

Case-based Article

Implementation of Rice Fish Farming as an Environmentally Friendly Alternative for Pest and Weed Control to Support Food Security in Talotenreng Village

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ARTICLE INFO	ABSTRACT
<i>Keywords:</i> Agriculture Mina padi Fish farming Pest weed	One of the main problems faced by farmers is the decline in farming productivity, resulting in farmer incomes also not decreasing. Apart from that, the problem of pests and weeds is also a polemic for farmers who always rely on artificial chemicals to control them. As long as the farming system run by partner farmers is still monoculture, the farming results obtained only come from one commodity. Farmers have not yet aimed at diversifying their farming, so the income they earn is very dependent on the success of their monoculture farming. The solution offered to partners to the decline in production followed by the degradation of agricultural land whose quality is increasingly decreasing is to refer to the concept of organic farming, where the use of fertilizer production facilities is directed at the use of agricultural waste as a substitute for inorganic fertilizer, apart from being a fertilizer, also as food for fish that is environmentally friendly. Apart from that, the solution offered is the application of an integrated agricultural system with the "Mina Padi" model. This system will cultivate rice together with fish in one rice field area so that the level of pest and weed attacks on rice plantations can be minimized. Rice plants in rice fields will provide natural food for fish, while fish function as control of pests and weeds in rice plantations. Apart from that, fish is a source of nutrients for rice plants. The aim of this PKM activity is to provide alternative farming diversification for partner farmers in increasing farmer income, increasing farmer knowledge, and reducing the level of pest and weed attacks by creating natural enemies in an integrated farming concept designed in the mina padi system.

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1. INTRODUCTION

The agricultural sector has an important role in providing national food and contributes to strengthening food security programs (Kurnia, 2021). The development of the agricultural sector can help in the growth and development of the national economy, as well as contribute to the welfare of society. Food security is a global issue that has received great attention from the government in supporting adequate food for society. One commodity that plays an important role in food security is rice. Rice farming is in first place among the businesses carried out by farmers which can produce grain as the main product and other by-products such as bran and rice straw (Kadir, 2020). Rice farming has become a center in the community's economy because it can increase people's income. So that rice farming is carried out by the majority of the Indonesian population as a livelihood. Even though the majority of people depend on their livelihood as farmers, in reality the condition of agriculture in Indonesia is not yet good enough. There are still many problems that arise every year and it is the government's duty to overcome them (Pridadi et al, 2020). One of the problems is land conversion which is increasing, as a result agricultural land is starting to decline. The decreasing availability of agricultural land is caused by the conversion of agricultural land to residential or industrial use (Ahmadian et al, 2021). The declining condition of agricultural land amidst increasing consumption means that farmers, as the main pillar of food security, are expected to be able to maximize production.

One of the main problems faced by farmers is the decline in farming productivity, resulting in farmers' income being uncertain. Apart from that, the problem of pests and weeds is also a polemic for farmers who always rely on artificial chemicals to control them. So far, the farming system run by partner farmers is still monoculture, so that the farming results obtained only come from one commodity (Kurnia, 2021). Farming income only relies on farming from monoculture businesses, so the concept of diversification has not been maximized. The risk element in rice production can be eliminated by diversifying the system through the introduction of fish farming (Herdiansah et al, 2018).

The decline in rice agricultural production followed by the degradation of agricultural land whose quality is increasingly decreasing has become a polemic for farmers. One of them has an impact on soil fertility. Efforts that can be made to improve soil fertility are the supply of nutrients through fertilization (Purnamasari et al, 2023). One thing that can be done is by referring to the concept of organic farming, where the use of organic fertilizer derived from natural materials (Rosadi, 2023) such as the use of fertilizer production facilities is directed at the use of agricultural waste as a substitute for inorganic fertilizer, besides being fertilizer, also as feed for environmentally friendly fish.

The solution offered is the application of an integrated agricultural system with the "Mina Padi" model (BAPPEDA 2020). This system will cultivate rice together with fish in one rice field area so that the level of pest and weed attacks on rice plantations can be minimized. The application of mina padi innovation will increase the productivity of agricultural land and farmers will have harvests from two different commodities, namely rice and fish (Pridadi et al, 2020). The mina padi system has several advantages, such as farmers will get additional income from fish without reducing income from rice, increase rice production, increase land efficiency and productivity, rice plants become more controlled and meet animal protein needs (Bobihoe et al, 2015). Another benefit of using the mina padi system is that it can eliminate weeds (Mahmudiyah et al, 2018). Rice plants in rice fields will provide natural food for fish, while fish function as control of pests and weeds in rice plantations. Besides that, fish faces are a source of nutrients for rice plants. Fish cultivated in Mina Padi rice fields can eat weeds that appear so that rice can grow well (Setiawan, 2019).

Mina padi was carried out at the Harapan Kita farmer group in Tallotenreng Village, Sabbangparu District, Wajo Regency. The stages in implementing this community service are the first stage of

situation analysis or observation which aims to provide an overview of the condition of the partners' land, the second stage of counseling which aims to increase the knowledge and skills of Farmer Groups in selecting alternative rice farming, namely using the "Mina Padi" system and increasing Farmer Group skills in making Organic Fertilizer, three stages of mentoring, where the mentoring stage aims to accompany farmers in carrying out direct demonstrations of implementing mina padi and the last is the evaluation stage. The evaluation stage will see how the indicators have been achieved in the mina padi activities that have been implemented by the partner farmer groups.

2. METHODS

This community service activity is carried out using the methods of observation, counseling, mentoring and evaluation stages. Observation activities began by coordinating with the Harapan Kita Farmers Group, followed by outreach activities by providing information directly to the community regarding the use of mina padi as an alternative for pest and weed control. This activity was carried out in Talotenreng Village, Sabbangparu District, Wajo Regency by involving the community, more specifically the target of this activity, namely farmers in Talotenreng Village who were participants in the activity. After the counseling stage, it continues with mentoring activities. This activity accompanies Farmer Groups in carrying out Mina Padi activities. The final stage is evaluation, it is hoped that the evaluation activity can be a consideration for Farmer Groups in implementing the technology offered.

The method used includes several stages which include:



Figure. 1 Stages of Implementing Mina Padi

2.1. Situation Analysis/Field Observation

The situation analysis/field observation is conducted through visits to the partner field locations earmarked for demonstration purposes. The emphasis is placed on a comprehensive formulation of the issues faced by farmers in the area.

2.2. Counselling

The counselling is undertaken as a step to disseminate information to the local community regarding the demonstration plot, outlining the implementation method and the significance of the rice-fish farming to be carried out in the farmers' fields. The aim of the counselling is also to offer solutions to the longstanding issues faced by the farmers. This approach is envisioned to enhance the effectiveness and intensification of agricultural land use. The counselling activities are conducted twice, covering topics such as Integrated Pest Management concepts and the utilization of natural enemies of plants, as well as Organic Farming.

2.3. Mentoring

The mentoring phase commences with supporting the farmer groups in executing the rice-fish farming process, beginning with land preparation/dike preparation, trench construction, creation of channels for water inflow and outflow, paddy field cultivation, seed sowing, fertilization, maintenance, and finally, fish and rice harvesting.

2.4. Evaluation

The evaluation of the conducted activities involves measuring success indicators of the rice-fish farming implementation by comparing the outcomes of monoculture farming traditionally practiced by farmers with the results of the rice-fish farming system established as a demonstration plot by farmers.

3. RESULTS AND DISCUSSIONS

The service activities carried out have the theme "Implementation of Mina Padi as an Environmentally Friendly Alternative for Pest and Weed Control to Support Food Security in Talotenreng Subdistrict".

3.1. Situation Analysis/Field Observation

Community Service Activities began with a survey/field observation which was carried out on September 15 2023. The survey was carried out to collect information from both related agencies and from potential partners and from other sources (Sumiarsih et al, 2019). So that field observation activities will provide an overview of the partner's condition and the partner's readiness to collaborate with the Community Service Team. This activity was attended by the Head of the Community Service Team and the Head of the Harapan Kita Farmers Group, Mr. Saharuddin along with several members of the Farmers Group. The aim of this activity is to see the field conditions in the Harapan Kita Farmers Group and discuss farmers' problems and alternative "Mina Padi" solutions in farming carried out by the Harapan Kita Farmers Group. This activity also directly carried out observations on one of the farmers' land which would be used as a demonstration land for Mina Padi activities. Determining the location of rice fields is determined based on several requirements, including: a) The location of the rice fields is in an irrigated area or has a water source; b) The location is protected from flooding and pollution; c) This activity is carried out in groups by the Harapan Kita Farmers Group.

Some of the requirements above have been fulfilled by several members of the Farmer Group. This activity was welcomed by members of the farmer groups whose land will be used as demonstration land for this activity. He said that he really hopes that this activity can run smoothly and can become a demonstration site for other group members. So that the application of mina padi can be implemented as a whole in Talotenreng Village. This activity also invited a positive response from the Head of the Farmer's Group because this activity could be an economic opportunity for farmers in Talotenreng Village.

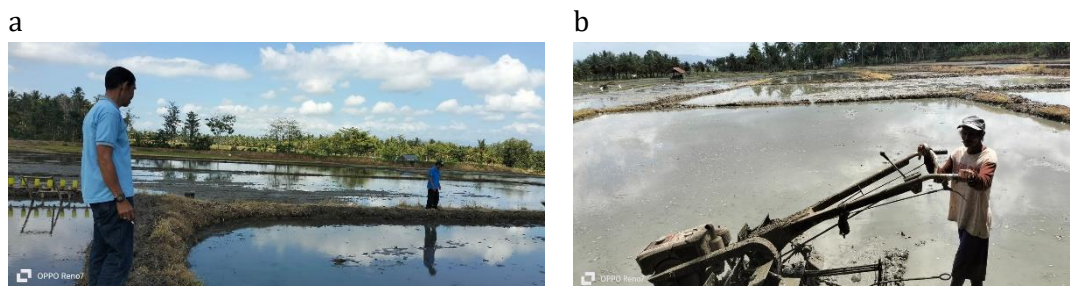


Figure. 2 (a)(b) Field observation

3.2. Counselling

The extension activity was held on September 19 2023 and was attended by 25 participants. Participants in this activity are farmers who are members of the Harapan Kita Farmer Group. The material was delivered directly by Mr. Ambo Upe, S.P., M.P. and attended by members of the Community Service Team as well as several lecturers and students involved. The extension activity began with the material "Extension on the concept of Integrated Pest Management and the use of natural enemies of plants" then continued with material on Making Organic Fertilizer. The enthusiasm of the participants in this activity was very high, especially in the second material which directly involved participants in making Organic Fertilizer.

Integrated Pest Management (IPM) is a concept developed to control Plant Pest Organisms (OPT) through ecological and technological approaches to manage pest or disease populations by applying one or a combination of various compatible control techniques so that the population is at a non-harmful limit (Pridadi et al, 2020). Counseling on the Concept of Integrated Pest Management aims to provide understanding to farmers that controlling pests and weeds is not the only solution for controlling them. The use of pesticides actually has other impacts besides controlling pests, namely being able to kill natural enemies of plants. So the solution offered is cultivating plants using "Mina Padi". The extension activity was continued with a demonstration activity on making organic fertilizer. Organic fertilizer is very important for farmers, because it can support the implementation of Mina Padi activities. Organic fertilizer can improve soil structure and the negative effects caused by this fertilizer are not as big as inorganic fertilizer (Purnamasari et al, 2023). Apart from improving soil structure, the benefits of organic fertilizer for rice farming include improving environmental conditions, reducing methane gas emissions, increasing water use efficiency, reducing insecticide use and increasing farmers' yields and income. Organic fertilizer can be made in solid or liquid form. Solid Organic Fertilizer is the result of the decomposition of a mixture of organic materials which can be accelerated artificially by populations of various microbes in warm and humid environmental conditions (Nurjannah et al, 2019). Liquid Organic Fertilizer is a type of fertilizer made through a natural fermentation process using organic materials. POC is rich in nutrients that are important for plant growth, and contains microorganisms that can help improve soil health and fertility (Anastasia et al, 2014). The process of making organic fertilizer is carried out by utilizing agricultural waste such as rice husks, leaves, straw and other organic materials.



Figure. 3. (a)(b) Mina Padi Extension; (c) (d) demonstration of making organic fertilizer

According to the participants, this training was felt to be very useful because of the knowledge about the use of the mina padi technique to overcome pests for rice plants and could generate additional economic results from the catfish production obtained from the mina padi technique. This activity supports and is beneficial for their economic life. So it is hoped that it will be developed towards greater productivity to increase family income from the agricultural and fisheries sectors. Apart from that, the demonstration carried out in the process of making organic fertilizer was highly appreciated by the community because it improved their skills in making organic fertilizer.

3.3. Mentoring

The stages of mentoring activities are carried out jointly between the Community Service Team and Farmer Group Members. The assistance stages carried out start with the purchase of production facilities in the form of rice seeds, fish seeds and fertilizers that will be used in the mina rice cultivation process. In this stage, the team accompanies farmer groups in carrying out the rice mina process starting from land preparation/bund preparation, making ditches, making channels for water going in and out, processing rice fields, spreading seeds, fertilizing, maintaining and harvesting fish and rice.

This mentoring activity directly involves the Community Service Team with stages in the form of monitoring and mentoring activities. The monitoring stage begins with accompanying farmers in land preparation. The Mentoring Stage begins with selecting seeds (Hardjanto, 2021) and sowing the seeds using the "Macampa" system, then continues with providing assistance with catfish seeds which will be sown directly by the Farmer Group. Determining seeds is important because it will determine the success of farming. The use of high quality seeds will reduce the risk of farming failure (Neonbota et al, 2016). This activity was accompanied directly by the Chair of the Implementation Team for Community Service Activities and immediately handed over the seed aid to the Chair of the Farmer Group.

This activity received a positive response from members, however there were several obstacles faced, where this assistance was not implemented optimally due to prolonged dry conditions. So farmers have difficulty obtaining water, the springs at the Devotion site are unable to irrigate rice fields which require a lot of water conditions in accordance with rice and fish farming. So the mentoring activities carried out only accompany Farmer Groups in carrying out the rice cultivation process, while waiting for optimal water conditions so that catfish seeds can be provided.



Figure. 4 (a) Preparation for sowing rice seeds; (b) use of seed sowing techniques using the "Macampa" system; (c) (d) Handover of fish seeds to the Chairman of the Harapan Kita Farmers Group

3.4. Evaluation

The success of mina padi farming can be done by evaluating activities. Program evaluation is carried out at the end of the activity to determine the level of understanding and skills of the community (Septriani et al, 2022). Apart from that, the evaluation stage is the stage used to reflect on the results and provide an assessment regarding the advantages and disadvantages of the results that have been created (Laura et al, 2022). Evaluation of this activity is carried out by coordinating regularly with the Harapan Kita Farmers Group regarding the development of the pilot land that has been implemented. This evaluation activity is important to carry out considering the climate conditions, namely dry, so this activity cannot be carried out optimally. The Community Service Team continues to strive to coordinate with the Farmer Group Chair and Farmer Group Members while waiting for suitable conditions for stocking fish seeds.



Figure. 5 (a) (b) Evaluation of PKM/Community service Activities

4. CONCLUSION

The implementation of Mina Padi goes through several stages, namely the observation stage, counseling stage, mentoring stage and evaluation stage. The application of mina padi through farmer empowerment can provide knowledge and skills to the community in Talotenreng Village. The farming community's knowledge of Mina Padi increased with the holding of activities regarding "Instruction on the Concept of Integrated Pest Management and the Utilization of Natural Enemies of Plants" followed by material and a Demonstration on Making Organic Fertilizer as an effort to increase food security and community independence using the Mina Padi system. With the mina padi system which has a dual function in agriculture and fisheries, people can gain excess profits from just one agricultural land. Mina Padi can also be an alternative business for farmers which will of course result in the production of fishery products with high marketability and fresh fish.

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