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Semi-organic Rice Farming as a Transition Period to Organic Rice Farming

D. Yadi Heryadi, Betty Rofatin, Zulfikar Noormansyah
Fakultas Pertanian Universitas Siliwangi
dyadiheryadi@unsil.ac.id

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ABSTRACT

Organic rice farming aims to achieve sustainable agriculture. It considers social, economic and environmental aspects. However, in practice, farmers experience various technical and economic constraints upon converting non-organic agriculture practice to organic rice farming. The alternative method is to implement semi-organic farming as a transitional period. The purpose of this study is to review technical / production and economic aspects of non-organic, semi-organic, and organic farming. It is conducted to determine whether semi-organic farming could be utilized as a transition period to organic rice farming. The study used a survey method on 75 farmers working in non-organic, semi organic, and organic farm in Priangan Timur, West Java Province, Indonesia. Article's result exhibited that, in terms of technical cultivation / production, the majority of semi-organic farmers had carried out the stages of organic cultivation. It generated higher productivity compared to non-organic farming. However, productivity remained below organic farming. In terms of economical aspect, income per hectare and R / C value are higher than non-organic farming. However, it is below organic farming. Semi-organic farming could be used as a transition to organic farming.

Keywords*: Transition; non-organic; organic Farming*

ABSTRAK

Pertanian padi organik adalah pertanian masa depan untuk mencapai pertanian berkelanjutan yang mempertimbangkan aspek sosial, ekonomi dan lingkungan. Namun dalam prakteknya para petani mengalami berbagai kendala teknis produksi maupun ekonomis ketika beralih langsung dari pertanian anorganik ke usahatani padi organik, sehingga muncul alternatif untuk melaksanakan usahatani semiorganik sebagai masa transisi. Tujuan artikel ini adalah melakukan tinjauan aspek teknis/produksi maupun ekonomis pada usahatani anorganik, semiorganik dan organik sehingga dapat menunjukkan apakah usahatani semiorganik dapat digunakan sebagai upaya transisi petani menuju usahatani padi organik. Rancangan percobaan menggunakan metode survey terhadap 75 orang petani yang mengusahakan tiga jenis usahatani dimaksud di Priangan Timur, Provinsi Jawa Barat, Indonesia. Hasil artikel menunjukkan bahwa dari sisi teknis budidaya/produksi semiorganik mayoritas telah melaksanakan tahapan budidaya organik dengan produktivitas lebih tinggi dibanding usahatani anorganik, walaupun masih di bawah usahatani organik. Sedangkan secara ekonomis, pendapatan per hektar dan nilai R/C lebih tinggi dibanding usahatani anorganik walaupun masih di bawah usahatani padi organik. Sehingga usahatani padi semiorganik dapat menjadi alternatif bagi petani sebagai transisi menuju usahatani padi organik.

Kata kunci : Peralihan, Non-organik; usahatani organik

INTRODUCTION

Organic farming is growing rapidly in all parts of the world. The global organic market continues to grow and has exceeded 100 billion US dollars. It is supported by 2.8 million organic producers. Increased stability of organically managed agricultural land reach a total of 71.5 million hectares. Ten percent of agricultural land in 16 countries employs organic agricultural methods. In 2017, organic agriculture land was merely 50.9 million hectares owned by 2.4 million producers. More than three-quarters of producers are in developing countries. These global organic statistics exhibited the contribution of organic agriculture to sustainable development goals (Fibl, 2020; Willer and Lernoud 2017).

The growth of organic agriculture in developing countries is triggered by consumer preference for healthy food. The trend/lifestyle development ultimately drives high demand for organic products, especially from developed countries (Karki et al. 2011; Widiarta, et al. 2011). The various advantages over conventional agriculture were encouraging. Organic agriculture is capable to maintain and protect soil health, fertility, and biological characteristics. It enables ecosystems to better adapt to the effects of climate change, and increase the potential for soil carbon sequestration (Surekha et al. 2013; Pathak et 1992; Carpenter Boggs et al. 2000; Bhooshan et al. 2011). Organic agriculture increase farmer income through higher productivity and premium prices (Surekha et al. 2013; Reddy 2010). The social advantage of organic agriculture is various avoidance of hazards related to loss of arable land, water pollution, biodiversity erosion, greenhouse gas emissions, food scarcity, and pesticide poisoning which in turn develop healthy communities (Scialabba 2013). In principle, organic farming re-examine the importance of the ecological underpinnings on the existing agricultural system. Organic farming has been proposed as an important means of achieving these goals (Seufert 2012).

The growth rate of organic production depends on different factors. It varies from one country to another and from one region to another (Brodt & Schug 2008). The total area of organic farm in Indonesia in 2011 was 74,034.09 ha. In 2015, it increased by about 76 percent to 130,384.38 hectares (Willer and Lernoud 2017). In 2020, it increased to 251,630.98 ha or around 0.44 percent of the total agricultural land in Indonesia (FiBL Statistics, 2020).

In Indonesia, organic agriculture (including organic rice) is known to have many advantages and benefits. However, its development performance is relatively slow (Mayrowani 2012). This slow performance was caused by declining number of organic farmers. In 2011, there were 8,612 organic farmers. In 2015, the total organic farmers decreased to 5,789 farmers (Willer and Lernoud 2017). In East Priangan, West Java Province, the performance of organic rice development was categorized as stagnant. The trend exhibits declining performance (Heryadi and Noor 2016). Total farmers decreased by 83 percent from 2,435 people (2009) to 408 farmers (2016). The farmers return to employing non-organic/conventional farming methods. It is caused by economical barriers, certification barriers, organic requirements barriers, production and institutional barriers, and technical barriers. These factors explain 63 percent cases of organic rice farmers returning to conventional rice farming methods (Heryadi et al, 2018).

Related to production and economic constraints, the transition to organic rice farming could not be conducted in a short time to maintain productivity (Department of Food Crops, Horticulture, and Plantation, Tasikmalaya Regency, 2015). It requires a variety of preparation of different cultivation techniques which differs from conventional rice cultivation techniques. To ensure farmers

do not experience difficulties upon transitioning to organic rice farming, semi-organic farming is conducted. Semiorganic farming does not use chemical pesticides. However, it uses chemical fertilizers adhering to the recommended dosage in the Standard Operating Procedure (SOP) (Makarim and Suhartatik, 2006).

This study aimed to examine whether, in terms of economy and technical production aspects, semi-organic rice farming could be used as a transition period between organic farming and organic rice farming. It is conducted by determining the differences in farm performance components, production costs (fixed costs and variable costs), revenue, income and feasibility of non-organic, semi-organic and organic farming

METHOD

The study was conducted using a survey method on 75 farmers employing non-organic, semi-organic and organic farming in East Priangan, West Java Province, Indonesia. This region is mainly cultivating organic rice. However, there are farmers cultivating non-organic and semi-organic rice. The questionnaire was designed to obtain primary data from respondents regarding farm performance, production costs (fixed costs and variable costs) and farm productivity. Descriptive analysis is utilized to illustrate the differences between non-organic, semi-organic and organic rice farming performance. Primary data were obtained from farmers, regarding the application of non-organic, semi-organic and organic agriculture. It involved land preparation, sowing, planting, crop maintenance (weeding, fertilizing, irrigation and pest control), and harvesting.

Analysis of non-organic, semi-organic and organic rice farming is used to determine the number of production costs, revenue, and income of rice farming utilizing Suratiyah (2015)'s formula which is described as follows: a) Total production cost is the sum of total fixed costs and total variable costs, b) Total revenue is the amount of multiplication between Price and yields, c) Profit/income is the reduction in total revenue with total production costs

The R/C ratio is used to analyze feasibility. R/C ratio is a tool to measure the value of revenue received from the cost incurred. R/C is calculated by comparing total revenue with total production costs. Criteria for decision making: if the R / C is less than one then the farm is not feasible to proceed if the R / C is equal to 1 break even farm and if the R / C is more than one then the farm is profitable (Suratiyah, 2015).

RESULTS AND DISCUSSION

1. Farm Performance

The farm performance consisted of activities related to land preparation, sowing, planting, irrigation, fertilizing, pest control, and harvesting for each type of farming method as exhibited in Table 1.

Farm performance analysis results exhibited that the non-organic, semi-organic and organic systems cultivation stages are similar by principle. There are only a few different treatments as described in (Table 1) and the following descriptions:

a) Non-organic farming does not incorporate manure/compost fertilizer. Non-organic and semi-organic farming does not make a water filter.

Table 1. Comparison of Technical Stages of Non-organic, Semi-organic and Organic Rice Farming

No	Cultivation Stages	Non-organic	Semi-organic	Organic
1.	Land Preparation :			
	a. Land cultivation 1: Immersion of previously harvested Day	√	√	√
	b. Land cultivation 2: Using hoe / tractor	√	√	√
	c. Applying manure/compost	-	√	√
	d. Saturated Water level Irrigation and managing planting space	√	√	√
	e. Making a tub at the watering hole at the size of 1x2 m for a water filter	-	-	√
2.	Sowing:			
	a. Seed selection using saltwater treatment	-	√	√
	b. Seed germination in a tray	-	√	√
	c. The germination period lasts for 7-10 days	-	-	√
3.	Planting :			
	a. Seeds per planting hole: 1-2	-	-	√
	b. Planting seedlings: 7-10 days after sowing	-	-	√
	c. Horizontal planting	-	-	√
	d. Planting gap 25 x 25 cm / *jajar legowo*	-	√	√
4.	Irrigation :			
	a. Uses water filter	-	-	√
	b. Does not require the constant water level	√	√	√
	c. The saturated water level during planting	√	√	√
	d. The higher water level during weeding	√	√	√
	e. The low or dry water level during pollination	√	√	√
	f. The saturated water level at 60 DAS up to harvest period	√	√	√
5.	Fertilization :			
	a. Chemical fertilizer	√	√	-
	b. Organic fertilizer/compost, Liquid organic fertilizer	-	√	√
6.	Control of Plant-Disturbing Organisms (OPT) :			
	a. Chemical pesticides	√	-	-
	b. Organic pesticides / biological agents	-	√	√
7.	Harvest Criteria	√	√	√

Description : √ = conducted

b) Non-organic farming germination activities: a) do not conduct seed selection using saltwater treatment to separate quality seeds; b) germination is carried out in paddy fields. Semi-organic and organic farming germination process is carried out on trays/baskets; c) The duration of germination is more than 15 days before transferring seedling to rice fields. This process is conducted in semi-organic farming. In contrast, organic farming select high-quality seeds utilizing saltwater, germination carried out on a tray/baskets for 7-10 days after sowing.

c) In non-organic and semi-organic farming, planting is carried out in the following manner: 3-4 seedlings per planting hole, planted after 14 days in the seedbed, not implementing horizontal planting and uses tight spacing. Organic farming planting stage is carried out in the following manner: 1-2 seedlings per planting hole, planting seedlings 7-10 days after sowing, planting horizontally with a spacing of 25x25 cm / *jajar legowo*.

d) Non-organic farming and semi-organic farming do not use a water filter. On the other hand, organic farming requires a water filter. Other irrigation activities are similar.

e) Fertilization activities in non-organic farming rely on chemical fertilizers and pesticides. Semi-organic farming combines chemical fertilizers and organic / compost with a 35-65 percent composition. Organic

farming uses 100 percent organic fertilizer/compost.

f) Non-organic farming uses chemical pesticides for pest control. Semi-organic and organic farming use organic pesticides / biological agents.

2. Production Cost Analysis

Production costs analysis is an analysis of the accumulation of all costs incurred during the production process. It consists of fixed costs and variable costs. The details of the full production costs are exhibited in the following description.

2.1 Fixed Cost

Fixed costs are costs that do not change despite fluctuating total production. It is not affected by the size of the production activity (Nemes, 2009).

Production cost analysis on fixed costs (Table 2) exhibits different magnitude of non-organic, semi-organic, and organic farm. Land and Building Tax (PBB) depends on the class/location of the rice fields used as farming land. Tool depreciation depend on the number of tools used, the purchase cost, and the economic life. The fixed cost of capital interest depends on the amount of capital used and the prevailing bank interest at the time of the study.

2.2 Variable Cost

a) Variable costs change according to fluctuating volume/amount of production (Sullivan and Sheffrin, 2003) or depending on the size of the production.

b) The variable cost analysis (Table 3) exhibits a varied amount. The largest variable cost is incurred by organic farming compared to other types of farming.

Table 2. Average Costs Comparison of Non-organic, Semiorganic and Organic Farming

No	Fixed Cost Type	Cost (IDR/hectare)		
		Non-organic	Semi-organic	Organic
1.	Land and Building Tax	27.894,00	43.800,60	31.336,63
2.	Tool Depreciation	51.021,00	40.232,50	49.427,29
3.	Capital Interest	1.838,72	1.957,96	1.881,79
	Total Fixed Cost	80.753,72	85.991,06	82.645,71

Description : 1 US $ = IDR 15.000.-

Table 3. Average Variable Costs Comparison of Non-organic, Semi-organic and Organic Farming

No	Variable Cost Type	Cost (IDR/hectare)		
		Non-organic	Semi-organic	Organic
1.	Seed	250.162,50	201.625,00	198.965,75
2.	Fertilizer:			
	a. Chemical	832.750,12	875.654,12	-
	b. Manure / Compost	-	715.725,10	2.187.69 8,36
3.	Pesticide :			
	a. Chemical	265.201,75	508.800,12	-
	b. Organic	-	-	275.800,32
4.	Work Force	7.125.425,00	7.601.920,44	7.985.725,10
5.	Capital Interest	248.206,18	261.057,61	319.445,68
	Total Variable Cost	8.802.499,27	8.748.969,11	10.967.635,21

c) The cost of procuring seeds in organic farming is the smallest compared to other types of farming. In accordance with the organic agriculture SOP, each planting hole is planted with 1-2 seedlings. Therefore it is more efficient compared to other farms which usually plant 3-4 seedlings per planting hole.
d) The largest fertilizer usage fee is organic farming. It uses organic fertilizer/compost or other types of organic fertilizer. Semi-organic farming uses chemical and organic fertilizer at the same time. non-organic farming uses chemical fertilizers.
e) The cost of procuring pesticides varies. However, the value described does not differ in a significant manner. Non-organic farming uses chemical pesticides. Semi-organic and organic farming uses plant-based pesticides.
f) Labor costs in organic farming are greater than in other types of farming. These costs are used for all stages of organic rice cultivation and provide wages for internal (family) and external workers. This is consistent with Pimentel et al. (2005) stating that average labor input is 15 percent higher in organic agriculture compared to conventional agriculture. The higher costs of organic dairy farming was confirmed by McBride and Green (2009). On the other hand, according to Crowder and Reganold (2015); Acs et al (2007), organic agriculture has higher variable costs, specifically labor costs, but their total costs are not much higher.
g) The fixed capital interest varies and this will depend on the amount of capital used and the bank interest that applies at the time of the study.

3. Revenue, Income, and R / C Ratio Analysis

Analysis of rice farming revenue was conducted by calculating the amount of rice production multiplied by the selling price per kilogram (kg). Rice farming income is the difference between revenue and production costs. The R / C ratio is the ratio between revenue and costs used to determine the farming feasibility.

The productivity of organic rice farming is higher (4,927.35 kg GKP or Harvested Dry Grain per hectare) compared to semi-organic farming (4,818.10 kg GKP per hectare) and non-organic farming (4,806.22 kg GKP per hectare). Shrestha et al. (2014) found better economic results from vegetable organic farming. Nemes (2009) reinforced that the majority of economic studies conducted in developing countries exhibit higher results on organic production.

Table 4. Average Revenue, Income per Hectare, and Agriculture Feasibility (R / C Ratio) Comparison of Non-organic, Semi-organic, and Organic Farming

No	Description	Cost (IDR/hectare)		
		Non-organic	Semi-organic	Organic
1.	Total Fixed Cost	80.753,72	85.991,06	82.645,71
2.	Total Variable Cost	8.802.499,27	8.748.969,11	10.967.635,21
3.	Total Production Cost	8.883.252,99	8.834.960,17	11.050.280,92
4.	Production/Hectare (Kg)	4.806,22	4.818,10	4.927,35
5.	Selling Price (IDR / Kg)	4.000,00	4.000,00	6.000,00
6.	Revenue (3 x 4)	19.226.200,00	19.272.400,00	29.564.100,00
7.	Income (6-3)	10.342.947,01	10.437.439,83	18.513.819,08
8.	R/C Ratio	2,16	2,18	2,67

The selling price of organic rice reaches IDR 6,000 .- / kg GKP. Non-organic and semi-organic rice selling price is IDR 4,000 / kg GKP. This is consistent with Surekha et al. (2013); Reddy (2010); Berentsen et al. (2012) that organic farming increase farmer income through higher productivity and the possibility of obtaining premium prices. Acs et al (2007) stated that the economic results of organic agriculture are better than conventional products due to higher prices of organic products.

Based on the calculation of productivity and product selling prices, revenue figures were obtained. The largest revenue was obtained by organic farming of IDR 25,093,818.75 with a profit of IDR 18,513,819.08 per hectare. Semi-organic farm obtained IDR 16,694,425.00 with a profit of IDR 10,437,439.83 per hectare. Non-organic farming obtained IDR 16,176,435.00 with a profit of IDR 10,342,947.01 per hectare. Different revenue figures between organic, non-organic and semi-organic farming were caused by higher selling prices of organic products. The productivity figures do not show significant differences. These implied that organic farmer profits are higher compared to semi-organic and non-organic farmers. Klima and Labza (2010) stated that the organic farmer's income is higher despite lower agricultural production; Dabbert et al. (2004; De Cock (2005) stated organic farming generates higher profit, selling price, and income. Krause and Machek (2018) stated that the profitability of organic farming is highly dependent on higher product prices. However, it is generally easier for organic farming produce to sell at higher prices.

After determining the revenue figures and production costs incurred, the agriculture feasibility could be determined using the R / C calculation. R / C ratio obtained is as follows: non-organic (1.80), semi-organic (1.84) and organic (2.27). This indicates that each 1 IDR costs incurred, farmer obtain IDR 1.80; IDR 1.84 and IDR 2.27 revenue respectively. Suratiyah (2015) stated that profitable and feasible agriculture possesses R / C ration > 1.

CONCLUSION

Based on the research result, it is concluded that semi-organic rice farming could be used as an alternative for farmers as a transition period to organic rice farming, with the following considerations: :Based on the cultivation/production technique aspect, semi-organic rice farming has largely followed the technical procedures for organic rice cultivation with higher productivity compared to non-organic farming. However, productivity remains under organic farming. Farmers' income from semi-organic rice farming per hectare is higher than non-organic farming with R / C higher than R / C non-organic rice farming, although it is still below organic rice farming.

Despite research limitations, there may be a common problem faced by farmers in various other regions. For farmers to employ organic rice farming and avoiding declining productivity, it is advisable to carry out semi-organic rice farming as a transition and gradually meet the technical requirements of organic cultivation. The technical requirements are suggested specifically to meet the certification requirement to obtain premium prices. The premium prices largely contribute to organic rice farming income generation.

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