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FARMERS' CAPACITY IMPROVEMENT THROUGH ORGANIC FARMING INTERVENTIONS

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ABSTRACT

Dynamic and sustainable agricultural technology innovation is very important to increase production and the added value of agricultural products. Rojolele Srinuk organic rice products have advantages, including a shorter harvest age and resistance to pests. Encourage farmers to cultivate organic Rojolele Srinuk rice is necessary to increase market share and the selling value of agricultural products. This community service program aims: (1) to improve farmers' skills in organic cultivation of Rojolele Srinuk rice, and (2) to increase the conversion of farming to organic cultivation of Rojolele Srinuk rice by expanding planting areas. The program is carried out in six stages: (1) program preparation, (2) organic fertilizer making training, 3) practicing organic cultivation of Rojolele Srinuk, (4) organic farming conversion assistance, (5) farming bookkeeping training, and (6) evaluation of organic farming conversion cultivation. The results of the program showed an increase in farmers' skills in organic rice cultivation, as well as an increase in the expansion of organic planting areas by 2 hectares (from 3 to 5 hectares). Even though there was a rat pest attack that damaged up to 80% of the land, the use of botanical pesticides resulting from the training helped reduce the damage and allowed a harvest with a yield of 30-50% of the expected. Bookkeeping training increases farmers' understanding of cost and profit analysis. The final evaluation shows the potential and challenges of organic farming conversion that need to be addressed in future programs.

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INTRODUCTION

Increasing production and added value of agricultural products requires the role of technological innovation that is dynamic and changes continuously to improve previous technology; this change is in accordance with the dynamics of preferences, needs, and challenges (Ruskandar, 2010). The innovation in question can be in the form of technological innovation, management, institutions, or the development of agricultural human resources. Agricultural innovation applied in the agricultural sector aims to increase productivity, be it land productivity, capital, and labor (Afriansyah et al., 2022). In relation to the agricultural sector, the challenges of increasing productivity, sustainability, and increasing farmers' income are unfinished homework.

In this case, organic farming provides hope as one way to solve this problem. As is known, over the past few decades, the use of pesticides that burden the environment, ecosystems, and health has been increasingly discussed. Pesticides have a detrimental impact on farmers and consumers, so the idea of organic farming emerged. Organic farming regenerates ecosystems to allow soil to remain fertile and water to be unpolluted. In organic farming, chemical fertilizers are not widely used or may not be used at all to protect the environment sustainably from pollution (Harraq et al., 2022). The organic farming system emerged because of the large role of the agricultural sector, so that environmentally friendly agricultural development is needed, and it not only focuses on increasing productivity but also considers the sustainability of nature and product safety.

The basic principles of organic farming management include maintaining the ecosystem through the use of environmentally friendly natural resources, increasing ecosystem diversity, crop rotation, and integration through an integrated agro-industrial system (Yuriansyah et al., 2020). Organic farming is believed to have the potential to solve contemporary problems while bringing benefits in environmental protection and preservation of non-renewable resources (Smoluk, 2020),as well as contributing to improving food quality (Lampkin, 1990). Globally, global organic agricultural land increased to 20% of the total agricultural land by the end of 2017, and the proportion of organic agricultural land is increasing on all continents (Sapbamrer & Thammachai, 2021). Consumer acceptance of organic products is also increasing because of believing organic products are healthier and more environmentally friendly (Nguyen et al., 2019).

Organic farming must also consider environmental balance, market demand, and social aspects of organic farming (Mishra et al., 2019). The trend of organic product consumption

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in Indonesia continues to increase due to increasing public awareness to consume healthy food from organic products. Organic consumers generally do not mind the more expensive price of organic products (Yuriansyah et al., 2020). Organic products provide a mutually beneficial solution for consumers and producers at the same time, producers receive economic benefits while consumers get healthy and safe food (Ferdous et al., 2021).

With the aim of sustainable economic development and growth and ecosystem preservation, organic agricultural production is being intensively developed at the same time to produce food of good quality for human health (Milošević et al., 2020). In 2020, Indonesia carried out the Fourth Medium-Term National Development Plan (2020 - 2024) to improve organic farming programs and policies throughout Indonesia. This plan aims to improve organic farming through the 1,000 Organic Villages program implemented by the Ministry of Agriculture, the Ministry of Villages, Disadvantaged Regions and Transmigration, and the Ministry of Trade (FiBL, & IFOAM, 2021).

Through organic farming, there is an opportunity to protect the environment, ensure food security, increase farmers' income, reduce poverty, empower women, and improve energy efficiency. Meanwhile, on the other hand, there are also challenges in managing organic farming, such as the narrow area of farmers' land, decreasing soil nutrients, requiring greater costs and resources, and the need to improve farmer education (Mishra et al., 2019).

In addition to the shift in planting methods towards organic, innovation in terms of rice varieties is also an alternative in efforts to increase rice production. One of them is the Rojolele Srinuk rice variety as a new development of the previous Rojelele variety, which was previously known but almost extinct. Rojolele is one of the Javanica rice varieties, which is famous for its delicious aroma and taste. This variety comes from Delanggu Village, Klaten Regency, and is a premium rice (Dwiningsih & Al-Kahtani, 2022). The characteristics of this variety have quite high plant performance (around 165 cm), sturdy stems, rough, thick leaves, deep root systems, and a fairly long planting period of 150 HST (Rachmawati et al., 2004). As an effort to improve the shortcomings of the Rojolele variety of rice, the Klaten Regency Government developed the Rojolele Srinuk variety of rice together with the National Nuclear Energy Agency (BATAN). This variety has a shorter lifespan, is not too tall, and is more resistant to brown planthopper pests than its parent variety, Rojolele (Putra et al., 2022). In any sector, farmers' rationality about the added value and benefits obtained plays a role and determines the acceptance of this rice variety.

One alternative strategy is through the Srinuk rojolele rice planting pattern with an

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organic system. This planting system answers the issue of degradation of agricultural land and environmental quality, demands for healthy food, as well as increasing consumer preferences for organic rice. In addition, the potential of land in the Polanharjo area with very good irrigation and market opportunities for rojolele rice is a strategic combination in realizing this agriculture as an organic rice business opportunity and increasing farmer income and local revenue.

As a new breakthrough in efforts to increase agricultural production, the introduction and expansion of Rojolele Srinuk rice cultivation with an organic system still requires many strategies so that it can be widely accepted by farmers, especially farmers in Polanharjo District, Klaten Regency. Among them is through empowerment to increase farmer capacity. The empowerment process carried out with awareness, capacity and empowerment of farmer groups can increase awareness, ability, expertise and strength to utilize their potential. Farmer empowerment aims to increase knowledge, understanding, courage to make decisions, and take action based on these decisions so that farmers can continue to empower themselves (Sihombing et al., 2024). Referring to various literature concluded that there are four major themes underlying the motives for converting to organic farming, namely: (1) profit/economic/financial issues; (2) environmental issues; (3) health and safety issues; and (4) ideological/philosophical motives (Cranfield et al., 2010).

In this context, promotion and capacity building of farmers in organic Rojolele Srinuk rice farming are crucial, especially regarding the benefits from the economic, environmental, and health aspects. The use of organic fertilizers will cut more production costs, in addition to increasing consumer awareness of healthy food. Related to the opening of the organic food product market, the introduction and expansion of Rojolele Srinuk rice cultivation with an organic system to the Gemah Ripah I Farmer Group in Glagahwangi Village, Polanharjo District, is an opportunity to increase farmers' income. The Gemah Ripah I farmer group, which was established in 2022 as a partner of the Agricultural Communication Research Group team, already has experience in farming Rojolele Srinuk, but most of them are still using conventional planting patterns. Gemah Ripah I currently has 15 farmers with land ownership of around 20 hectares, of which only 3 hectares of land have been converted to an organic rice farming system. With this community service activity, there is the potential for additional land area for conversion to organic, which is around 3 hectares, as well as an increase in the number of farmers joining the Gemah Ripah I Farmer Group. This community service program aims: (1) to improve farmers' skills in organic cultivation of Rojolele Srinuk

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rice, and (2) to increase the conversion of farming to organic cultivation of Rojolele Srinuk rice by expanding planting areas.

Some potential partners from the natural resource aspect: (a) Rojolele Srinuk rice variety is a superior variety of Klaten Regency that is not owned by other regions, making it one of the iconic products; (b) support for fertile land with good irrigation. As for support from the business management aspect: (a) the group has an organizational structure with strong leadership; (b) group members are experienced in cultivating Rojolele Srinuk rice so that additional skills in rice cultivation will be easier for farmers to apply; (c) farmers have high motivation to grow organically; (d) availability of support from certified seed providers; (e) the existence of local agents who can synergize with the RG team to assist farmers in transforming towards organic rice cultivation; (f) there is still a large market potential for both conventional and semi-organic rice which is widely open both in the Klaten area and markets outside the Klaten area including demand from various government agencies and restaurants.

LITERATURE REVIEW

Organic farming is increasingly in the spotlight in the discourse on sustainable agricultural development because it is considered capable of reducing dependence on chemical inputs and increasing the resilience of the agroecological system. A study by Rahmann et al. (2017), emphasized that the development of organic farming in developing countries requires an ecosystem-based approach combined with active community participation and a strong policy support system.

In particular, the transition to organic farming requires changes in farmers' knowledge and behavior. In addition to training and promotion of farmers, emphasis should be placed on creating favorable conditions at the food system level based on agroecological principles (Bottazzi et al., 2023). This can be done through, among others: supporting grassroots farmer organizations, enforcing appropriate environmental legislation, securing organic farmers' productive resources, and enhancing participatory organic certification and alternative food networks.

A study in India showed that technical training and mentoring consistently had a significant impact on the success of organic farming adoption among smallholder farmers (Kumar et al., 2020). Social and cultural compatibility is also an important factor in the

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adoption of this system, especially in the context of traditional farming communities. From an economic perspective, although the initial cost of organic production is higher, in the long run, this system provides benefits through savings in input costs and higher product selling prices. Koesling et al. (2017), found that the sustainability of organic farming is supported by market stability and good distribution networks, especially for high-value products such as premium rice.

Local varieties such as Rojolele Srinuk, which have historical value and high consumer preference, have great potential in organic farming systems. However, challenges such as pest attacks (e.g., rats) are still major obstacles. Innovation in the use of plant pesticides based on local resources has proven effective in various studies, such as the use of local plant extracts, which are natural rodenticides (Deka et al., 2021).

In the institutional context, the formation of organic farmer groups plays an important role in ensuring the sustainability of organic conversion. Research by Eyhorn et al. (2019) shows that well-organized farmer groups make it easier for farmers to access training, markets, and obtain organic certification. Therefore, structured and sustainable assistance is the main key to maintaining farmer motivation to farm organically.

MATERIAL AND METHOD

The organic farming conversion program that will be carried out in Glagahwangi Village is a continuation of the independent learning program - independent campus (MBKM) with a village development, internship, research, and entrepreneurship scheme. The implementation of organic farming conversion in the MBKM program has been pioneered previously on an area of 3 hectares. This continued organic farming conversion service program targets 10 farmers who are members of the Gemah Ripah 1 Farmer Group in Glagahwangi Village, Polanharjo District, Klaten Regency. The area of land managed by farmers in this group is around 2 hectares.

The implementation of the community service program is conducted in six stages of activities as follows.

1. Program preparation

Program preparation is carried out by planning an organic farming conversion program. In addition, mapping of program targets is also carried out for the addition of farmer group partners. This preparation stage is carried out to ensure that the program can be implemented optimally in terms of licensing, participation, and sustainability in the future.

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2. Organic fertilizer making training

Organic fertilizer making training is carried out for new farmer group partners, resulting from the program's target mapping. The training program is carried out with a discussion model and direct practice of making liquid and solid organic fertilizers, accompanied by facilitators and organic fertilizer practitioners (Figure 2)

3. Practicing organic cultivation of Rojolele Srinuk

An important stage in this community service program is to equip farmers with skills by providing materials and direct practice of implementing organic rice on farmers' land as an organic farming conversion development program. Practice in an area of 2 hectares involving 10 farmers. This theory and simultaneous application adopt the Farmer Field School (FS) system as a popular education and extension approach that uses experiential learning and a group approach to facilitate farmers in decision making, solving problems, and learning new techniques (Mdiya et al., 2024)

One of the main components in organic farming conversion is through fertilization application, where each 2,200 m2 plot is done with half-dose chemical fertilizer, which is 100 kg, which is usually 200 kg. The organic fertilization process is carried out by providing basic fertilizer from cow and goat manure and fertilizing with liquid NPK fertilizer every 7 days. The plant cultivation process will be accompanied by a facilitator and a special SOP for organic farming conversion cultivation. The organic farming conversion process in this program lasts for one planting season, for 100-105 days after planting (DAP) (Figure 3).

4. Organic farming conversion assistance

Organic farming conversion assistance is carried out by the research group team and organic farming conversion facilitators by monitoring the land and farmer groups once every 2 weeks to find out the progress of plant cultivation and obstacles during plant cultivation, such as pests and diseases, weeds, and others. Organic farming conversion assistance is carried out on the land and village farmers' huts and via WhatsApp media (figure 4). The assistance aims to: (1) ensure that the implementation of organic farming carried out by farmers is in accordance with the guidelines recommended by the community service team, (2) assist farmers in the learning process that will increase farmers' knowledge, skills and independence; and (3) ensure feedback from farmers regarding the community service process and program including knowing the problems of farmers during the practice of implementing organic farming and providing the necessary solutions.

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5. Farming bookkeeping training

The activity is carried out in the form of training and simple farming bookkeeping practice involving all members of the Gemah Ripah I farmer group. From the activity, it is expected that 75% of farmers who are members of the farmer group can understand the practice of farming bookkeeping for calculating production costs and profits from organic rice harvests properly (Figure 5).

6. Evaluation of organic farming conversion cultivation

The evaluation aims to measure the impact of the community service program. Evaluation of organic farming conversion cultivation is carried out at the end of the program by analyzing farming costs, crop cultivation activities, cultivation results, and rice yields.

RESULT AND DISCUSSION

1. Program preparation

Program preparation is carried out by planning an organic farming conversion program. In addition, mapping of program targets is also carried out to add farmer group partners. This preparation stage is carried out to ensure that the program can be implemented optimally in terms of licensing, maximum participation opportunities from farmer group members, and management of the sustainability of organic farming practices after the community service program. The community service program preparation was carried out in April 2024. In the preparation of the program, the activities carried out include: (1) socialization of the community partnership program to farmer members of the Gemah Ripah I farmer group; (2) coordination of the community service team; (3) preparation and purchase of materials needed for conversion activities to organic farming by partner farmer groups, including the purchase of Rojolele Srinuk seeds and materials for making organic fertilizer.

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Figure 1. Survey and program preparation

2. Training in making organic fertilizers and pesticides:

Training in making organic fertilizers was carried out for the farmer group partners on June 21, 2024. The training activities were[100] carried out through lecture and discussion methods as well as direct practice. From the training activities for making liquid and solid organic fertilizers, accompanied by the team, farmers gained experience in making organic fertilizers and directly applied them to agricultural land. The organic fertilizers made were combined with vegetable pesticides from the 'gadung' tubers. This was done because of the massive rat pests in the rice fields of the demonstration plot partner farmers.

Figure 2. Organic fertilizer and pesticide making training

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3. Practice of organic rice cultivation in Rojolele Srinuk.

The development of organic farming conversion was carried out for 10 organic farmers with 2 hectares of land. The organic farming conversion process was carried out starting from the seedling process, land processing, planting, and plant maintenance. The fertilization process during the organic farming conversion for each 2,200 meter square plot was carried out with half-dose chemical fertilizer, namely 50 kg, which is usually 100 kg. The organic fertilization process was carried out by providing basic fertilizer from cow and goat manure and fertilizing with liquid NPK fertilizer every 7 days. This organic farming conversion practice is able to reduce farming costs by 25% or around 1 million rupiah from the components of fertilizer and pesticide costs. Farming costs for 2,200 square meters of land usually cost farmers 3.7 million to 4 million rupiah. The decrease in fertilizer and pesticide costs is due to the application of organic fertilizers and botanical pesticides from materials available in the surrounding environment, so there is no need to buy them. The plant cultivation process was accompanied by a facilitator and a special Standard Operating Procedure for organic farming conversion cultivation. The organic farming conversion process in this program lasts for one planting season, for 100-105 days after planting (DAP).

Figure 3. Demonstration of the application of organic fertilizers and pesticides

4. Organic farming conversion assistance:

Organic farming conversion assistance is carried out by the community service team and organic farming conversion facilitators through monitoring the land and farmer groups once every 2 weeks to determine the progress of plant cultivation and obstacles during plant

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cultivation, such as pests, diseases, weeds, and others. Organic farming conversion assistance is carried out in the fields and village farmer huts. During the assistance, farmers consulted about plant development and problems encountered in the Rojolele Srinuk rice cultivation process. In the process, one of the obstacles faced by farmers was the attack of rat pests, which was quite severe, so that around 80% of the partner farmers' land was damaged. From this problem, the community service team provided a solution by conducting training in making herbal pesticides using natural raw materials, namely: gadung tubers (Dioscorea hispida Dennst), frangipani leaf stems (Plumeria acuminate), bran, catfish, and eggs. The herbal pesticide products from the training were then applied to farmers' land. The results of observations by farmers and the community service team showed the effectiveness of gadung tuber pesticides in reducing rat pest attacks so that farmers could still harvest, even though only 30-50% of the usual.

Figure 4. Monitoring of organic conversion in rice cultivation land

5. Farm bookkeeping training

The activity is carried out in the form of training and simple farming bookkeeping practice involving all members of the Gemah Ripah I farmer group. From this activity, farmer members of the farmer group can understand simple farming bookkeeping practices for able to calculate production costs and profits from organic rice harvests properly. It is hoped that after understanding the added value generated from organic farming practices, it can increase the motivation of partner farmers to implement organic Rojolele Srinuk rice cultivation.

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Figure 5. Farm Business Bookkeeping Training

6. Evaluation of organic farming conversion cultivation

Evaluation of organic farming conversion cultivation was conducted at the end of the program, involving farmers and members of the community service team. Farmers were asked to analyze farming costs, crop cultivation activities, cultivation results, and rice yields obtained from the conversion to organic farming. This activity aims to assess the success of the program in terms of cultivation carried out by farmers. In the process, farmers actively discussed, including presenting opinions regarding the practice of organic Rojolele Srinuk cultivation. Farmers have a positive response to organic farming practices because there are costs that can be cut, especially from fertilizers. However, there were obstacles in the form of massive rat pest attacks in the cultivation practice area, which resulted in the failure to achieve maximum harvest results. The land service team's projection was able to produce a harvest of 6 tons/ha, but due to rat pest attacks, the harvest only reached 2.5 tons/ha due to the pest attack. This crop failure became a joint evaluation with farmers to improve integrated pest control by planting simultaneously in the rice cultivation area.

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Figure 6. Post-harvest of Rojolele Srinuk rice activity

CONCLUSION AND RECOMMENDATION

Community service activities to increase the capacity of farmer groups towards the transformation of organic rice farming in Rojolele Srinuk were preceded by a socialization process for the service program, training in making organic fertilizers, demonstration practices for land for the application of organic Rojolele Srinuk rice cultivation, assistance in converting organic farming, training in making organic pesticides, training in bookkeeping for farming businesses and evaluation of organic farming conversion cultivation. The results of the program showed an increase in farmers' skills in organic rice cultivation, as well as an increase in the expansion of organic planting areas by 2 hectares (from 3 to 5 hectares). Various supporting potentials, such as ease of making and availability of raw materials for organic fertilizer, potential for an organic rice market that is still open, efficiency of around 25% of farming costs, and better rice prices, motivated farmers to transform cultivation from conventional to organic.

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