APPLICATION OF GREEN AGRICULTURE IN RURAL FARMERS IN INCREASING PRODUCTION

Ahmad Priatna*, Is Eka Herawati, Lina Asnamawati

Agribusiness Study Program, Universitas Terbuka (INDONESIA)

**Corresponding author: nengapriatna@gmail.com*

Abstract

There are various ideas about how to create sustainable agriculture in an era of climate change, rising energy costs, social unrest, financial instability, and escalating environmental degradation that supplies enough food and ecosystem services for current and future generations. A new agricultural system must have a minimum of ten characteristics, which are the hallmarks of green agriculture, in order to satisfy the demands of a quickly changing world. Finding a set of thresholds that every agricultural production strategy must meet in order to avoid unsustainable trends brought on by agricultural technology will result in a tipping point occurrence is the key difficulty. Only agricultural methods that advance rural areas by increasing production yields and technology while meeting the established threshold criteria will be regarded as a workable kind of green agriculture. It is wise to define a set of principles and boundaries of sustainability and flexible and locally adaptable resilience for the future agroecosystem because the importance of green agriculture for rural communities will increase the mindset that can bring about significant change and the diversity of ecological, socio-economic, historical, and political contexts in which rural agricultural systems will develop.

Keywords: Green Agriculture, Rural Agriculture Increase, Production Yield.

1 INTRODUCTION

Agriculture, which is one of the vital sectors in dealing with the development of the human population in Indonesia, especially providing food and employment, has serious problems, including those related to land, irrigation, seeds, fertilizers, agricultural machinery, field extension workers (farmer resources), labor, until the problems of agricultural trade system that never ends. On the labor side, farmers in Indonesia are still dominated by the older generation with an average age of over 50 years. Based on census data in 2010, the average age of farmers in Indonesia is 52 years. Furthermore, in 2013, the results of the Agricultural Census also showed that the majority of farmers in Indonesia are groups of people aged 45–54 years. This is further strengthened by the results of a survey by the Indonesian Institute of Sciences (LIPI) which shows that almost none of the children of farmers want to become farmers.

Only about 8% of youth in Indonesia aged 20-39 years are interested in becoming farmers. The rest, mostly tend to choose to work in the industrial sector. This means that the number of farmers who change occupations outside the agricultural sector is greater than the number of young people who are willing to engage in agricultural business. The decline in the interest of the younger generation in the agricultural sector is an alarm for the government to immediately find a solution to this problem. The decrease in the number of farmers will have implications for the decrease in the availability of domestic products and the erosion of employment opportunities. The reason is that agriculture is a sector that contributes to providing 40% of jobs. In addition, the government's target to make Indonesia the world's food barn by 2045 will be difficult to realize if the problem of farmer regeneration continues. In terms of land area, it was recorded that there were 87.63% or 22.9 million farming households with land ownership of less than 2 hectares. Around 5 million farmers are reported to have land area of less than 0.5 hectares. Based on these conditions, farmers cannot maximize production on their land and then becomes one of the triggers that affect the level of farmers' welfare.

BPS data (2018) shows its analysis that the conversion of paddy fields reaches 200,000 ha per year. In addition, the data also shows that the area of agricultural land in 2018 was only 7.1 million hectares, where this figure decreased compared to 2017 which was still 7.75 million hectares [13].

This agricultural problem will be able to be resolved more quickly if farmers in Indonesia are willing to make friends with the use of modern technology. So far, the use of technology in agriculture in Indonesia is still underdeveloped compared to other countries. One of the causes of the lagging behind of agriculture in Indonesia is none other than the age of farmers in Indonesia who are no longer young. On the other hand, the speed of population growth in Indonesia and the world is increasing rapidly without balancing the area of agricultural production land. Therefore, the real and reasonable solution is the strengthening of agricultural technology followed by the implementation of food diversification.

Indonesian agricultural policy has recognized the importance of implementing green agriculture practices for environmental, social and economic aspects. Most of the national green growth strategies are directed at reducing the negative impact of the agricultural sector on the environment. However, these strategies are often not carried out comprehensively and are sporadic. This causes a gap between aspirations and the application of the concept of green agriculture. This study provides an overview of the concept of green agriculture, policies and strategies related to the concept, instruments commonly used, and conditions in the field. This study aims to answer the following questions: What are the main drivers and negative impacts on environmental degradation associated with commercial agriculture? What are the main characteristics of government strategies and policies related to green agriculture? What are the mechanisms, instruments and regulations that have been and are being implemented by the government and the private sector to achieve sustainable agriculture? What are the strengths and weaknesses of existing capacities to implement green agriculture?

And finally, what are the main factors that contribute to the gap between aspirations and application in the field? The discussion focused on five main commodities based on competitiveness and their contribution to environmental and social risks, namely, rubber, coffee, cocoa, oil palm, and rice. The first four commodities have strong global market demand, thereby increasing the threat of environmental degradation but also opportunities to promote sustainable agriculture with support from the international community for sustainable commodities. Meanwhile, rice (paddy) is the staple food of the Indonesian people and has a high domestic demand.
For all these commodities, the environmental challenges faced are often accompanied by social conflicts, poverty in rural areas, and the uncertainty of livelihoods that are vulnerable to climate change and socio-political shocks.

2 METHODOLOGY

This article was created using the literature study method by collecting secondary data from the library and reading and recording information that was deemed necessary in this paper. The source of the literature used in this paper comes from data from the Central Statistics Agency, modules, journals, previous news and updated news, the Ministry of Agriculture website. This article is used to find out how important green agriculture is for increasing the production of rural farmers.

3 RESULTS AND DISCUSSION

Behind its success, it is undeniable that the green revolution also has a negative impact on the environment. The widespread use of inorganic fertilizers, pesticides, herbicides and the intensive exploitation of land in the long term brings consequences in the form of environmental damage, ranging from soil, water, air and living things. The use of synthetic chemicals has implications for the destruction of soil structure and the destruction of soil microbes so that from day to day our agricultural land is becoming increasingly critical [1]. Modern agricultural practices that are carried out unwisely result

in environmental pollution, poisoning, disease and death in living things, which in turn can lead to disaster and catastrophe [2].

Along with the increasing awareness of environmental sustainability, the green revolution has received criticism from various circles. Not only causing environmental damage due to the use of technology that does not look at the established rules, the green revolution also creates economic injustice and social inequality. Economic injustice arises because of monopolistic practices in the provision of agricultural production facilities, while social inequality occurs between farmers and communities outside farmers [3].

The existence of these dynamics encourages the emergence of ideas to develop an agricultural system that can last to the next generation and does not damage nature. In the last two decades, the concept of green agriculture has developed which is an implementation of the concept of green agriculture development. The development of green agriculture aims to increase the income and welfare of the farming community at large through an increase in agricultural production which is carried out in a balanced manner by taking into account the carrying capacity of the ecosystem so that production sustainability can be maintained in the long term by minimizing environmental damage [4].

Various studies on green agriculture have been carried out, including showing evidence that green agriculture can increase productivity higher than conventional agriculture. A study of 286 sustainable agriculture projects in 57 developing countries in Africa, Asia and the Americas between 1999 and 2000 showed an average yield increase of up to 79%. These projects apply more efficient water use techniques, increase the amount of organic matter in the soil and carbon sequestration, and control pests, weeds and plant diseases with integrated pest management techniques. In that year, it was recorded that 12.6 million farmers had adopted sustainable agricultural practices with an agricultural area of 37 million hectares or equivalent to 3% of the arable land area in Africa, Asia and Latin America [5].

Tabel 1. *The following table outlines the differences between conventional farming and Green farming.*

Conventional Agriculture	Green Agriculture
Highly dependent on the advancement of technological innovation	It really depends on the management, knowledge and skills of farmers
Requires large capital investment for production and technology development	In general, it does not require a large capital investment
A fairly large/large scale of agriculture	Small and medium scale farming
Cultivation system: monoculture	Cultivation system: diversification
Extensive use of chemical fertilizers and pesticides	Minimizing the use of chemical fertilizers and pesticides, switching them to natural fertilizers and pesticides
The costs incurred for labor wages are relatively low because only a small amount of labor is needed	Labor costs are higher because more labor is needed
High dependence on the use of fuel for energy sources in agricultural production, fertilizer production, packaging, transportation and marketing	The use of fossil fuels in the production process is relatively lower due to the minimal use of agricultural machinery, does not produce chemical fertilizers, and in its marketing, there

Conventional Agriculture	Green Agriculture
	is more emphasis on direct and local marketing (agricultural areas are close to consumers so that distribution lines are shorter than conventional farming systems).)

A study conducted by the Rodale Institute in 2011 demonstrated the advantages of organic farming, which is an example of green farming, over conventional farming. These advantages are better performance in the dry season and save 45% of energy use than conventional farming. Conventional agriculture produces 40% more greenhouse gas emissions which can exacerbate global warming. The Rodale Institute further discovered the fact that organic farming is three times more profitable than conventional farming. Data for the period 2008-2010 show that organic farming gains $1,395/hectare annually, while conventional farming earns only $475/hectare/year. Iowa State University also conducted a similar study and revealed the annual profits of organic farming are up to $500/hectare more than conventional farming. This is due to the low cost of organic farming production because it does not require the cost of purchasing synthetic pesticides and fertilizers at quite expensive prices, as well as the relatively higher prices of organic crops in the market [6].

The organic farming system is one example of how sustainable agriculture is used. Environmental protection is the main goal of the crop production technique known as organic farming. This approach does not rely on chemical inputs like pesticides and fertilizers [7]. The methods employed in organic farming are derived from sustainable farming systems that place an emphasis on the preservation and conservation of natural resources in order to maintain the ecological balance and help raise agricultural production over time. The following actions assist with sustainable agriculture [8]:

3.1 Integrated Pest Management

Plant pest control can be done in a wiser and environmentally friendly way by eliminating the use of chemical pesticides through the Integrated Pest Management (IPM) method. IPM is pest control that is carried out using natural elements that are able to control pests so that they remain at an amount below the harmful threshold [9] in ways that are safe for the environment and living things [10]. Some ways of integrated pest control are use insects or animals known as natural enemies of pests such as *Tricogama sp*. which are natural enemies of egg parasites and larval parasites of plant pests; use pest trapping plants to keep pests away from the main crop; and perform crop

rotation to prevent the accumulation of pathogens and pests that often attack only one species.

3.2 Soil Conservation

Soil conservation can be interpreted as placing each plot of land in a way of use that is in accordance with the ability of the land and treating it according to the necessary conditions so that damage does not occur and can function sustainably [11]. Soil conservation activities include making swales or terraces on sloping land to prevent erosion, reforestation or replanting critical lands, doing crop rotation and planting cover crops.

3.3 Maintain Water Quality

Maintaining and protecting water resources to maintain its quality in its natural condition is an absolute thing in agriculture. The decline in water quality will reduce the usability, productivity, and capacity of water resources which in turn will reduce the wealth of water resources. Activities that can be carried out to maintain water quality include: reducing the use of synthetic chemical compounds into the soil that can pollute groundwater, using drip irrigation which saves water and fertilizer use, planting, maintaining and soil conservation activities in critical land areas, especially upstream. watershed.

3.4 Protective Plants

Planting protection crops such as wheat and clover at the end of the harvest season for vegetables or cereals is beneficial for suppressing weed growth, preventing erosion, and improving nutrition and soil quality.

3.5 Crop Diversification

Crop diversification is a technique of growing/maintaining more than one type of crop in one area of agricultural land. This method is an alternative to reduce the risk of agricultural business failure due to extreme weather conditions, plant pest attacks, and market price fluctuations. Crop diversification can also contribute to land conservation, preserving animal habitats, and increasing populations of beneficial insects. From an economic point of view, crop diversification can increase farmers' incomes throughout the year and minimize losses due to possible failure from planting only one type of crop.

3.6 Plant Nutrition Management

Plant nutrient management is needed to improve soil conditions and protect the soil environment. This can be done by using manure and legumes as ground cover which not only fertilizes the soil but also reduces the cost of purchasing inorganic fertilizers. Several types of organic fertilizers that can be used include compost, vermicompost, and green manure (foliage).

3.7 Agroforestry (forestry)

Agroforestry is a land use system that combines seasonal and annual crops to increase profits, both economically and environmentally. This system helps to create plant diversity in an area of land to reduce the risk of failure and protect the soil from erosion and minimize the need for fertilizers from outside the land due to the recycling of crop residues [12].

4 CONCLUSIONS

Advances in agricultural science have allowed humans to manipulate entire ecosystems to fulfil their survival. Along with the rapidly growing population, the availability of natural resources has become limited in number. Water, soil and fuel are three important components that determine the survival of humans and other living things; therefore it is a must to use them as efficiently as possible. Comparison between conventional farming and green farming shows that green farming has proven advantages in terms of economic, social, and environmental aspects. Green agriculture consumes less water and energy, improves soil nutrient composition, reduces production costs, increases community participation, and is environmentally friendly. While conventional agriculture is not able to meet the world's food needs without compromising environmental sustainability. The social, economic, and environmental benefits of green farming systems are the reasons why green farming is the best way to accommodate food needs and maintain environmental sustainability, both for present and future generations.

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