

# Bokashi And Botanical Pesticides Production Training in Support Organic Farming for Sustainable Agriculture

Wiyono<sup>1</sup>, Agus Budiyono<sup>1</sup>, Teguh Supriyadi<sup>1</sup>, Siti Mardhika Sari<sup>1\*</sup>

1, Universitas Tunas Pembangunan Surakarta

\*e-mail: [mardhikasari.siti@gmail.com](mailto:mardhikasari.siti@gmail.com)

## Abstract

*Agriculture played a crucial role in maintaining food security in a country, including Indonesia. The practice of agricultural activities was highly dependent on the environment. Environmentally friendly agricultural practices, also known as organic farming, were widely popular. Public awareness of the quality of healthy food was the reason why organic farming practices were increasingly in demand. This agricultural practice was related to the recycling of nutrients through plant and livestock waste, as well as other waste that could improve the fertility status and structure of the soil. Community service activities were located in Dlingo Village, Mojosongo District, Boyolali, involving the Mudho Tani livestock group. The method used was providing material regarding the manufacture of organic fertilizer and vegetable pesticides by utilizing materials found in the environment. Organic fertilizer used cow dung because the majority of the group members were livestock breeders, while vegetable pesticides used spices (ginger, turmeric, mackerel). The practice of making fertilizers and pesticides was carried out to increase the skills of farmers so that they could apply the principles of organic farming. With this service activity, it was hoped that farmers' skills in making organic fertilizers and pesticides could increase and be applied to agricultural practices. The implementation of an organic farming system was one of the supports for creating sustainable agriculture.*

**Keywords:** Pesticide; Organic; Sustainable Agriculture

## 1. INTRODUCTION

Indonesia is known as an agricultural country and there are a variety of agricultural crops in Indonesia. However, it is very unfortunate, nowadays Indonesia's agricultural land is increasingly narrow due to industrialization. Green land turns barren, natural disasters cannot be avoided. Apart from that, what is also worrying is the public's mindset which often underestimates the agricultural sector. That is why Indonesia's agricultural output is not commensurate with the available natural resources. Therefore, steps are needed to advance Indonesian agriculture that is environmentally friendly so that it does not harm the living creatures in it.

Environmentally friendly agricultural practices, also known as organic farming, are currently widely applied in agricultural systems in various countries ([Yuriansyah et al., 2020](#)). Public awareness of healthy food has made organic farming practices increasingly intensive. Organic farming, as an agricultural production system based on biological recycling. Nutrient recycling can be done through plant and livestock waste, as well as other waste that can improve the fertility status and structure of the soil. The organic farming system is the "law of return" which means a system that seeks to return all types of organic material to the soil, both in the form of residues and crop waste and livestock which then aims to provide food for the plants ([Mayrowani, 2012](#)). The philosophy underlying organic farming is to develop the principles of providing food to the soil which in turn provides food for the plants (feeding the soil that feeds the plants) and not providing food directly to the plants. ([Hamka et al., 2018](#)).

The concept of development in agricultural sector should not only focus on increasing productivity, but also pay attention to natural balance, quality and product safety. Cultivation principles based on pest control use of compost fertilizer, integrated resource management, and attention to environmental sustainability need to be applied in the agricultural sector development concept ([Imani et al., 2018](#)). This aims to ensure that the development of the agricultural sector can be economically, socially and sustainable in the future. This cultivation concept is in

accordance with the principles of organic farming which can be one solution to various potential long-term problems resulting from the application of conventional agricultural systems that rely on excessive use of inorganic chemical fertilizers and pesticides (Taki et al., 2022). Problems that could potentially arise include water pollution, decreased soil fertility, pest resistance to pesticides, and threats to human and animal health due to the presence of pesticide residues in consumed food products.

Sustainable agriculture has emerged as an alternative agricultural system to answer the many obstacles faced by farmers (Efendi, 2016). This refers to the capacity of agriculture to contribute to overall well-being by providing food and other goods and services that are efficient and economically profitable, socially responsible and environmentally appropriate. This system involves an interrelated combination of land, crop and livestock production that corresponds to the non-use or reduced use of external inputs that have the potential to harm the environment and/or the health of farmers and consumers. Instead, this system emphasizes food production techniques that integrate and suit local natural processes such as nutrient cycling, biological nitrogen fixation, soil regeneration and natural enemies of pests. Using local resources to improve land can be beneficial in that increased income can reduce barriers to adopting sustainable resource use practices.

The Mudho Tani livestock group, located in Dlingo Village, Mojosongo Boyolali District, has abundant raw materials to be used as organic fertilizer and pesticides. However, currently the use of livestock manure has not been carried out optimally.

The aim of this activity is to provide farmers with skills in utilizing livestock manure and plant rhizomes which can be used as organic fertilizer and pesticides, as an effort to apply the principles of organic farming which is one of the conditions for creating a sustainable agricultural system. The expected benefit from this service activity is that members of the farmer group will be able to know and utilize materials around the environment that can be applied to daily agricultural practices.

## 2. METHODOLOGY

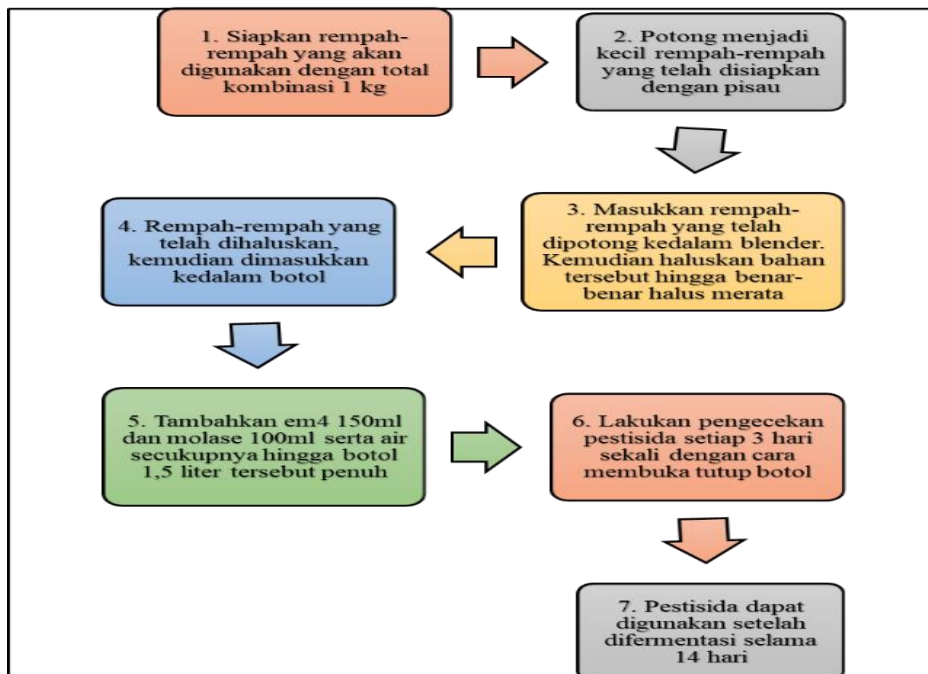
The abundant availability of raw materials for organic fertilizers and botanical pesticides in the environment, if not balanced with practical skills, will not support the creation of organic farming (Marwantika, 2019). Regarding this problem, members of farmer groups need to be equipped with skills in practice of making organic fertilizers and pesticides so that they can then be applied to agricultural systems they implement. The method used is providing materials and demonstrations or manufacturing practices. Before the farmer group training was carried out and the university had agreed that the theme would be given about organic farming. This is because farmers still have difficulties in the practice of making organic fertilizers and pesticides. Farmer group members were given material regarding the importance of implementing organic farming systems as well as steps for making organic fertilizers and pesticides..

## 3. RESULT AND DISCUSSION

The practice of making fertilizer uses cow dung, because this material is easily available in the environment (Hartatik et al., 2015). The majority of group members have cattle at home. So far, the utilization of manure has not been carried out optimally. Making bokashi fertilizer from cow dung requires additional ingredients, such as: straw, bran, husk/charcoal husk, EM-4, molasses/sugar, water. Meanwhile, the tools used include: tarpaulin/other mat, hoe/shovel, bucket, sprayer. The steps for making bokashi fertilizer from cow dung are as follows:

1. The initial step is making a solution from EM-4, molasses/sugar and water in a ratio of 1 ml : 1 ml : 1 liter of water.
2. The manure ingredients include cow dung, husk charcoal and bran mixed evenly on a dry mat/tarpaulin.
3. The EM-4 solution is poured in using a sprinkler slowly and gradually until a dough forms. When the dough is formed, if it is clenched with your hands, no water will come out of the dough. Likewise, if the fist is released, the dough will rise again (water content is around 30%).
4. The dough is then made into a mound 15-20 cm high. The mound is then covered with a tarpaulin or thick plastic for 7-14 days. During the process, the material temperature is maintained between 40-60°C. If the temperature of the material exceeds 60°C, the sack cover is opened and the dough material is turned upside down and then the mound is closed again.
5. After fourteen days the tarpaulin or thick plastic can be opened. Making bokashi is said to be successful if the bokashi ingredients are well fermented. The characteristics are that bokashi will grow with white mushrooms and have a delicious aroma. Meanwhile, if the resulting bokashi smells bad then the bokashi making failed (Fitriany & Abidin, 2020). The finished Bokashi should be used straight away. If you want to store the bokashi first, it must be dried first by leaving it on the floor to dry. Once the bokashi is dry it can be stored in a plastic container.

Botanical pesticides are basic ingredients come from plants which are relatively easy to make with limited capabilities ([Sidauruk et al., 2020](#)), because this botanical pesticide is easily decomposed in nature so it does not pollute the environment and is relatively safe for humans. In this service, the practice of making vegetable pesticides uses spices. The spices used are ginger, turmeric, kencur, and laos with a total combination of 1 kg. Other additional ingredients used are EM-4, molasses, and water. The steps for making vegetable pesticides are as follows:



Application of organic farming systems in the field still experiences several obstacles, including: The area of land where organic farming systems are implemented is relatively small and is located around non-organic (conventional) cultivated land. Existing water sources are contaminated with fertilizers, pesticides and other chemicals. However, this is not an obstacle to starting organic farming practices. With organic farming, apart from maintaining better food quality, it also supports environmental sustainability.

In fact, organic farming practices in the field are still rarely found. Based on the results of hearings with members of farmer groups, only a few implement organic farming systems using manure. This practice is also not 100% organic, farmers still use chemical fertilizers at planting time. Organic fertilizer derived from animal waste is usually only applied after tillage before planting.

The majority of farmers around the Dlingo area cultivate rice for the main commodity, but some grow horticulture such as melons, chilies and so on. They actually understand the use of organic fertilizer, but in practice they sometimes still encounter problems. One obstacle is that the technique for making bokashi is still not correct, so the fermentation process fails and bokashi cannot be used. The failure factor in making fertilizer can also be influenced by environmental factors. The main factors causing rot in the bokashi making process include the bokashi being too wet, the pH being too low and the N content being too high.

Bokashi is often used as compost because it is easy to obtain and easy to make. Apart from that, bokashi also has many functions for plants and soil, loosening soil, making it easier to absorb other nutrients as well as improving the structure of damaged soil or critical soil because this affects growth. plant. Bokashi can provide nutrients to the soil that can be used for plants thereby increasing plant productivity and plants having good growing quality. Bokashi has four benefits, namely to restore soil fertility by improving soil properties (physical, chemical or biological), bokashi accelerates and facilitates N absorption by plants.

Bokashi result from fermentation of organic materials using EM-4 technology. Bokashi has advantages and disadvantages among other organic fertilizers, even better than chemical fertilizers. Even though they both use organic materials as the basic ingredient for making organic fertilizer, bokashi fertilizer has a higher nutrient content compared to ordinary compost, so that the growth process in plants is faster, energy loss is low and the population of microorganisms in the soil is more perfect. ([Rohmah & Suntari, 2019](#)). The combination of organic ingredients such as brown sugar molasses solution and the microorganism content in EM-4 complements the advantages of bokashi fertilizer.

Before carrying out the training, we did not carry out a pre-test with farmer groups, because the pre-test had been carried out previously at the university. Meanwhile, the post test is carried out by farmer groups by applying fertilizers and pesticides resulting from training in the fields. We screen problems among farmer groups on land by involving certain steps to identify, categorize and prioritize the problems faced by farmers. The following are several ways to screen farmers for problems on the land:

1. Field Survey: Conduct field surveys to get information directly from farmers. Interviews and questionnaires can be used to explore the problems they face. Identify problems related to crop production, land management, pesticides, fertilizer, water, and other factors that can affect agricultural yields.
2. Visual Observation: Carry out direct observations on farmers' fields to identify signs of problems such as plant disease, nutritional deficiencies, or environmental damage.



3. Discussion Group Meetings: Hold discussion group meetings with local farmers to hear their experiences and views regarding problems on the land. Discuss with them the obstacles they experience daily in agricultural practices.



Picture 1. Materials and tools for making bokashi fertilizer and botanical pesticides



Picture 2. Practice of making bokashi fertilizer from cow dung.



Picture 3. Process of crushing spices as a basic ingredient for making vegetable pesticides.



Picture 4. Storage botanical pesticide in the bottle for 14 days before it is ready to use.

#### 4. CONCLUSION

The community service activities that have been carried out can increase farmers' skills in utilizing materials that can be found around them to be processed into organic fertilizers and pesticides. Another benefit is that farmers better understand the importance of preserving the environment by minimizing the use of inorganic fertilizers and pesticides. One of the main advantages of organic plants is that they are more environmentally friendly. Without the use of chemicals, the process of growing organic plants will not pollute the soil, water or air. The application of organic farming is considered as one of the approaches to sustainable agricultural development, because the development of organic farming cannot be separated from the overall agricultural development program.

After carrying out community service activities, farmers are expected to be able to practice making organic fertilizers and pesticides independently.

## **REFERENCES**

- Efendi, E. (2016). Implementasi Sistem Pertanian Berkelanjutan dalam Mendukung Produksi Pertanian. *Jurnal Warta*, 47.
- Fitriany, E. A., & Abidin, Z. (2020). Pengaruh Pupuk Bokashi Terhadap Pertumbuhan Mentimun (*Cucumis sativus* L.) di Desa Sukawening, Kabupaten Bogor, Jawa Barat Effect Of Bokashi Fertilizer on Cucumber (*Cucumis Sativus* L.) Growth in Sukawening Village, Bogor District, Jawa Barat. In *Jurnal Pusat Inovasi Masyarakat Juli* (Vol. 2020, Issue 5).
- Hamka, E., Mahmud, A., Rahma Ma'mun, S., Bubun, R. L., & Tamtama, A. (2018). Sistem Organik Untuk Pengembangan Pertanian Organik di Desa Lamomea Kabupaten Konawe Selatan. *Jurnal Dedikasi*, 15, 62–70. <http://ejournal.umm.ac.id/index.php/dedikasi/issue/view/584>
- Hartatik, W., Husnain, H., & Widowati, L. R. (2015). Peranan Pupuk Organik dalam Peningkatan Produktivitas Tanah dan Tanaman. *Jurnal Sumberdaya Lahan*, 9(2), 107–120.
- Imani, F., Charina, A., Karyani, T., & Mukti, G. W. (2018). Penerapan Sistem Pertanian Organik di Kelompok Tani Mekar Tani Jaya Desa Cibodas Kabupaten Bandung Barat. *Jurnal Pemikiran Masyarakat Ilmiah Berwawasan Agribisnis*, 4(2), 139–152.
- Marwantika, A. I. (2019). Pembuatan Pupuk Organik Sebagai Upaya Pengurangan Ketergantungan Petani Terhadap Pupuk Kimia Di Dusun Sidowayah, Desa Candimulyo, Kecamatan Dolopo, Kabupaten Madiun. *Indonesian Engagement Journal*, 17–28.
- Mayrowani, H. (2012). Pengembangan Pertanian Organik di Indonesia. *Forum Penelitian Agro Ekonomi*, 30(2), 91–108.
- Rohmah, A., & Suntari, R. (2019). Efek Pupuk Bokashi terhadap Ketersediaan Unsur Basa (K, Na, Ca, dan Mg) Pada Inceptisol Karangloso, Malang. *Jurnal Tanah Dan Sumberdaya Lahan*, 6(2), 1273–1279. <https://doi.org/10.21776/ub.jtsl.2019.006.2.8>
- Sidauruk, L., Manalu, C. J., & Sinukaban, D. E. (2020). Efektifitas Pestisida Nabati dengan Berbagai Konsentrasi pada Pengendalian Serangan Hama dan Produksi Tanaman Jagung Manis (*Zea Mays Saccharata* Sturt). *Jurnal Ilmiah Rhizobia*, 2(1), 24–32.
- Taki, R., Bag, A. G., Sadhik, S., Keerthika, B., & Kumar, K. V. S. (2022). The Role of Organic Farming for Sustainable Agriculture: An Approach to Economic Integrity. *International Journal of Environment and Climate Change*, 943–953. <https://doi.org/10.9734/ijecc/2022/v12i1030883>
- Yuriansyah, Y., Dulbari, D., Sutrisno, H., & Maksun, A. (2020). Pertanian Organik sebagai Salah Satu Konsep Pertanian Berkelanjutan. *PengabdianMu: Jurnal Ilmiah Pengabdian Kepada Masyarakat*, 5(2), 127–132. <https://doi.org/10.33084/pengabdianmu.v5i2.1033>