

REALIZING SUSTAINABLE AGRICULTURE WITH EMPOWERMENT AND APPLICATION OF BIOSAKA INNOVATION TECHNOLOGY IN SEUMANTOK VILLAGE, WEST ACEH

Dewi Andriani¹, Lias Harapan², Fantashir Awwal Fuqara³, Jekki Irawan⁴,
Putri Mustika Sari⁵, Abdul Muzammil⁶, Anisah Nasution⁷

^{1,3,4,5,6,7}Faculty of Agriculture, Teuku Umar University

²Pante Ceureumen Agricultural Extension Center, West Aceh Regency.

E-mail: dewaandriani@utu.ac.id

Abstract

The problem of unbalanced use of inorganic fertilizers and in the long term it can cause damage to the physical, chemical and biological properties of the soil as well as changes in the balance of soil nutrients, so that it produces unproductive marginal land for sustainable crop cultivation. Biosaka can be an effective and efficient innovation to reduce dependence on the use of inorganic fertilizers and minimize farming production costs. This community service was carried out in Seumantok Village, West Aceh. Methods for implementing community service include socialization, technical guidance in making biosaka and evaluation with questionnaires. The results obtained by the community are able to understand the meaning of biosaka and its benefits, how to make biosaka, and how to apply biosaka to cultivated plants. This biosaka eliminator is expected to be able to have a good effect on agricultural land, able to reduce the use of inorganic materials and maximize crop production potential in Seumantok Village, West Aceh.

Keywords: *Organic Fertilizers, Biosaka Eliminator, Sustainable Agriculture*

1. INTRODUCTION

Fertilizer is an important component in increasing agricultural production in Indonesia. Fertilizer is used as a source of essential elements that can be added to the soil to support plant growth and production. Fertilizer is classified into two parts, namely inorganic fertilizer and organic fertilizer. Inorganic fertilizer comes from chemical, physical or biological engineering produced by industry or fertilizer manufacturing factories, while organic fertilizer is fertilizer that comes from decaying plants, animal waste or animal parts. Inorganic fertilizer is able to increase agricultural yields, because it is able to provide nutrients in a short time, is easily soluble, thereby increasing nutrient absorption for root and plant growth. However, the problem is that the use of inorganic fertilizers that are unbalanced and carried out in the long term can erode nutrients and reduce the life of microorganisms in the soil. Continuous use of inorganic fertilizers can result in damage to the physical, chemical and biological properties of the soil as well as changes in the balance of soil nutrients, resulting in marginal land that is infertile for sustainable crop cultivation. Another problem is that the price of inorganic fertilizers continues to increase, forcing farmers to look for other alternatives to supply nutrients to their plants. An alternative to overcome the problem of imbalance in the use of inorganic fertilizers is to implement a sustainable agricultural system that is environmentally friendly by minimizing the use of chemicals. This condition can be achieved through increasing the use of organic fertilizer. Organic fertilizer comes from plants or animals which can be converted into nutrients for plants. The advantages are that it can improve soil texture, increase soil pH, add macro and micro nutrients, increase microorganisms in the soil and relatively does not cause environmental pollution. Biosaka is one of the renewable technology systems for modern organic agriculture in the form of bio-technology. Biosaka can be made from grass mixed with water and crushed, and can be directly applied to all types of plants. Biosaka is also called a biological elicitor, in other words it can induce plant resistance.

REALIZING SUSTAINABLE AGRICULTURE WITH EMPOWERMENT AND APPLICATION OF BIOSAKA INNOVATION TECHNOLOGY IN SEUMANTOK VILLAGE, WEST ACEH

Dewi Andriani, Lias Harapan, Fantashir Awwal Fuqara, Jekki Irawan, Putri Mustika Sari, Abdul Muzammil, Anisah Nasution

Apart from that, biosaka functions as a plant vaccine to protect plants from pest and disease attacks and is able to reduce fertilizer use by 50-90 percent. Based on the description above, biosaka can be an effective and efficient innovation to be developed to reduce dependence on the use of inorganic fertilizers which can damage the environment, as well as reduce the price of inorganic fertilizers which are quite expensive. Therefore, it is hoped that the use of biosaka technology will be an antidote for farmers in increasing production and family welfare. In several previous studies, efforts have been made to apply biosaka on agricultural land to support a sustainable agricultural system (Sustainable Agriculture). One of them is giving biosacca solution to rice plants to reduce the use of pesticides in controlling rat pests so that it can support better rice production. Rice yields also had a positive impact and increased from previously around 3-4 tonnes-1/ha to around 6-7 tonnes-1/ha after the use of biosaka. This community service activity aims to provide knowledge and information regarding biosaka and methods of making biosaka. The output target of this community service is biosaka innovation technology to reduce the use of inorganic fertilizers and minimize farming production costs. It is hoped that this service activity will be useful for the community in supporting sustainable agricultural activities in Seumantok Village, Pante Ceureumen District, West Aceh.

2. IMPLEMENTATION METHOD

TIME AND PLACE

Community service activities will be carried out in August 2023 in Seumantok Village, Pante Ceureumen District, West Aceh. Seumantok Village is one of the villages in Mukim Kinco, Pante Ceureumen District, West Aceh Regency with coordinates at 4°18'30" - 4°38'40" N and 96°10'30" - 96°38'30" East

TOOLS AND MATERIALS

The tools used to make biosaka are containers (basins/buckets), filters, funnels, bottles, sprayers/hand sprayers. The materials used are healthy grass/leaves, not damaged (holes) or yellow due to pests/disease and clean water.

STAGES OF ACTIVITIES

This community service activity method includes several stages including socialization/counseling, technical guidance and biosaka production, then continued with the data collection stage.

SOCIALIZATION

The socialization or counseling began with an introduction to the service team from the Faculty of Agriculture, Teuku Umar University and Agricultural Extension Workers from BPP Pante Ceureumen, West Aceh, then continued with conveying the purpose of their visit. Material presented to farmers regarding the problems and impacts of using inorganic fertilizers if done in the long term. The resource person also explained regarding biosaka, the selection of materials and the application of biosaka to superior commodities in Seumentok Village, as well as the benefits of biosaka innovation in substituting excessive use of inorganic fertilizers. The socialization activities continued with interactive discussion methods and question and answer sessions.

TECHNICAL GUIDANCE FOR BIOSOC MAKING

The community service activity was continued by practicing making biosaka by the resource person and was immediately followed by the participants. The stages of making biosaka include (1) Mixing the ingredients with 2-3 liters of clean water in a container, (2) Squeezing with the right hand, while the left hand holds the base of the ingredients, (3) Squeezing until finished, not stopping, not until the stems are crushed, hands should not be lifted, keep hands in the water

and do not change people, (4) Kneading is done until the concoction is homogeneous, that is, the water and the essence of the grass/leaves are combined, it takes around 10-20 minutes to achieve homogeneity, (5) Characteristics The visual characteristics of homogeneous biosaka are that it does not settle, there are no grains, it can be green/blue/red according to the color of the grass/leaves used, (6) The concentration of the biosaka ingredients can be measured using a Total Dissolved Solid (TDS) tool, with a minimum density of 350 The higher the ppm, the better, (7) Next, the biosaka mixture is filtered and put into a bottle using a funnel. (8) Biosaka can be directly applied to plants according to the recommended dose.

DATA COLLECTION

The data used in community service activities is primary data obtained from participant observation, experience and direct practice, the data is presented in the form of picture descriptions. Furthermore, secondary data collection was obtained through reviewing a number of literature and previous research related to biosaka production which was then explained by the resource person. The final stage of community service activities is evaluation using a questionnaire regarding the participants' understanding of biosaka elicitors and biosaka making techniques. Next, the results of the questionnaire evaluation will be analyzed descriptively.

3. RESULTS AND DISCUSSION

Community service activities begin with socialization/counseling activities regarding biosaka (Figure 1). The resource person explained the meaning of biosaka, namely Bio and Saka which means saving nature back to nature [5]. This socialization also explains that biosaka is an elicitor and is a breakthrough to be applied to the community in plant cultivation.



Figure 1. Biosaka socialization

This socialization activity is a form of effort to provide understanding and perception to the community that biosaka elicitors can increase community initiative and innovation in utilizing abundant wild grass. Apart from that, it provides the public with the perception that biosaccharide elicitors can be used as a substitute for excessive use of inorganic materials and become additional fertilizer that is environmentally friendly, as well as more efficient, reducing costs and maximizing farming potential. If the application of biosaka on agricultural land has a good effect and maximizes the potential for crop yields, then this innovation can become a product that supports sustainable agricultural progress and becomes a product that can be developed to improve the community's economy.

REALIZING SUSTAINABLE AGRICULTURE WITH EMPOWERMENT AND APPLICATION OF BIOSAKA INNOVATION TECHNOLOGY IN SEUMANTOK VILLAGE, WEST ACEH

Dewi Andriani, Lias Harapan, Fantashir Awwal Fuqara, Jekki Irawan, Putri Mustika Sari, Abdul Muzammil, Anisah Nasution



Figure 2. Grass is the basic ingredient for making biosaka

The activity continued with preparing materials to practice making biosaka (Figure 2). Biosaka is made from grass and leaves available around the farmer's land. Grass and leaves are chosen that grow perfectly and are not attacked by pests or diseases, because the quality of the grass will determine the quality of the elicitor. Then choose at least 5 types of grass, you need to know the free type of grass and adjust it to the availability in the surrounding environment. The service activities continued by practicing making biosaka according to procedures and carried out together (Figure 3 and Figure 4). Activity participants were active and enthusiastic in taking part in making biosaka. Squeezing the grass and leaves is done manually using your fingers so as not to damage the texture of the various natural types of grass.



Figure 3. Process of Making Biosaka



Figure 4. Process of Making Biosaka

Grass has active components and chemical compounds found in the outer wall (epidermis), so its extraction is thought to be able to provide a signaling function that can trigger increased activation and expression of genes related to the biosynthesis of secondary metabolites so that plant growth and production also improves. After socialization and practice in making biosaka, a biosaka elicitor product was obtained (Figure 5). Based on lab test results, biosaka ingredients show that they contain hormones, PGPR and ZPT, esters and terpenoids which are useful for controlling pests and diseases originating from bacteria.

The existence of a biosaka elicitor can provide solutions for farmers in cultivating plants, such as an easier application method, nutrients are easy to absorb, does not damage plants and soil content, and can increase the availability of nutrients in the soil. This community service activity also explains how to apply biosaka spraying (Figure 6). Biosaka spraying has the same principles as 4T fertilization, namely the right type, right time, right method, right dose. The thing that needs to be considered when spraying is that the spray tool must be clean from pesticides, fungicides and herbicides. Spraying time can be done in the morning or evening, with the biosaka spraying time interval adjusted to the plant commodity. Spraying is carried out with a mist nozzle at a minimum distance of 1 meter above the plant leaves. The spray dose is also adjusted to the plant to be sprayed.



Figure 5. Biosaka products

REALIZING SUSTAINABLE AGRICULTURE WITH EMPOWERMENT AND APPLICATION OF BIOSAKA INNOVATION TECHNOLOGY IN SEUMANTOK VILLAGE, WEST ACEH

Dewi Andriani, Lias Harapan, Fantashir Awwal Fuqara, Jekki Irawan, Putri Mustika Sari, Abdul Muzammil, Anisah Nasution



Figure 6. How to apply Biosaka

The biosaka dose for rice, corn or sorghum plants is 40 ml, for soybeans or beans 30 ml, and for vegetable plants 25 ml with a tank capacity of 15-16 liters, and can be given regularly at intervals of 7-14 days depending types of cultivated plants. Furthermore, this community service activity was evaluated using a questionnaire, the results of the evaluation are presented in Table 1. The evaluation results show that participants who took part in this community service activity were able to understand biosaka and its benefits for plants increased by 26.50% and skills in making biosaka increased by 20.00%. Skills in applying biosac also increased by 22.44%, where biosac was sprayed onto plants by misting. Good quality biosaka and proper application of biosaka can have a good impact on plant cultivation. The same results were obtained from the previous service, namely that there was an increase in the knowledge of farmer group training participants by around 28% to 80% after being given counseling. This condition shows that training activities like this can provide benefits to the community.

Table 1. Evaluation Results of Empowerment and Application of Biosaka Innovation Technology

| No. | Description of activities | Before Activity (%) | After Activity (%) |
|-----|--|---------------------|--------------------|
| 1 | Able to understand and explain the meaning of biosaka and its benefits for plant cultivation | 73.50 | 100 |
| 2 | Able to choose basic materials and skilled at making biosaka | 80.00 | 100 |
| 3 | Able to apply biosaka to plants correctly | 77.56 | 100 |

The people in Pante Ceureumen District have a superior agricultural commodity, namely peanuts, and are also the area with the largest peanut production in West Aceh Regency. Through community empowerment activities and the application of biosaka in Seumantok Village, it is hoped that farmers will be able to increase knowledge regarding efforts to maintain the quality of soil fertility, reduce environmental pollution due to the use of pesticides and reduce the use of inorganic fertilizers by implementing balanced fertilization, so that peanut cultivation and

production can achieve maximum production. in the long term, stable and sustainable. This community service activity also has limitations in that the potential of natural resources and human resources in Seumantok Village has not been utilized optimally and has not received optimal regional development contributions from either the government or universities. So there is a need for further assistance to realize the hope of becoming a more superior village.

4. CONCLUSION

The series of community service program activities related to biosaka production in Seumantok Village showed good results, and can be demonstrated by the activeness and participation in each activity. The results of this community service activity also answer the goal, namely increasing community knowledge regarding the importance of biosaka and improving skills in concocting biosaka and how to apply it.

SUGGESTION

The biosaka produced during this community service activity is relatively small, so it is necessary to provide more grass or leaf base materials. Apart from that, assistance is needed to spray biosac onto plants and evaluate the plant's response to the application of biosac.

THANK-YOU NOTE

We express our gratitude to all officials of Seumantok Village, Pante Ceureumen District, West Aceh Regency who have permitted and assisted this activity, as well as residents/participants of Seumantok Village who have been willing to attend and participate in community service activities. We would also like to thank the Pante Ceureumen District BPP agricultural instructors who have socialized and been directly involved in supporting the smooth running of community service activities.

REFERENCES

- Purba, T., Situmeang, R., and Rohman, HF 2021. Fertilization and Fertilization Technology. In *Angewandte Chemie International Edition*. 6(11): 951–952.
- Ndau, WA, Hudin, R., Sudirman, PE, and Ngoni, MS 2023. Utilization of Leaf Waste and Animal Manure as Basic Ingredients for Making Organic Fertilizer. *JMM (Independent Community Journal)*. 7(4): 3268-3277.
- Purbosari, PP, Sasongko, H., Salamah, Z., and Utami, NP 2021. Increasing Environmental Awareness and Health of the Somongari Village Community through Education on the Impact of Inorganic Fertilizers and Pesticides. *Agrokreatif: Scientific Journal of Community Service*. 7(2): 131-137.
- Nurwati, N., Siswati, L., and Mufti, M. 2017. Training on making organic fertilizer from cow dung in the Tebing Tinggi Okura sub-district, Pekanbaru City. *Dinamisia: Journal of Community Service*. 1(1): 84-89.
- Suprapti, I., Wulandari, SE, Agustina, NW, Putri, MD, Arifin, A., Toha, E., and Romadhoni, AH 2023. Application of innovative technology for making biosaka fertilizer in Ellak Laok Village, Lenteng District, Sumenep Regency. *Pangabdhi Scientific Journal*. 9(1): 16-21.
- Rampe, H., Umboh, S., Rumondor, M., and Rampe, M. 2019. Utilization of plant extract elicitors in the cultivation of sweet potato (*Ipomoea batatas* L.). *Vivabio: Journal of Multidisciplinary Service*, 1(1): 26-33
- Abror, LAA, Azmi, I, and Hariadi. 2023. Socialization and Production of Biosaka as a Solution to Reducing the Use of Chemical Fertilizers in Selaparang Village. *Journal of Master of Science Education Service*. 6(2): 390-393.

REALIZING SUSTAINABLE AGRICULTURE WITH EMPOWERMENT AND APPLICATION OF BIOSAKA INNOVATION TECHNOLOGY IN SEUMANTOK VILLAGE, WEST ACEH

Dewi Andriani, Lias Harapan, Fantashir Awwal Fuqara, Jekki Irawan, Putri Mustika Sari, Abdul Muzammil, Anisah Nasution

-
- Maruapey, A., Ali, A., Lestaluhu, R., Refra, MS, Nurlela, N., and Tharukliling, S. 2023. Assistance in Sweet Corn Cultivation through Plot Demonstration Practices with the Biosaka Elicitor Application. *Journal of Community Service Partners (JURPAMMAS)*. 3(1): 7-14.
- Jannah, NM, Hidayah, TC, and Putra, CR 2023. Utilization of Home Yards and Production of Biosaka to Realize Advanced and Sustainable Agriculture in Ketangga Village. *Proceedings of the National Talk Seminar*. Vol (1): 1510-519.
- Raidar, U., Ramadhan, F., Nufus, NRK, Supriyatna, MR, Pesema, EA, Nabila, Z., and Safitri, A. 2023. Agricultural Extension for Rat Pest Control and Biosaka Production as an Effort to Support a Sustainable Agricultural System in Pekon Banjarmasin. *BUGUH: Journal of Community Service*. 3(2): 112-117.
- Rizki, A., Sipahutar, AV, Nurisma, D., Sitompul, ERA, Sibarani, FS, Purnama, FE, and Ramadhan, RP 2023. Analysis of Increasing the Income of Rice Farmers in Pulau Sarak Village Through the Use of Biosaka in 2021-2022. *Indonesian Journal of Advanced Social Works*. 2(4): 321-330.
- Azhimah, F., Saragih, CL, Pandia, W., Sembiring, NB, Ginting, EP, and Sitepu, HP 2023. Socialization and Application of Biosaka Production on Horticultural Land in Karo Regency. *National Community Service Journal*. 1(5): 216-224.
- Ansar, M., Manurung, R., Barki., Suwandi., Pembudy, R., Fahmid, M. and Sugiharto, U. 2023. Elisator Nuswantara Biosaka Breakthrough Sustainable Agriculture Land of the Archipelago Land of Harmony. IPB Press. Bogor [ID]
- Suwandi, S. 2023. Biosaka to Increase Environmentally Friendly Agricultural Productivity. Directorate General of Food Crops. proceeding.uns.ac.id. Retrieved October 15, 2023.
- Suhastyo, AA 2019. Empowering Women Farming Groups through Training in Making Liquid Organic Fertilizer. *UNSIQ Journal of Research and Community Service*. 6(2): 60-64.
- Mindhayani, I. 2022. Training on Making Liquid Organic Fertilizer for Urban Farmer Groups. *Independent Empowerment Journal*. 4(1): 808-819.
- Junita, D., Agustinur, A., Lizmah, SF, Afrillah, M., Ariska, N., and Rizal, C. 2023. Assistance in Compost Processing Based on Cellulolytic Microorganism Bioactivators for the Bungoeng Jeumpa Women Farming Group (KWT), Lapang Aceh Village West. *UNDIKMA Community Service Journal*. 4(2): 309-315.