AGRISOCIONOMICS
Jurnal Sosial Ekonomi dan Kebijakan Pertanian
ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
Vol 8 (3): 793-806, November 2024

ADOPTION INNOVATION STRATEGY IN ORGANIC FARMING INNOVATION BASED ON SUSTAINABLE EXTENSION ON DRY LAND IN GUNUNGKIDUL REGENCY

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Submitted 07 January 2024; Approved 05 July 2024

ABSTRACT

The excessive use of chemical fertilizers poses a threat to land integrity, leading to soil quality degradation. To counter this trend, farmers must transition towards organic farming practices. This study aims to examine the evolving process of adopting innovations in organic cultivation among farmers in dry land areas of Kalurahan Giritorto, Kapanewon, Purwosari, Gunungkidul Regency. Employing a qualitative descriptive approach, the research takes the form of a case study. Data collection involves interviews with 7 (seven) informan represent the farmer group, observations, and focus group discussions (FGDs), with triangulation techniques. Findings indicate that the adoption of organic farming innovations is feasible, albeit in a semi-organic manner. Farmers adjust their practices to align with environmentally friendly agriculture, gradually reducing the reliance on chemical fertilizers while increasing the use of organic alternatives. Despite positive acceptance and awareness, implementation encounters various obstacles, with economic constraints being the most significant. The study identifies three distinct groups of adopters: early innovator/adopter farmers, early majority farmers, and late majority/slow farmers. These groups exhibit differing characteristics in terms of farming experience, age, group dynamics, and socioeconomic conditions. For the first group, a sustainable extension design is recommended to foster continued innovation. The second group should concentrate on reinforcing motivation and learning from the early adopters. The third group, concerted efforts from extension workers and government interventions are essential to offer intensified assistance. This targeted approach aims to facilitate the continued adoption of organic agricultural innovations by providing capital for later adopter farmers because of low economic conditions.

Keywords: *adoption innovation, dryland, genta organik, organic farming*

BACKGROUND

The primary challenges facing dryland agriculture encompass environmental, economic, and social issues, notably dryland degradation resulting from ecosystem imbalances. The main challenges facing dry land agriculture include environmental, economic and social problems, especially dry land degradation due to ecosystem imbalance. The increasing number of conversions of land into residential areas and the opening of new roads on the south side have disturbed the environmental balance. Economic and social problems occur because agricultural yields are

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
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decreasing due to soil damage. In the end, farmers prefer other jobs by becoming construction workers and do not prioritize managing agricultural land because it is not profitable.

The promotion of organic cultivation technology necessitates a systematic reduction in the reliance on chemical fertilizers. Overuse of chemical fertilizers on dry land exacerbates water scarcity issues and diminishes soil quality, leading to a decline in nutrient levels and reduced crop yields among farmers (Asiah et al., 2019). The repercussions of chemical pollution pose a significant threat to both the environment and human health, directly impacting the food chain and jeopardizing the sustainability of agriculture and future food supplies. Notably, a substantial proportion of inorganic products, including vegetables, grains, fruits, and milk, often contain harmful residues of toxic agricultural chemicals, rendering them unsuitable for consumption (Asiah et al., 2019). Agricultural education regarding the dangers of excessive use of chemical fertilizers has been carried out by extension workers, but its implementation is still limited.

Inorganic agriculture perpetuates a misalignment between resource availability and consumption, resulting in subsiding water levels, soil health deterioration, loss of beneficial biodiversity, the emergence of resistant weed bio-types, and increased prevalence of insect pests and diseases that ultimately impede profitability. Smallholder farmers, particularly those lacking access to external inputs, face socio-economic challenges and increasing marginalization within communities. Applying organic fertilizer does not require expensive costs, but requires a high level of commitment. Organic ingredients are available in the farmer's environment. The use of organic materials can reduce production costs significantly as (Michalke et al., 2023) resecarch.

The imperative solution to address these complex issues lies in the adoption of sustainable agriculture practices. Recognizing the significance of organic farming, the government, through the Ministry of Agriculture, has introduced the Genta Organik program. Genta Organik serves as a pro-organic agricultural movement advocating for the use of organic fertilizers, biological fertilizers, and soil enhancers to alleviate the challenges posed by expensive chemical fertilizers. This initiative encourages farmers to independently produce organic fertilizers, biofertilizers, and soil enhancers. Importantly, organic farming does not outright prohibit the use of inorganic (chemical) fertilizers; rather, it promotes their judicious use in adherence to balanced fertilization principles.

To facilitate the adoption of organic farming, the implementation of field schools has proven effective. Field schools operate as a learning platform grounded in ecology, system analysis, and experimentation, engaging farmer groups in continuous field observations throughout the production cycle. This approach facilitates adaptive management decision-making, local problem-solving, and collaborative group efforts (van den Berg et al., 2020); Mariyono et al., 2021). While field schools are acknowledged for their efficacy in promoting behavioral change, the sustainable adoption of organic farming presents challenges, requiring farmers to transition from conventional chemical fertilizer practices to organic alternatives. This transition necessitates time, compelling reasons, and a comprehensive understanding of the ecological drawbacks and threats to food security associated with chemical fertilizer use.

The adoption of innovation in agriculture involves three key paradigms: the innovation diffusion paradigm, the economic constraint paradigm, and the adopter's perception paradigm (Ruzzante et al., 2021). Each paradigm highlights different factors influencing adoption rates and patterns. The innovation diffusion paradigm posits that information spreads through society, categorizing adopters based on measurable attributes. The economic constraint paradigm emphasizes rational decision-making at the individual level, while the adopter's perception

ISSN 2580-0566; E-ISSN 2621-9778
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paradigm introduces subjectivity, considering perceived need and attributes of the innovation. These paradigms collectively shape the multidisciplinary theory of agricultural technology adoption, combining decision-making and innovation diffusion theories to explain farmers' varying adoption behaviors.

Rogers' Diffusion of Innovation (DOI) theory underpins the mass diffusion of innovative technology (Ong et al., 2022). According to DOI, there are five types of adopters, including innovators and early adopters who play pivotal roles as risk-takers and opinion leaders. The early majority becomes crucial in reaching a tipping point for widespread adoption. Critical mass, defined as the minimum number of adopters for an innovation to continue, underscores the significance of the early majority. Intervention strategies are essential to facilitate the adoption process, understanding the stages of technology adoption and designing interventions accordingly.

The agricultural extension process, fundamentally aimed at behavioral changes, involves cognitive, emotional, and psychomotor aspects post "innovation" receipt. The nature of innovation adoption is governed by factors such as profitability, compatibility, simplicity, triability, and observability(Euriga, 2015). This extension process based on organic or semi-organic cultivation innovation is not easy to implement on dry land. Limited conditions require extension workers to collaborate with many parties, such as: the importance of strengthening group institutions, collaborating in providing capital and supporting management systems such as (Riptanti et al., 2021) research.

Purwosari District, which is characterized by karst soil and dependence on rainwater, faces limitations that impact farmers' incomes due to biophysical constraints, limited cultivation opportunities, and economic infrastructure challenges. The Genta Organic Initiative of the Ministry of Agriculture, implemented through organic field schools, seeks to exploit the untapped potential of organic fertilizer production in the region. Agricultural extension related to organic farming has been carried out using lecture, discussion and mentoring methods. Extension agents have also formed a group of young farmers or Taruna Tani which can bring together young people who are interested in agriculture. This breakthrough was welcomed by several young people. Some young people even become pioneer farmers who encourage other young people to take up organic or semi-organic farming as (Nurlaela et al., 2020 ; Yuniasih et al., 2021). However, even though they have participated, farmers, especially senior farmers, have not fully applied the knowledge they have gained. Ministry of Agriculture's Genta Organik initiative, implemented through organic field schools, seeks to leverage the area's untapped potential for organic fertilizer production. However, despite participation, farmers have not fully implemented acquired knowledge.

The potential for dry land agriculture in this region, with the application of organic farming, offers a sustainable solution considering the problems of ecosystem imbalance, damage caused by chemical fertilizers, and unpredictable climate change. The research focus on the process of adopting organic farming innovation in Giritirto Village, Purwosari District aims to identify strategies for assisting farmers in implementing organic farming. The goal is to rejuvenate barren land, increase soil fertility, and provide economic and environmental benefits for farmers. This research contributes novelty in achieving sustainable dryland agriculture, overcoming challenges and encouraging positive changes in the organic farming landscape.

RESEARCH METHODS

ISSN 2580-0566; E-ISSN 2621-9778
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The research was carried out from April to December 2023 in Kapanewon Purwosari, Gunungkidul Regency, Special Region of Yogyakarta (DIY). This location was chosen because it was appointed by the Ministry of Agriculture to hold an organic field school in 2022. The research methodology used was qualitative with a focus on representatives of farmer groups participating in the Genta Organik Program (Organic Agriculture Movement) which consisted of 10 groups, but only 7 people attended because 3 people could not attend the FGD. Each group is represented by a leader. In Giritirto Village, one informant was selected from each of ten farmer groups, and one additional informant was an extension agent. Data collection used a combination of observation techniques, Focus Group Discussion (FGD), and interviews. The FGD will take place on October 11, 2023. Qualitative data analysis is a methodological approach to organizing and synthesizing information obtained from interviews, field notes, and other sources. This process ensures that the data can be understood and facilitates communication of findings to others (Sugiyono, 2019). Using qualitative research methods, this research aims to explore the experiences, perceptions and behavior of farmers participating in the Genta Organic Program, as well as the insights of extension workers. This approach allows for in-depth exploration of the complexities surrounding the adoption of organic farming innovations in specific regions.

RESULT AND DISCUSSION

Kalurahan Giritirto has an area: 1,205.95 ha, which is divided into 7 villages (Petoyan, Nglegok, Gading, Susukan, Tompak, Ploso, Blado). With limited land available, farmers in dry mountainous areas such as in Gunungkidul cannot have large areas of land and therefore become small farmersEven though the land is dry land and only relies on rainwater irrigation, by utilizing local in-situ resources and prioritizing diversification of superior dry land commodities, it must be in accordance with regional agroecosystem conditions, namely acceptable to local communities and providing added value to farming income as (Matheus et al., 2017).

Figure 1. Dryland Farming in Giritirto Village, Gunungkidul Regency

The climatological conditions in the studied region, characterized by a tropical climate, are primarily influenced by karst hilly areas with numerous natural caves and underground rivers. This landscape contributes to less fertile soil in the southern region, leading to suboptimal agricultural cultivation. Approximately 90% of the land in this area is rainfed dryland, heavily reliant on the climate cycle, especially rainfall, for agricultural activities. Although there are relatively narrow irrigated rice fields, the majority of rice cultivation depends on rain-fed conditions. The

ISSN 2580-0566; E-ISSN 2621-9778
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sustainability of the soil resource base in dryland regions is a formidable challenge. A sustainable system should over the long term enhance environmental quality and the resource base on which agriculture depends (Stewart & A, 2016).

One of the overarching challenges in the region is the physical condition of dry lands, with a considerable portion already damaged or having the potential to transform into critical land. Currently, about 18 million hectares are at risk. Addressing the increasing prevalence of dry land issues requires preventive measures, particularly through the regulation of planting patterns. One of the main challenges in this region is the physical condition of dry land, most of which has been damaged or has the potential to turn into critical land. Currently, around 18 million hectares of land are at risk. Overcoming the increasing prevalence of dry land problems requires preventive efforts, especially through regulating planting patterns, so that many farmers plant crops between pine forests. They collaborate with the government through the Ministry of Forestry which has local land authority. Agriculture is also carried out under these tree stands. Trees have an important role in this, because they function as a preventive measure against erosion and contribute to maintaining soil fertility. It is important to emphasize the cultivation of food crops along with these steps to ensure the family's food needs are met (Pitaloka et al., 2018). Trees play a crucial role in this regard, serving as a preventive measure against erosion and contributing to the maintenance of soil fertility. It is essential to emphasize the cultivation of food crops alongside these measures to ensure the fulfillment of family food needs (Pitaloka et al., 2018).

The integration of preventive strategies, such as regulated cropping patterns and strategic tree planting, is critical to mitigate the challenges posed by the climatic and physical characteristics of the region. This holistic approach not only addresses soil erosion and fertility issues but also ensures sustainable agricultural practices in the face of tropical climates and karst hilly areas. There are still several problems in implementing this approach, due to the lack of collaboration in Giritirto Village, the Extension Officer plays a role in being a communicator in overcoming the problems of a sustainable dryland farming system. Some active farmer groups are easy to direct, but some groups do not have a planned schedule for group meetings, the reason they are busy working in other sectors outside of agriculture is because the agricultural sector cannot promise a decent living. Apart from that, the lack of assistance from other parties outside the village makes it seem like farmers are struggling alone. The use of technology also needed in this dry land such as (Sahputra et al., 2023)

Farmers Characteristics

The characteristics of farmers in dry land are related to land ownership and the positioning of the farmer's profession as a main or side job. Farmers with limited land ownership only have the option of becoming laborers as an effort to continue living, because farming cannot support their livelihood. For many, agriculture serves as the main occupation, while a smaller segment engages in farming as a supplementary source of income. This condition makes them live in poverty. Their average age is old, but now some young people are starting to farm with better management. This condition makes them live in poverty. Their average age is old, but now some young people are starting to farm with better management. They grow horticultural commodities such as shallots and chilies that older people did not cultivate before. including organic-based land management which is carried out by many young people today, as research (Yuniasih et al., 2021). A significant portion

ISSN 2580-0566; E-ISSN 2621-9778
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of the population is organized into farmer groups, highlighting the cooperative nature of agricultural activities in the community.

Table 1. Farmer from Group Representative in Giritirto Village

No	Name	Age	Gender	Farmer Group Name	Position in Group	Start Farming	Reasons to Choose Farming	Other jobs besides farming
1	Paino	60	M	Ngudi Makmur 1	Chief	1980	Given from parents	-
2	Timbul	46	M	Tunas Harapan	Chief	2000	Given from parents	-
3	Jadi	70	M	Ngudi Makmur	Chief	2000	Given from parents	-
4	Mujiman	57	M	Sido Makmur	Chief	1995	Given from parents	Coconut Collector
5	Kadarman	60	M	Ngudi Rejeki	Chief	1990	Given from parents	Planting eucalyptus
6	Temu	43	F	Taruna Tani Tirta Gempita	Vice Chairman	2020	Given from parents	Production of POC under the SAO trademark
7	Heri	34	M	Taruna Tani Tunas Muda	Chief	2012	Given from parents	Wet tobacco leaf picker

Source: Primary Data (2023)

Dryland agricultural cultivation activities in Kalurahan Giritirto are characterized by a rainfed farming system, particularly during the MT III season when many lands remain unplanted. The key activities involved in agricultural cultivation include tillage, fertilization, irrigation, pest control, and marketing.

1. Land Processing: Tillage is conducted through two methods: on large lands, tractors are used, while on narrow lands situated on edges or slopes, hoes are employed. Proper tillage is essential for optimal crop production, especially in dealing with the challenges posed by the nature of clay soil, which tends to crack when lacking water.
2. Fertilization: During the first planting period (MT I), rice is the main crop. Three rounds of fertilization are conducted, with the first using organic fertilizers derived from fermented livestock manure. Most farmers use manure directly without fermentation due to manpower constraints. Those with their own livestock utilize their manure, while others purchase batches. Chemical fertilizers are still used but in balanced and non-excessive doses. Corn and soybeans are planted during the second planting period (MT II), with fertilization practices varying based on the crop. Some farmers in Kalurahan Giritirto produce liquid fertilizer (POC) independently.
3. Irrigation: The rainfed system predominates in the agricultural land, with only a few farmers having the economic capacity to use technologies such as borewells. The high cost of borewells limits widespread adoption. Some farmers purchase water from tanks for irrigation, incurring a cost of Rp 100,000 for 5000L for an area of 1500 m^2.

ISSN 2580-0566; E-ISSN 2621-9778
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4. OPT Handling: Pest control is primarily chemical, although there is a shift towards environmentally friendly methods such as vegetable pesticides, yellow/green viscous substances for pest control, and the use of trichoderma for fungal control. However, the adoption of these practices is not widespread due to limited knowledge and confidence among farmers.
5. Marketing: Rice production is primarily for subsistence and food granary stock rather than commercial sale. Corn and soybeans are sold directly to collectors at set prices (Rp 4500/kg for corn and Rp. 10,000/kg for soybeans). Chili harvests are sold to middlemen/collectors at fluctuating prices, with the current rate at Rp24,000/kg.

Table 2. Farming Activities in Kalurahan Giritirto

Tillage	Commodities and Crop Rotation	Fertilization	OPT Handling	Irrigation	Post-Harvest Activities
Tools using tractors (horizontal), buns (on narrow and sloping land) Sport the soil and give fertilizer the base. using a hoe.	MT I: Padi, Jagung MT II: Shallots, Chili, Soybeans MT III: Tobacco, Chili and some are bero (not planted with anything)	On rice 3 times: Organic starting fertilizer, second and third chemical On corn 2 times> organic starting fertilizer, both chemical	Spraying with chemicals within safe limits	It's raining, buy water tanks	Rice: stored for its own consumption Corn/corn/ tobacco: sold to collector/ merchant

Based on the cultivation activities above, organic farming innovations or environmentally friendly agriculture have been implemented although still not completely. Field schools are one of the triggers to make farmers aware that organic or environmentally friendly farming is an option to protect the environment, maintain land fertility and be safe for consumption. This goal is a long-term goal that not all farmers are willing to doInnovation is a new idea or activity that is then applied to improve the quality of human life. Field schools are one of the triggers to make farmers aware that organic or environmentally friendly farming is an option to protect the environment, maintain land fertility and be safe for consumption. This goal is a long-term goal that not all farmers are willing to do, as per research (Euriga & Amanah, 2018).

Organic farming is one of the innovations that is adopted quickly if it has profitable, harmonious, simple, easy and observable conditions. Farmers' perceptions regarding organic farming are still a job for extension workers to continuously educate farmers. Even though it is initially unprofitable, in the long term, organic or environmentally friendly farming modes are a very appropriate choice, as. (Alotaibi et al., 2021) research. The results showed that the characteristics of organic agricultural innovation could not meet these criteria. Farmers still find it difficult to get organic fertilizer, to make their own also feels troublesome, because so far they have felt the benefits of using chemical fertilizers. The task of extension workers and innovators is to strengthen farmers' understanding while making organic farming technology easy to adopt so that farmers' behavior can gradually change.

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Organic Farming Innovation Adoption Process

The adoption process of organic farming innovations in Kalurahan Giritirto, particularly through the Genta Organik program, has been underway for an extended period. This program is funded by the Ministry of Agriculture based on directions from the DIY Agricultural Service which directly appointed the location of Giritirto village, Semin sub-district as the location for the Genta Organic program. The community's familiarity with organic farming principles has been demonstrated through previous Field School activities. Farmers possess a sound understanding of the advantages of organic fertilizers and the drawbacks of excessive chemical fertilizer use. The Ministry of Agriculture's Genta Organik initiative aims to promote the widespread use of organic fertilizers, biological fertilizers, and soil improvers as a cost-effective solution to the challenges posed by expensive synthetic fertilizers.

The Genta Organik movement advocates for the independent production of organic fertilizers, biofertilizers, and soil improvers by farmers. It doesn't entail completely abandoning the use of inorganic fertilizers; rather, it encourages their judicious use in accordance with the concept of balanced fertilization. This process is the starting point in reducing organic fertilizer. All farmers have used organic fertilizer at the beginning of land preparation, then the balanced fertilization process is carried out in the vegetative and generative periods. The implementation of Genta Organik in the Special Region of Yogyakarta involves field schools, where farmers participate in the creation of demplots to produce and apply organic fertilizers, biological fertilizers, and soil improvers in shallot farmland. The overarching goal is to guide farmers in developing agricultural production systems that rely on natural ingredients while minimizing the use of synthetic chemicals like fertilizers, pesticides, and herbicides.

The Genta Organik program, conducted through organic farming field school activities from February to May 2023, has shown positive outcomes. Before this activity was carried out, the instructors had actually conveyed this in their mentoring activities, and farmers had knowledge of the benefits of organic cultivation, but the many obstacles in implementation meant that farmers were not ready to directly change their cultivation mode from conventional to organic. This organic bell is a means to strengthen farmers' motivation to adopt it in stages Farmers experienced significant improvements in knowledge, attitudes, and skills, as evidenced by effective field school evaluations. However, the challenge lies in ensuring the sustainability of these improvements post-field school activities. Extension workers and stakeholders must actively address this to facilitate the effective adoption and continued implementation of organic farming practices.(Rizki, 2023)

The evaluation results of the shallot Organic Field School demplots highlight variations in crop yields across different locations. The Tunas Muda Farmer Group exhibited the highest yield, followed by the Ploso Makmur and Tirta Gempita Farmer Groups, all surpassing the average yield of 12-18 tons/ha. Observations in the field indicate that cultivation behavior, particularly in the use of organic fertilizers, plays a pivotal role in these outcomes. Factors such as early planting, regular watering, good cooperation among group members, and the innovative approach of millennial group leaders contribute to successful demplots. The use of organic fertilizers enhances soil fertility and water retention, while effective pest control methods, such as the use of blue viscous substances, contribute to favorable outcomes. Young farmers, especially those leading groups like Tunas Muda and Tirta Gempita, serve as inspirations for their peers in embracing innovative and sustainable farming practices, aligning with previous research findings (Satria P et al., 2017); Nurlaela et al., 2020) In the first group, the role of extension workers is a motivator and accelerator,

ISSN 2580-0566; E-ISSN 2621-9778
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because farmers are independent and have high innovation capabilities. In the field, farmers like this are more considered as extension partners, even some of them (group leaders) become independent extension workers. This pioneering young farmer had a great influence in diffusing agricultural innovation (Arvianti et al., 2020).

Table 3. Results of Shallot Organic Field School Demplot in Kalurahan Giritirto

No.	Group Name	Ubinan yield (ton/ha)
1	KT. Ngudi Makmur	14.81
2	KT. Ngudi Makmur I	8.64
3	KT. Sinar Harapan	3.36
4	KT. Sido Makmur I	14.59
5	KT. Ngudi Rejeki	5.12
6	TT. Tirta Gempita	21.92
7	TT. Tunas Harapan	3.20
8	KT. Ploso Makmur	26.27
9	TT. Tunas Muda	30.56
10	KT. Subur	11.42

Based on an interview with Mas Heri, one of the millennial farmers in the Tunas Muda Farmers Group stated that he was brave enough to take risks by spending large amounts of money to use pest repellent regularly and using lots of organic fertilizer as (Mahbubi, 2022; Genoveva & Tanardi, 2022), Farmers in early adopters have longer experience farming shallots than other group farmers. They have practiced more organic fertilizers repeatedly in cultivating shallots, and the yields are better, so it can be said that this farmer became a successful early adopter and successfully developed his farming experience continuously. This is in accordance with the research of Montes de Oca Munguia et al, (2021)which states that adoption is a process that can develop gradually from some components to a complete technology package. Experience has also shown that technology adoption is not a static one-time decision but rather involves a dynamic process in which information gathering, learning and experience play an important role especially in the early stages of adoption. In addition, economic capabilities play an important role in the success of this adoption. Farmers who have large livestock and can afford organic fertilizer are more successful in organic farming than poor farmers, as Rusliyadi et al. (2023) research.

In the medium category, there are three groups, namely: Subur Farmer Group, Ngudi Makmur 1, Sido Makmur 1. In this group the use of organic fertilizers has been carried out, but not as much as the first group. The willingness and ability of farmers to implement organic behavior is also relatively high. In the aspect of experience, they are not very experienced compared to the first group. In adopting organic behavior, this group still tends to be moderate and does not dare to exceed what they usually do. In the context of classifying adopters, there are five types of technology adopters based on the stage of adoption: innovators, early adopters, early majority, late majority, and laggards. This group enters at the initial majority according to Mahler and Rogers (Ong et al., 2022). It is defined as critical mass as "the minimum number of adopters of an innovation for an innovation to continue. The early majority group, therefore, played an important role in bringing technology to a tipping point. Therefore the role of extension workers becomes very important to convince this group to continue to be enthusiastic in implementing organic innovation, It is necessary to convince them by discussing this with the initial group in order to get greater

ISSN 2580-0566; E-ISSN 2621-9778
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reinforcement. Supported by strengthening group management and readiness, it is hoped that this group will become a successful adopter like the first group.

Meanwhile, the Tunas Harapan, Sinar Harapan and Ngudi Makmur 1 Farmer Groups performed below the local average. This is due to poor cooperation between group members, low use of organic fertilizers, and unable to overcome OPT. In addition, because the planting schedule is later, the demplot is exposed to rain that submerges onion plants that are only 10 days old after planting. The old age of farmers also affects the speed of adoption. In the context of adopter classification, this group enters the final majority, and is slow/laggard (Ong et al., 2022). Lack of experience and low group cohesiveness coupled with weak leadership, are the reasons farmers in this third group have not been able to adopt organic farming well. The role of extension workers in encouraging farmers to implement organic farming is needed in this group (Anita & Kusumayana, 2019). Based on crop yields and analysis related to conditions in the field, it can It is mapped that the success of the demplot is influenced by several things as Table 4.

Table 4. Results of Analysis of Organic Farming Adoption in Giritirto Village

Adoption class	Farmer Group	ASPECTS			
		Shallot Farming Experience	**Group Dynamics**	**Economic Capabilities**	**Farmer Capacity**
Inovator First Adopter	Tunas Muda Ploso Makmur Tirta Gempita	Have experience in shallot farming Applying organic fertilization in bulk Applying natural pest control technology in the form of blue viscous	The active group, the leader of the innovative creative group, dare to try new things.	Have good economic ability	Young, tech-savvy, access a lot of information through social media, dare to take risks, etc
Early majority	Tani Subur, Ngudi Makmur 1 Sido Makmur 1	Have experience in shallot farming Has not applied fertilization optimally Have not implemented natural pest control technology	Inactive groups, The leader of the group is less creative	Have good economic ability	Old age, farming with old technology, the majority of professions as laborers, Don't dare to take risks
Final Majority Sluggish	Tunas Harapan Sinar Harapan Ngudi Makmur 1	Inexperienced in onion farming Have not applied organic fertilization optimally	Inactive group, passive group leader	Low economic capability	Old age, farming with old technology, the majority of

ISSN 2580-0566; E-ISSN 2621-9778
http://ejournal2.undip.ac.id/index.php/agrisocionomics
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	Have not implemented natural pest control technology	professions as laborers, Don't dare to take risks

Source: Primary Data Analysis (2023)

Strategy for Adopting Organic Agriculture Innovation based on Sustainable Extension in Dry Land

Based on Figure 2, it can be explained that: farmers have actually often received material and information related to the importance of organic farming for the environment, but they have not been fully able to do so because of their habit of belief in old habits, as well as innovations in environmentally friendly organic farming cultivation technology that need to be strengthened. The Farmer Field (Sekolah Lapang) Genta Organik program is one of these strengthening efforts. Furthermore, after Farmer School was implemented, the results were 3 classifications of early innovator/adopter farmers, early majority farmers, and late/slow majority farmers. 1) Innovator Farmers: Provide opportunities for innovator farmers to engage in knowledge-sharing forums and exchange experiences with the early majority. Facilitate Farmer Group Discussions (FGDs) to promote social learning, especially among younger farmers. Encourage innovators to continue developing farming innovations and share successful strategies with extension workers who can assist in finding partners or market opportunities. 2) Early Majority Farmers: Facilitate joint forums and demonstration plots (demplots) where early majority farmers can learn from innovators. Strengthen the dynamics of learning within farmer groups to enhance the quality of adoption. Empower early majority farmers through shared experiences and encourage them to provide insights to the late majority. Foster a supportive community that accelerates the adoption process. 3) Late Majority/Slow Farmers: Provide intensive assistance, both in terms of knowledge and material support, to the finalmajority of farmers. Collaborate with extension workers and stakeholders to offer targeted training programs, access to resources, and financial assistance. Recognize the importance of time and energy required to accompany this group (Satria et al., 2017). Focus on building the capacity of late majority farmers through personalized guidance.

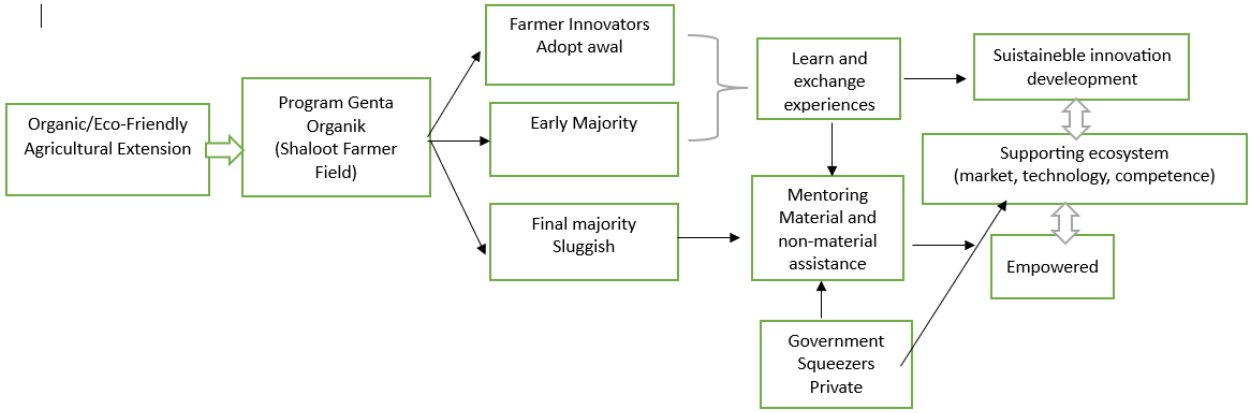

Figure 2. Strategy to Strengthen the Adoption of Organic/Sustainable Extension Based Agriculture

Key Factors for sustainable adoption: technology, markets, and capacity building are identified as key factors in supporting the sustainability of adoption programs: align efforts towards

ISSN 2580-0566; E-ISSN 2621-9778
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providing farmers with access to technology, establishing market linkages, and enhancing their capacity through ongoing training and skill development. Strengthen the support system around farmers, ensuring that they have the necessary resources and knowledge to sustain organic farming practices. The market is an important requirement for farmers to implement environmentally friendly organic farming (Arga et al., 2022). Agricultural extension workers have a very important role in the process of adopting organic farming innovations, especially for farmers who are in the late majority. Good mentoring and communication will make it easier for the counseling and adoption process to run smoothly as (Prayoga et al., 2019) research.

Encourage collaboration and partnerships between farmers, extension workers, and stakeholders. Create a network that fosters mutual learning and support. Leverage cooperative efforts to address challenges collectively and promote the long-term success of organic farming initiatives. Empower farmers by building their capacity in organic farming practices. Implement capacity-building programs that focus on technological advancements, market-oriented strategies, and sustainable agricultural practices. Empowered farmers are more likely to adopt and sustain organic farming innovations.

Market access and technological feasibility are identified as crucial components for sustainable adoption. Facilitate market access for organic products and ensure that farmers have access to appropriate technologies. Strengthen the linkage between farmers and markets to create a sustainable economic model for organic farming. By tailoring strategies to the specific needs of each farmer classification and addressing key factors such as technology, markets, and capacity building, the adoption of sustainable organic farming practices can be strengthened and sustained in Kalurahan Giritirto. Continuous collaboration and empowerment efforts will contribute to the long-term success of the organic farming initiative.

CONCLUSION AND SUGGESTION

Dryland agriculture is highly reliant on rain, making water management crucial. Implement water conservation techniques, such as rainwater harvesting and efficient irrigation systems, to mitigate the impact of erratic rainfall patterns during the dry season. Economic limitations hinder farmers, especially those without livestock, from obtaining sufficient organic fertilizer. Advocate for government subsidies, loans, or community initiatives to provide economic support for purchasing organic fertilizers. Encourage collective initiatives for shared resource acquisition.

Farmers are categorized into early innovators, early majority, and late majority/slow adopters. Tailor extension services based on the characteristics of each group. Promote innovation for the early group, facilitate knowledge exchange for the early majority, and intensify support for the late majority through targeted assistance programs. Provide specialized training, incentives, and recognition to encourage early innovators to continue experimenting with organic farming practices. Foster collaboration between the government, extension workers, and local communities/farmer groups. The three adopter groups vary in terms of farming experience, age, group dynamics, and socioeconomic conditions. Develop flexible and targeted strategies that consider the diverse characteristics of each group. Recognize the specific needs and challenges faced by farmers in different adopter categories. Emphasize the long-term benefits of organic farming for sustainable agriculture. Implement measures to ensure the continued support and development of organic farming practices beyond the initial adoption phase.

ISSN 2580-0566; E-ISSN 2621-9778
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By addressing economic constraints, tailoring strategies to different adopter groups, and fostering collaboration between stakeholders, the adoption of organic farming innovations in Kalurahan Giritirto can progress effectively, empowering farmers and promoting sustainable agricultural practices in dryland areas. Providing capital for infrastructure is very important for later adopter farmers because of low economic conditions. Extension workers accompany farmers in implementing the transition from conventional farming to organic farming

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