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Farmers Empowerment in The Implementation of Integrated Farming Systemsat The Tunas Tani Group in Margorejo Village, Tegineneng District

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Abstract. Integrated farming is an agricultural integration system that combines several agricultural, livestock and other sectors (plantations, fisheries) as a solution to increase land productivity and environmental conservation. Farmer groups are an important sector that supports the community's economy, especially in rural areas, so that they can develop and become a source of income for farmers. An integrated farming can produce four products (4F), namely fuel, fertilizer, animal feed and food. This product is a basic need in running an agricultural and livestock business so that it will create a sustainable business and reduce external expenses. The integrated farming system is expected to produce cheap feed, renewable energy sources in the form of biogas, and organic fertilizer that can be used for agricultural businesses. So that integrated farming practices can run as expected, managers need to understand how integrated farming practices have performance and measurable success. Success in integrated farming practices can be a motivation for farmers, especially the young rural generation, to become integrated farming entrepreneurs. The Service Team took the initiative to provide assistance to the Tunas Tani farmer group domiciled in Margorejo Village, Tegineneng District to be able to rise and develop through technological adaptation to integrated farming practices with the use of animal manure as a plant nutrient as well as adaptation to the use of simple bookkeeping and recording of farming operations so that business performance can be measured. The results of education and extension activities show that there has been an increase in farmers' understanding of the practices and benefits of integrated farming. The results of the demonstration show that farmers have the willingness to try and apply technological innovations that have been practiced jointly by the proposer and farmer groups in integrated farming practices.

Keywords : Land Productivity, Environmental Conservation, Livestock Manure, Organic Fertilizer

INTRODUCTION

Agricultural development faces increasingly complex challenges, both in technical, economic and social aspects, related to the phenomenon of climate change, limited labor, resource and environmental degradation, and various issues in the context of global trade. To increase food production, the government's attention in the future is expected to be more focused on the development of dry land (acid dry land and dry climate dry land), degraded/abandoned land (idle/unused land and ex-mining land) (Budiono, 2019).

Lampung Province is one of the potential agricultural areas and is a national food barn. The condition of agricultural land in Lampung Province is included in the category of dry acid land and is dominated by food crops. The economic potential in Lampung Province, both in terms of natural resources, human resources, technology, infrastructure and institutions, is quite potential in supporting the development of various agricultural products (food crops, plantations, livestock, fisheries) and various processed agricultural products.

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The productivity of food crop farming produced by farmers in Lampung is still classified as moderate and tends to be low, both food crops and plantation crops, namely for rice 4.08, t / ha, corn 3.89 t / ha peanuts 2.17 t / ha and coffee 0.9 t / ha (https://lampung.bps.go.id). Cultivation practices carried out by the community are still conventional and agricultural activities are still taking place partially, namely farming activities are carried out individually, not yet integrated. Conventional farming in the early stages was able to increase agricultural productivity significantly, but in the long term, production efficiency decreased due to various adverse side effects such as decreased soil fertility and loss of soil organic matter (Sidauruk, et al., 2021). To increase land productivity, integrated and sustainable agricultural business development technology is needed.

Lampung Province also has potential in the livestock sector that has not been managed in an integrated manner with plants. In fact, livestock waste can be used as organic fertilizer which if managed properly can overcome the problem of fertilizer needs in the agricultural sector as well as organic fertilizer can help overcome the problem of land degradation due to the continuous use of chemical fertilizers. Meanwhile, plant waste can be used as a source of protein for livestock feed needs (such as cassava, corn, straw, coffee skin). Therefore, to increase land productivity, reduce the cost of agricultural production and at the same time increase farmers' income, integrated and sustainable agricultural business development technology is needed.

An integrated farming system is an agricultural integration system that combines several sectors, such as agriculture, livestock and other sectors (plantations, fisheries, and forestry) as a solution to increase land productivity and environmental conservation. An integrated farming system can produce four products (4F), namely fuel, fertilizer, animal feed, and food. These products are basic needs in running agricultural and livestock businesses so that they will create sustainable businesses and reduce expenses (Handayanta, et al., 2022). An integrated farming system is expected to produce cheap feed, renewable energy sources in the form of biogas, and organic fertilizers that can be used for agricultural businesses. The advantage obtained from an integrated farming system is an increase in more varied output. In addition, economically, an integrated farming system has other advantages, namely reducing the risk of crop failure.

Failure or decline in harvest from one component can still be covered by the results (harvest) from other components and increase farmer income, because the input provided will produce varied and sustainable output. The integrated farming system functions as a producer of intangible services, especially in terms of stabilizing environmental quality. An example that can be applied to an integrated farming system is the combination of cattle farming and corn cultivation, with the activity of utilizing cow dung into organic fertilizer using the vermicomposting method and biogas production (Ruhiyat, et al., 2020). The result of the vermicomposting process is an environmentally friendly organic fertilizer known as vermicast (worm castings). Furthermore, the vermicast is used to meet the fertilizer needs in farming corn and vegetables. The young corn produced can be sold to the market, while the corn stalks can be used as a source of green fodder after going through a fermentation process into silage. Rice straw can also be used for animal feed. The quality of straw can be improved through fermentation and ammoniation technology.

Tunas Tani Taruna Tani Group (KT Tunas Tani) is a farmer group whose members are young millennial farmers who have a strong desire to develop potential and increase land productivity by optimally utilizing the potential in the Margorejo Village area, Tegineneng District. This group was formed in 2020 during the pandemic which caused most people to

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interact in rural areas due to the implementation of PPKM (Restrictions on Community Activity Movement). Efforts to optimize unused village yards into pilot areas for integrated agricultural practices managed by KT Tunas Tani are an option to increase farmers' income, because the integrated agricultural system can integrate food crops with livestock, where food crop waste can be used as animal feed and livestock manure can be used as fertilizer for food crops.

Tunas Tani Group is an association of young people from Margorejo Village, Tegineneng District, Lampung, which is currently carrying out joint business activities in the integrated agricultural sector, with the aim of integrating the agricultural, livestock and fisheries sectors. As well as strengthening cooperation with other institutions that support improving the knowledge and skills of members so that they grow and develop into independent farmers. The vision of KT Tunas Tani is to create an independent, sustainable and environmentally friendly farmer group to improve the welfare of members and the surrounding community. The Group's Mission is to explore natural resources and human resources to improve agriculture with a touch of modern technology, so that the welfare of members and the community can be achieved. The Covid-19 pandemic that has occurred since 2019 has also had a negative impact on farmers in rural areas as supporters of the regional economy, the important thing felt by farmers is the decrease in actual capacity both in the flow of production inputs and agricultural products to be sold to the market due to PPKM constraints. Due to these conditions, young farmers in Margorejo Village are motivated to open a joint business with integrated agricultural practices by utilizing members' yard land which is managed together.

One alternative solution to restore agricultural land is to combine crop and livestock farming. The integration of crop-livestock systems (CLS) is a form of good practice that has been widely practiced by our ancestors. Manure will add organic matter to the soil which will then improve microbial life, soil enzyme activity, cation exchange capacity, nutrient availability, and the soil's ability to retain water (Martines, et al. 2014). It should be noted that the use of manure will also supply micro minerals, because these minerals are always added when livestock rations are prepared, some of which are not absorbed and are excreted through feces. The Tunas Tani Group has 27 members and six of them are administrators. The following is a picture of integrated farming practices that have been carried out since 2020.

The objectives achieved in this activity are:

1. Increasing the knowledge and skills of partners in making compost from animal waste (kohe) namely cows, sheep and chickens, for environmentally friendly integrated farming practices.
2. Increasing the knowledge and skills of partners in making compost from rice plant waste (straw) which is quite widely available in the village.
3. Educating farmers to make maximum use of land by planting green fodder on the edge of the integrated agricultural land area.

Based on the results of direct observation (surveys and interviews) and discussions with partners who were targeted in this activity, it was found that there were quite a number of factors that caused their business problems. Specific problems of partners in information technology literacy in carrying out their business activities that were identified:

1. Difficulty in obtaining fertilizer for plants caused young people to take the initiative to make organic fertilizer from animal waste (cow). However, the lack of knowledge of

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farmers regarding the technology for making compost from animal waste has caused the business to be less than optimal.
2. Although partners have implemented integrated farming practices for food crops (corn and chilies), livestock, sheep and chickens, and tilapia, partners' knowledge of integrated farming practices that are sustainable and environmentally friendly by utilizing animal waste (cow) for plants as a source of nutrients is still limited.
3. How to improve the performance of integrated farming businesses by utilizing integrated livestock plants, namely the use of animal waste as compost fertilizer as a source of nutrients for plants;

METHOD

Implementation of Activities

To overcome the problems faced by MSMEs, several intensive and relevant stages or steps need to be carried out, with the procedure/stages of integrated agricultural management implementation assistance activities as follows:

1) Field observation for mapping the location of food crop demonstration plots (corn), sheep pen demonstration plots and meeting hall rooms for technical guidance on recording and bookkeeping of agricultural businesses.
2) Coordination between the implementation team, administrators/managers and members of KT Tunas Tani to prepare the schedule for implementing activities.
3) Preparation of educational activities, demonstrations, assistance, and evaluation. In this activity, educational materials, equipment and materials as well as transportation equipment needed for the implementation of educational activities, demonstrations, assistance, and evaluation are prepared.

Data collection and analysis techniques

1. Educational activities for managers and members of KT Tunas Tani about the implementation of integrated farming, namely: Education about compost made from animal waste (kohe); education about green plants for animal feed to optimize the use of yards/gardens. This activity is carried out using the caramah method and group discussions located on the group's integrated farming practice land in July 2023. Participants are managers and all members of KT Tunas Tani. The implementers are lecturers and students who propose.
2. Demonstration activities on how to make compost from sheep and chicken animal waste (kohe) and compost from plant residues (rice straw and other plant materials) are carried out in the pen area at the integrated farming location owned by KT Tunas Tani. Participants are KT members who are responsible for the livestock maintenance division. The activity is carried out for one day by the Implementation Team and accompanying students.
3. Assistance activities for the application of demonstration results in integrated farming practices. Assistance is carried out periodically 2 times a month to ensure that group partners implement it correctly.

Evaluation of Program Implementation and Sustainability

The evaluation of the results is carried out 2 months after the implementation to measure the success of the activity. The benchmark used is the adoption stage by the use of fertilizer by the group applied to the crop land in the crop production section. The evaluation of the

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activity is carried out to ensure that partners can apply the technology provided. The evaluation is carried out to ensure that the activity runs not only according to plan, but also remains relevant according to the situation that needs to be developed and resolved. The evaluation of this community service program will be carried out in two stages, namely process evaluation and result evaluation.

a. Process evaluation. This activity is carried out during the activity. In this evaluation, the implementing team will open a question and answer discussion session. This is done to ensure that the community service participants have understood the material in the mentoring provided.
b. Result evaluation. This activity can be seen through the implementation and results of the implementation after mentoring.

Description and Technology Flowchart

The flowchart for implementing activities is as follows.

Survey of conditions and needs for integrated agricultural management practices → Observation of the development of the KT Tunas Tani business during 20220 to 2022 through interviews and discussions with group administrators → Identifying group needs related to integrated agricultural practices to increase production efficiency → Technical coordination of the implementation of integrated agricultural management practice assistance with the Implementation Team → Coordination with KT Tunas Tani administrators and members regarding the planned assistance activities Education on integrated agricultural management practices → Introduction to integrated agricultural management strategies that are appropriate for the group → Education on compost made from animal manure (Kohe) and plant waste → Education on the benefits of planting green fodder in integrated agricultural management and planting green fodder plants as hedge plants on the land → Demonstration of how to make compost from goat/sheep manure (kohe) and plant residues (rice, corn, and others) to meet plant fertilizer needs → Assistance in making compost and planting green fodder plants → Observation of the results of making compost → Assistance in implementing the use of compost on plants Observation of the results of making compost and planting green fodder around the integrated farming land.

RESULTS AND DISCUSSION

This PkM is implemented to stimulate farmers to apply innovative technology for making organic fertilizers from livestock manure and plant waste in their farming practices. A series of planned activities have been carried out and the measurement of farmer partners' understanding of the technology provided shows the enthusiasm of farmers to apply it. The expected impact of this activity is the increase in the economic scale of farmer groups and the implementation of environmentally friendly and sustainable livestock farming.

Integrated and sustainable agricultural socialization and education stages

Community service activities are carried out in 3 stages. The first stage is socialization/education to farmer group partners on the importance of implementing integrated agricultural practices to maintain environmental sustainability and sustainable agriculture. Education and counseling were carried out on Saturday, July 8, 2023 at the integrated agricultural land of the Tunas Tani group, Margorejo Village, Tegineneng Pesawaran District. The partners who attended were 11 (eleven) people consisting of

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administrators and group members. The activity took place from 09.00 to 12.00 WIB (photo documentation of the activity is listed in the Attachment). The material presented in this activity consisted of:

1. Development of an integrated agricultural system
2. Integrated and sustainable agricultural practices
3. Utilization of plant and livestock waste in integrated agriculture
4. Techniques for making organic fertilizers from plant waste and livestock manure
5. Utilization of green fodder plants in sustainable agricultural practices.

The integrated agricultural socialization and education activity began with the provision of a set of questionnaires to participating farmers to determine their level of knowledge of integrated agriculture. The initial evaluation results showed that 45.4% (5 farmers) had good knowledge of integrated agriculture and the remaining 54.6% (6 farmers) had poor knowledge of integrated agriculture. At the end of the socialization activity, it was re-evaluated with the same questions given during the initial evaluation. The evaluation results showed an increase in the understanding of all farmers about integrated agricultural practices and their benefits for sustainable agriculture.

The educational and extension activities were quite interesting, seen from the enthusiasm of farmers in participating in the activities and the interesting Q&A discussions. New farmers understand the benefits of integrated farming practices of crops and livestock that they have been running so far have extraordinary benefits for environmental sustainability in the long term. Not only is the health of the environment maintained, but the agricultural products cultivated, both crops and livestock, in the long term can produce healthy food.

Figure 1. Delivery of educational materials on integrated agricultural practices

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Figure 2. Participants in integrated agricultural practice extension

Demonstration Stage How to make compost from animal waste and rice straw

The second stage is a demonstration of how to make compost from animal waste (cows and goats) and rice plant waste (straw) which are abundantly available in the village. This compost making is done with additional material EM 4. The practice of making compost is carried out by students and implementing lecturers assisted by farmers. The stages of the process of making compost from cow and goat manure can be seen in the following picture.

Figure 3. Preparation of a demonstration plot for making compost

Figure 4. Collecting cow dung from the pen

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Figure 5. Refining of livestock manure media

Figure 6. Addition of EM4

Figure 7. Chopping rice straw

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Figure 8. Mixing of livestock manure, EM 4 and rice straw

Figure 9. Fermentation of compost fertilizer

After the demonstration process on how to make compost from cow, goat and straw dung, the next step was to demonstrate how to make compost from plant waste, as shown in the following image.

Figure 10. Fermentation of compost made from plant waste

The next stage after the education/extension and demonstration of how to make

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compost is the mentoring stage which is carried out for 2 (two) times and is carried out 2 weeks and 4 weeks after the demonstration. In the mentoring activity, farmers are assisted in observing compost and utilizing compost for planting chilies at the integrated agricultural practice location.

The third stage is monitoring the application of compost fertilizer and planting of green fodder plants at the KT Tunas Tani integrated farming location. At this stage, the proposer conducts observations and monitoring to see whether farmers have implemented the technology provided. The results of the observations are shown in the following figure.

Figure 11. Planting chilies using livestock manure compost in land surrounded by livestock feed plants.

The group routinely collects livestock manure to be used as the main ingredient for making animal manure compost. The benefits of better sanitation and cleanliness of the pen, as shown in the following picture

Figure 12. The cage is clean and free from dirt.

CONCLUSION

1. Education provided to partners has a positive impact on partners' knowledge of sustainable agricultural practices and their benefits to the environment and business

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sustainability. This is shown by the increase in the initial and final evaluation scores of socialization and extension activities.

2. Demonstration of how to make compost from animal waste and plant waste can be understood and applied by farmers. Demonstration activities on how to make compost fertilizer received a positive response and results with increasing partners' understanding of how to make compost and the benefits of using compost for sustainable farming and environmental sustainability. .
3. Farmers' trust in the benefits of integrated crop-livestock farming practices has increased, as evidenced by the increasing activity of group members in collecting livestock waste on a scheduled basis for making compost fertilizer.

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