10.55382/jurnalpustakamitra.v2i4.325>
- Bunga, N. I., Tobondo, Y. V., & Balo, M. J. (2025). Pemberdayaan Ibu Rumah Tangga Kelompok Tani Sesedongi di Kelurahan Tentena melalui Budidaya Sayuran Organik dengan Memanfaatkan Limbah Pertanian Guna Meningkatkan Ekonomi Keluarga. *Jurnal Abdi Insani*, 12(3), 1292–1302. <https://doi.org/10.29303/abdiinsani.v12i3.2383>
- Efendi, M. Y., Kustiari, T., Sulandjari, K., Sifat, W. O., Ginting, S., Arief, A. S., & Nurhidayah, R. E. (2021). Metode pemberdayaan masyarakat. *Angewandte Chemie International Edition*, 6(11), 951–952.
- Fatimah, R., & Muhidin, R. (2024). Peningkatan Kapasitas Petani dalam Pembuatan Pupuk Organik Bokashi dan Pupuk Organik Cair (POC). *Laksanapadma*, 1, 6–11. <https://journal.uniga.ac.id/index.php/laksanapadma/article/view/41408>
- Fauziyah, E. (2026). *Menanam harapan di lahan kering dan pesisir Madura*. Lamongan: PT Ghani Press Group.
- Fick, S. E., & Hijmans, R. J. (2017). WorldClim 2: new 1-km spatial resolution climate surfaces for global land areas. *International Journal of Climatology*, 37(12), 4302–4315. <https://doi.org/10.1002/joc.5086>
- Fitriany, E. A., & Abidin, Z. (2020). Pengaruh pupuk bokashi terhadap pertumbuhan mentimun (*Cucumis sativus* L.) di desa sukawening, kabupaten bogor, jawa barat. *Jurnal Pusat Inovasi Masyarakat*, 2(5), 881–886. <https://journal.ipb.ac.id/index.php/pim/article/view/31740>
- Ghifari, M. R., Ghifari, F., Prawira, R., Mirzakoni, T. A., Raja, F. M., Eugenia, H. S., ... Ramadan, B. S. (2025). Pelatihan Pembuatan Pupuk Bokashi Berbasis Kotoran Sapi dan Limbah Baglog Jamur Menggunakan EM4 bagi Kelompok Tani Hutan Alam Lestari di Desa Kradenan, Kabupaten Grobogan, Jawa Tengah. *Jurnal Pengabdian Masyarakat Inovasi Indonesia*, 3(5), 363–372. <https://doi.org/10.54082/jpmii.885>
- Hala, D. M., Poleuleng, A. B., Chadijah, St., & Kafrawi. (2023). Pemanfaatan Limbah Pertanian Menjadi Pupuk Organik Bokashi di Dusun Katoang, Desa Bontomatinggi, Kecamatan Tompobulu, Kabupaten Maros. *Jurnal Abdi Inovatif: Pengabdian Kepada Masyarakat*, 2(2), 84–91. <https://doi.org/10.31938/jai.v2i2.486>

- Hartanti, A., Suyani, I. S., Sulistiyowati, R., Zuhroh, M. U., & Su'ud, M. (2025). Pembuatan Pupuk Organik Cair (POC) dan Bokashi Padat Serta Pengaplikasian Bagi Tim Penggerak PKK Kecamatan Kanigaran, Kota Probolinggo. *Abdimas Galuh*, 7(1), 758. <https://doi.org/10.25157/ag.v7i1.17816>
- Hikmah, A. N., Astaman, P., Dassir, M., & Nadirah, S. (2025). Pelatihan Pembuatan Pupuk Kompos Bokashi untuk Meningkatkan Kemandirian Petani di Wilayah Pegunungan Camba, Kabupaten Maros. *Sinergi Aksi Nyata Cendekia*, 1(1), 6–13. DOI: <https://doi.org/10.6131/sancaka.v1i1.171>
- Hikmat, M., Hati, D. P., & Sukarman, S. (2022). Kajian lahan kering berproduktivitas tinggi di Nusa Tenggara untuk pengembangan pertanian. *Jurnal Sumberdaya Lahan*, 16(2), 119–133. <https://epublikasi.pertanian.go.id/berkala/jsl/article/view/3311>
- Irmawati, L., et al. (2025). Pemanfaatan Limbah Kotoran Domba dan Jerami sebagai Pupuk Bokashi di Desa Neglasari. *Jurnal Pengabdian Kepada Masyarakat*, 15(1), 105–111. <https://doi.org/10.30999/jpkm.v15i1.3689>
- Iswahyudi, I., Izzah, A., & Nisak, A. (2020). Studi penggunaan pupuk bokashi (kotoran sapi) terhadap tanaman padi, jagung & sorgum. *Jurnal Pertanian Cemara*, 17(1), 14–20. DOI: <https://doi.org/10.24929/fp.v17i1.1040>
- Kementerian Pertanian. (2019). *Keputusan Menteri Pertanian Republik Indonesia Nomor 261/KPTS/SR.310/M/4/2019 Tentang Persyaratan Teknis Minimal Pupuk Organik, Pupuk Hayati, Dan Pembenah Tanah*.
- Kusuma, F. D., & Hapsari, M. T. (2024). Peningkatan Kapasitas Masyarakat Urban dalam Pembuatan Pupuk Bokashi. *ABDIKU: Jurnal Pengabdian Masyarakat Universitas Mulawarman*, 3(1), 29–32. <https://doi.org/10.32522/abdiku.v3i1.1541>
- Nugroho, A., Putritamara, J. A., Purwanti, T. S., Ramadhani, Z. O., Latifah, U., & Arif, S. F. (2026). *Strategi Bertahan dalam Krisis: Inovasi Peternakan Lahan Kering di Nusa Tenggara Timur*. Malang: Universitas Brawijaya Press.
- Patawaran, N., Nggego, D. A., & Redu, S. T. (2025). Pertanian Organik Berbasis Pupuk Bokashi untuk Peningkatan Produktivitas Cabai pada Kelompok Tani di Kabupaten Merauke. *Jurnal Abdimas Bina Bangsa*, 6(1), 261–274. <https://www.jabb.lppmbinabangsa.id/index.php/jabb/article/view/1559>
- Putra, G. A., Wiraguna, D., Saputra, Z. H., Azhari, D., Nur'aini, H., & Fariadi, H. (2025). Pengembangan Desain Kemasan Pupuk Untuk Meningkatkan Daya Saing Di Desa Mekar Sari. *Jurnal Dehasen Mengabdi*, 4(1). <https://doi.org/10.37676/jdm.v4i1.7903>
- Rahmad, N., Fahlin, D. K., Jambak, L. G. K., Niha, A. A., Ahmadi, T. P., & Revaldo, M. Z. (2026). Strategi Peningkatan Nilai Jual Pupuk Organik Cair (POC) melalui Pendampingan Labeling dan Pengemasan Produk di Desa Totoharjo Lampung Selatan: Pengabdian. *Jurnal Pengabdian Masyarakat Dan Riset Pendidikan*, 5(1), 1547–1553. DOI: <https://doi.org/10.31004/jerkin.v5i1.6955>
- Rinaldi, A., Ridwan, R., & Tang, M. (2021). Analisis kandungan pupuk bokashi dari limbah ampas teh dan kotoran sapi. *Jurnal Saintis*, 2(1), 5–13. <https://journal.ft.unibos.ac.id/saintis/article/view/98>
- Sabat, D., et al. (2025). Kewirausahaan Berbasis Bokashi: Teknik Pengolahan, Pemasaran Digital dan Pembukuan Sederhana bagi Alumni. *Bakti Cendana*, 8(2), 235–249. <https://doi.org/10.32938/bc.8.2.2025.235-249>
- Sadjadi, S., Herlina, B., & Supendi, W. (2017). Level penambahan bokashi kotoran sapi terhadap pertumbuhan dan produksi pada panen pertama rumput raja (*Pennisetum purpureophoides*). *Jurnal Sain Peternakan Indonesia*, 12(4), 226003. <https://doi.org/10.31186/jspi.id.12.4.411-418>
- Sari, N. I., & Djodding, I. M. (2024). Analisis Strategi Pembangunan Ekonomi Pertanian yang Berkelanjutan di Wilayah Pesisir. *Jurnal Ilmiah Sosio Agribis (JISA)*, 24, 39–43. <https://journal.uningrattual.ac.id/index.php/JST/id/article/view/15>
- Selan, M., Baun, A., Palinata, Y. J., Nope, F. E., & Atty, J. Ch. (2023). Pelatihan Pembuatan Pupuk Bokashi Bagi Kelompok Tani di Desa Tubuhue Kecamatan Amanuban Barat Kabupaten

- Timor Tengah Selatan. *EJOIN: Jurnal Pengabdian Masyarakat*, 1(4), 258–263. <https://doi.org/10.55681/ejoin.v1i4.740>
- Sihaloho, A. N., Girsang, W., Purba, R., Meriaty, M., Rosalyne, I., Girsang, C. I., ... Darta, J. (2025). Pelatihan Pembuatan Pupuk Bokashi Limbah Pertanian Memanfaatkan Teknologi EM4 bagi Petani. *Jurnal Pengabdian Masyarakat Sapangambe Manoktok Hitei*, 5(1), 8–14. <https://doi.org/10.36985/6d7kar48>
- Sujono, S., Suhadi, A., Zulfikar, Z., Khafidhoh, N., Abar, A. B. K., Mubarok, M. Z., ... Mubarok, U. H. (2023). Pelatihan Pembuatan Pupuk Bokashi Plus di Desa Turipinggir Kecamatan Megaluh Kabupaten Jombang. *Jumat Pertanian: Jurnal Pengabdian Masyarakat*, 4(3), 142–145. <https://doi.org/10.32764/abdimasper.v4i3.4226>
- Suliartini, N. W. S., Ngawit, I. K., Farida, N., & Anugrawati, D. R. (2021). Usaha peningkatan produksi padi fungsional melalui aplikasi teknologi tepat guna di Desa Kateng Kabupaten Lombok Tengah. *Jurnal Abdi Insani Universitas Mataram*, 8(2), 236–248. <https://doi.org/10.29303/abdiinsani.v8i2.389>
- Susanto, D. A., et al. (2025). *Pemberdayaan Masyarakat*. Yogyakarta: CV. Edu Akademi.
- Tabun, A. C., Ndoen, B., Leo-Penu, C. L. O., Jermias, J. A., Foenay, T. A. Y., & Ndolu, D. A. J. (2017). Pemanfaatan limbah dalam produksi pupuk bokhasi dan pupuk cair organik di desa tuatuka kecamatan kupang timur. *Jurnal Pengabdian Masyarakat Peternakan*, 2(2). DOI: <http://dx.doi.org/10.35726/jpmp.v2i2.212>
- Wardah, E., Maisura, M., & Budi, S. (2019). Dampak Pelatihan Pembuatan Pupuk Bokashi Untuk Petani Cabai Merah. *AgriFo: Jurnal Agribisnis Universitas Malikussaleh*, 4(2), 87–92. DOI: <https://doi.org/10.29103/ag.v4i2.2720>
- Wulandari, E., & Kurniati, E. (2025). Karakteristik pertanian di Indonesia: Antara tradisi, tantangan struktural, dan peluang transformasi. *Jurnal Ekonomi Pertanian Dan Agribisnis*, 2(1), 57–72. <https://ejurnal.suaninstitute.org/index.php/JEPA/article/view/97>