

Development of Organic Farming to Create a Environmentally Friendly Farming Which Has an Impact on Increasing the Quality and Quantity of Agricultural Productivity

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Abstract: The purpose of this paper is to describe research findings that indicate that organic farming is increasingly being considered as a solution for improving soil quality and creating environmentally friendly agriculture. Environmentally friendly agriculture is a sustainable agricultural system that aims to improve, enhance, and maintain the quantity and quality of productivity by considering nutrient supply through the use of organic materials, minimizing dependence on inorganic fertilizers, improving soil biota, controlling plant pests (OPT) based on ecological conditions, and diversifying crops. Various innovative environmentally friendly agricultural systems have been developed based on good agricultural practices through synergy between technological components. The results explain that organic farming offers numerous benefits for improving soil quality and crop yields and has a more positive environmental impact compared to conventional agriculture. Environmentally friendly agriculture has strengths that outweigh its weaknesses, opportunities that outweigh its threats, and is socially sustainable, ensuring the sustainability of future agriculture and acceptance by users, especially farmers. It can also improve farmers' economic well-being.

Keywords: Agricultural Productivity, Environmentally Friendly Farming, Organic Farming.

Introduction

Agricultural development faces various challenges including climate change that threatens food insecurity, conversion of agricultural land to non-agricultural use, population growth that increases in line with food demand, exploitation and degradation of agricultural land resources that reduces the quality of land, agricultural products and the environment. Law No. 18 of 2012 on food mandates that in addition to food security and food independence and food safety must be taken into consideration.

The current trend in agriculture is shifting towards green, back-to-nature, and

environmentally friendly concepts. Poor land management has led to various problems such as land degradation and a decline in the quality of agricultural products. For this reason the concept of environmentally friendly agriculture is beginning to be promoted in order to support efforts to achieve food self-sufficiency and sustainable agriculture.

In recent years, organic farming has gained attention as a more sustainable alternative for improving soil quality and agricultural yields. Many studies show that transitioning from conventional to organic farming systems can help reduce the negative impacts of synthetic chemical use, while naturally increasing productivity (Altieri, 2018). However, the continuous use of

chemical fertilizers and pesticides over the long term has caused soil degradation and a decline in land fertility (Weil & Brady, 2016). The FAO (2020) states that organic farming has great potential in creating a more sustainable agricultural system by utilizing natural fertilizers, crop rotation, and soil microorganisms.

The agricultural system is environmentally friendly and successful and effective, therefore it is necessary to follow the following principles, among others: (a) use as little chemical inputs as possible, (b) implement conservation measures for soil and water, (c) maintaining stability productivity for long-term and sustainable development (d) paying attention to the balance of the ecosystem and (e) being able to provide for local needs, domestic needs and even for export (Sutanto, 2002; Husnain et al., 2014).

The purpose of this paper is to explain the development of organic farming to create environmentally friendly agriculture that impacts the improvement of agricultural productivity in terms of quality and quantity. The research method involves collecting relevant information through literature reviews of existing studies, interviews, and questionnaires.

Organic Agriculture

Agriculture that intensively utilizes local resources with little or no external inputs is a farming method often referred to as organic farming, meaning that this farming method no longer uses chemicals such as chemical fertilizers and pesticides. This farming method is expected to not damage the environment but can produce high quantities and quality of products. (Oktavia, H.F., Susilastuti, D., 2020).

The implementation of organic farming systems has been proven to have a positive impact on soil quality. The use of organic fertilizers such as compost and green manure plays an important role in increasing the organic content of the soil, which ultimately helps improve soil structure and increase the soil's capacity to retain water. Weil & Brady (2016) state that the presence of organic matter in the soil can increase soil particle

aggregation, reduce the risk of erosion, and improve water infiltration, thereby improving the overall physical quality of the soil. Organically managed soil has higher microbial activity compared to conventional soil, which plays an important role in the mineralization of nutrients and increasing nutrient availability for plants (Tian et al., 2017).

Environmentally Friendly Agriculture

Environmentally friendly agriculture has a concept of sustainability that is expected to produce high agricultural productivity as an ecology-based agricultural system. Quoting Sumarno, Husnain explains that there are four components of environmentally friendly agriculture, namely: (1) mitigation of land degradation through erosion and surface runoff control, (2) farming that is free from external pollutants, (3) low greenhouse gas emissions, and (4) organic agricultural products that are free from residues and safe for consumption. (Husnain, Nursyamsi, D., 2012)

Environmentally friendly agriculture is a sustainable agricultural system that aims to increase and maintain high productivity by paying attention to nutrient supply from the use of organic materials, minimizing dependence on inorganic fertilizers, improving soil biota, controlling plant pests based on ecological conditions, and diversifying crops (Hendrawati, 2001). Soemarno (2001) defines environmentally friendly agriculture as agriculture that applies environmentally compatible technology () to optimize the use of natural resources in order to obtain high and safe production, as well as to preserve the environment and agricultural natural resources. Based on this definition, agricultural development is directed towards achieving food security while also paying attention to food safety. The concept of environmentally friendly agriculture boils down to soil quality, which affects: (i) soil productivity to increase crop productivity and other biological aspects; (ii) improving environmental quality by neutralizing contaminants in soil and agricultural products; and (iii) the health of humans who

consume agricultural products (Doran and Parkin, 1999).

Environmentally friendly agriculture is a simple agricultural technique because it uses beneficial microorganisms in the soil to improve soil balance and enhance plant growth (Nur Rahmawati, 2016).

According to Sumarno and Suyamto, as explained by Alya Putri Mulyani and Adi Firmansyah, one alternative for sustainable farming is environmentally friendly agriculture. By taking advantage of opportunities, increasing self-awareness and commitment to managing available resources, sustainable farming can be achieved. Producing innovations in agricultural cultivation techniques oriented towards producing quality results, optimal production, and maintaining environmental sustainability by implementing environmentally friendly farming. Through these environmentally friendly innovations, it will be possible to produce high-quality, highly competitive products that are in line with market preferences. (Mulyani and Firmansyah, 2020).

The development of environmentally friendly agriculture, especially for food crops and horticulture, must take several things into account, including: (i) maintaining biodiversity and the ecological balance of natural biota; (ii) maintaining the physical, chemical, and biological quality of agricultural land resources; (iii) minimizing contaminants from agrochemical residues and organic and inorganic waste originating from within or outside the farm; (iv) maintaining natural land productivity; (v) preventing the endemic accumulation of disease pathogens and pest infestations and preserving natural enemies; and (vi) ensuring that agricultural products are safe for use as food and feed (Soemarno, 2001).

Organic Fertilizer

Farmers generally cannot grow crops without fertilizers. The fertilizers commonly used by farmers, which are relatively expensive, are factory-made chemical fertilizers. In addition, fertilizer shortages due to delays in supply from distributors also occur frequently. Besides requiring high production costs, the use of chemical fertilizers also has a negative impact on

the environment. Eutrophication (the overabundance of nutrients in water) can cause the soil structure to become hard when fertilizers are used unwisely and in excess of the recommended dosage. (Nugraha, 2016).

According to Minister of Agriculture Regulation No. 2/Pert./HK.060/2/2006, organic fertilizer is defined as fertilizer that consists mostly or entirely of organic materials derived from plant or animal residues that have undergone processing into solid or liquid form and are used to supply organic matter and improve the physical, chemical, and biological properties of the soil. (Minister of Agriculture Regulation, 2006).

Integrated Crop Management

Integrated crop management (ICM) is one approach to increasing rice productivity and production. This innovative approach to improving agricultural productivity and efficiency through ICM is specific location with involving participation farmers towards synergy components technology. According to the Agricultural Research and Development Agency in 2007, the principles of PTT are (a) PTT is an approach through the management of agricultural resources, land, and water, (b) utilizing agricultural technology that has been developed and applied with consideration for synergy between components of technology, (c) paying attention to the suitability of technology with the environment physical, socio-economic farmers (d) being participatory active farmers in selecting technology that is suitable for local conditions.

Integrated crop management (ICM) is an environmentally friendly agricultural model that integrates various technological components to increase crop productivity without damaging the environment. This innovative approach to increasing productivity and efficiency in farming through ICM is location-specific and involves farmer participation in the synergy between technological components (Directorate General of Food Crops, 2014).

According to Balitbangtan (2007), the principles of PTT implementation are: (i) PTT is an approach

through the management of plant, land, and water resources; (ii) PTT utilizes developed and applied agricultural technologies with consideration for synergies between technologies; (iii) PTT considers the suitability of technologies to the physical and socio-economic environment of farmers; and (iv) PTT is participatory in nature, involving the active role of farmers in selecting technologies that are suitable for local conditions.

Super Legowo Planting System

The Jajar legowo super system is an agricultural system that is environmentally friendly and applies technology for the cultivation of food crops, particularly rice in an integrated manner based on a planting distance of 2:1 in the jajar legowo system. The application of the planting system in the legowo 2:1 system with a planting distance of 25 cm x 12.5 cm x 50 cm increases the population of plants to 213,333 clumps/ha or increased by 33,3 percent compared to the 25 cm x 25 cm tile planting system with a population of 160,000 clumps per ha. The technology of jajar legowo super is specific location such as agroecosystems optimal rice fields, rice fields rain-fed, dry land dry climate, and tidal rice fields (Agricultural Research and Development Agency, 2016).

Improving The Quality And Quantity Of Agricultural Productivity

The implementation of organic farming systems has been proven to have a positive impact on soil quality. The use of organic fertilizers such as compost and green manure plays an important role in increasing the organic content of the soil, which ultimately helps improve soil structure and increase the soil's capacity to retain water.

Organic farming systems play an important role in increasing the diversity and activity of soil microorganisms. Soil microorganisms, such as bacteria, fungi, and actinomycetes, play a crucial role in the decomposition of organic matter and nutrient cycling. This microbial activity contributes

to the decomposition of organic matter, releasing essential nutrients such as nitrogen, phosphorus, and potassium, which are vital for plant growth. In addition, this process also increases the availability of organic carbon in the soil, which in turn supports microbial life (Sabrina et al., 2020).

Organic farming systems have a significant positive impact on the environment, particularly in reducing soil and water pollution and increasing biodiversity. Another advantage of organic farming systems is their ability to increase plant resistance to pests and diseases. Pretty (2018) explains that the diversity of plants and microorganisms in organic soil plays a role in building plants' natural resistance to pathogens and pests. Plants that grow in an environment with balanced microbes tend to be stronger, thereby reducing the need for synthetic pesticides. Thus, organic farming not only increases crop stability but also ensures healthier and safer agricultural products (Permatasari et al., 2018).

Several studies show that after several years of implementing organic systems, crop yields can increase significantly. This increase occurs due to improved soil fertility, better soil structure, and higher water storage capacity. In addition, more stable organic soil also helps reduce the level of erosion that often occurs on conventional farms that rely on chemical fertilizers and synthetic pesticides. Over time, healthier soil conditions create an environment that is more conducive to rice growth, thereby increasing overall agricultural productivity (Reganold & Wachter, 2016).

Conclusion

Based on the above explanation, it can be concluded that organic farming has many benefits for improving soil quality, crop yields, and a more positive environmental impact compared to conventional farming. Environmentally friendly agriculture has greater strengths than weaknesses, greater opportunities than threats, and must be socially sustainable to ensure the sustainability of future agriculture and acceptance by users, especially farmers, as well as economically improve the welfare of farmers.

Conflict of Interest: The authors declare that there is no conflict of interest regarding the publication of this article.

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