

# Analysis of Ecological Dimensions on Organic Farming of the System of Rice Intensification (SRI) (Case Study in East Luwu Regency)

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## ABSTRACT

Organic farming of the System of rice intensification (SRI) is one an approach in the practice of rice cultivation that emphasizes the management of land, plants and water management. The research aimed is to examine the ecological dimensions of organic farming–SRI in East Luwu Regency, South Sulawesi, Indonesia. This study used a case study method with a qualitative analysis approach. The results showed that the SRI pattern could improve soil quality, the formation of organic rice land zones that could be formed the production areas and agro-tourism areas, intensity of plant pests controlling that environmentally friendly, water management efficiently, and utilization of rice straw after harvest and the decrease of of chemical fertilizers utilization. The practices could be guarantees the sustainability of organic farming.

**Keywords :** Organic Farming, SRI Pattern, Ecological Dimension, Environmental Friendly

## I. INTRODUCTION

Development of sustainable agriculture had become a paradigm of agricultural development patterns implemented in the system of organic farming development. Organic farming has developed throughout the world as an alternative to inorganic agriculture.

The farming environmentally friendly, low external input, applying local wisdom (indigenous knowledge), limiting the use of chemicals both pesticides and fertilizers are the basic principles of the Systems of Rice intensification (SRI) [5]. The SRI pattern is one approach in the practice of rice cultivation that

emphasizes the management of land, plants and water management through group empowerment and local wisdom based on environmentally friendly activities [3].

The sustainability of organic farming with rice cultivation using the SRI pattern based on ecological dimensions can be seen from the following aspects: soil quality, organic rice field zone, intensity of plant disturbing organisms, water management, and utilization of rice residues after harvest and fertilizer an-organic utilization [2].

The implementation of the SRI pattern seems very ideal for environmental conditions that are very

supportive of the innovation components required in the SRI. On a small scale the SRI pattern has given a successful of the using seed efficiently, saving water use, and substituting the use of inorganic fertilizers with organic fertilizer produced by farmers themselves [3].

Associated with the phenomenon of organic agriculture in the adoption of SRI method innovations in the development of organic rice, this study will focus on the ecological dimensions of the organic farming of the SRI pattern in East Luwu Regency of South Sulawesi, Indonesia.

## II. METHODOLOGY

This research method is more specific using the case study as a strategy to answer the formulation of research problems. The case study was chosen as the strategy of this study with the consideration that the organic farming movement programmed by the Regional Government of East Luwu Regency through the involvement of various stakeholders was a unique and contemporary phenomenon [6],

The research data used is descriptive, with a qualitative approach (qualitative research) that aims to understand objects that are examined in depth and not to make generalizations, but to make an in-depth explanation of the meaning behind the object of study [4].

The stages of the research activities: (a). Collection and information from the results of interviews, field notes, documents, recordings, pictures, photos based on stakeholder mapping, (b). Reducing data with the aim to make a summary that is considered important relating to the research objectives, (c). Presentation of data is used to further improve understanding of the case and as a reference for taking action based on understanding and analysis of data presentation, (d).

Conclusion, is the result of research that answers the focus of research objectives [1,7].

## III. RESULTS AND DISCUSSIONS

### Land Quality

The quality of rice fields in East Luwu Regency has generally experienced a decrease in fertility rates due to the high use of synthetic chemicals such as pesticides, chemical fertilizers (Urea, SP36, and NPK). In general, paddy fields in East Luwu Regency are technically irrigated so that in their land use, the planting index is 200. This condition causes high utilization of synthetic materials (chemicals) in supporting production activities.

In researches [2, 8] in two study sites, that at the beginning of the implementation of the SRI pattern there was a decrease in productivity. Especially in lands that had low fertility. The decline in production in the first and second planting seasons, in the application of SRI pattern reaches 30 to 50 percent, but through continuous composting, land productivity is slowly increasing. In the fourth season for lands that are not too fertile the level of organic productivity is the same as the productivity of farming using conventional farm techniques. The determination of farmers to continue to implement SRI, even though at the beginning of the farm the yield had decreased, was driven by an understanding of healthy and sustainable farming patterns from the mentoring process by extension agents and facilitators from the "Aliksa" Foundation.

The existence of various studies showed that to improve the quality of land is needed a rice cultivation system by without chemical materials. At present, rice cultivation activities at the location of the SRI pattern were being directed towards the environmentally friendly and sustainable rice cultivation system by involving various stakeholders.

TABLE 1 THE COMPARATIVE OF PRODUCTION OF HARVESTED DRY UN-HULLED RICE ON CONVENTIONAL AND ORGANIC FARMING SYSTEMS IN EAST LUWU REGENCY.

No	Rice Cultivation System	Production	Production input
1	Conventional farming system	4 - 6 tons	Synthetic (chemical) fertilizer and herbicide
2	SRI organic farming	5 - 8 tons	Compost and vegetable pesticides

Table 1 showed that the increase of the harvested dry un-hulled rice production in conventional farming systems is lower from SRI organic farming. Increased production with the improvement of the physical, chemical and biological structure of the soil was caused by the increase in the number of tillers ranged of 30-40 tillers per clump. While the conventional pattern is ranged of 20-25 tillers per clump after farmers did above three times planting. The use of organic fertilizer by farmers, although it is still considered not maximal, ranged from 5-6 tons per ha which is actually between 8-9 tons per ha but has been able to provide and provide nutrients for crops which are characterized by an increase in production. This is what gives an indication that the SRI pattern could provide sustainability with the high interest of farmers who want to participate in this program.

**Organic rice field zone**

The farmers of the program area had implemented the SRI pattern for 1 to 3 years. In general, there has been the increase of the average productivity of 500 - 1,000

kg harvested dry grain per hectare. However, the reported production indicators of farmers still need to be studied further, especially on some measurement of area units, such as the standard area of farm land cultivated for the SRI pattern, as well as the tiling sample unit that is carried out in measuring productivity



Before the application of the SRI



after the implementation of the SRI

**Figure 1.** The Land condition of conventional farming and the application of SRI pattern in East Luwu Regency

For the sustainability of the SRI development program that used only the technological innovation. This was dominant in providing assistance was from “Aliksa” Foundation. With there was the new decision on the implementation of Corporate Social Responsibility of PT. Vale (enterprise) so directed the development of organic rice formed of regional-based. This is done in line with the results of evaluation and monitoring that the dominant problems occur in the field is a market problem where the distributors and exporters want a continuous production with a total production of 20 tons of organic rice per month.

### ***Intensity of plant disturbance organism***

The high public interest in developing this organic farming system was marked by the excess of participants in the SRI Field School. Although the school activity self-help without assistance from the "Aliksa" Foundation as a partner of PT. Vale. One reason many farmers are interested because it had compared that the intensity of pest and disease attacks on rice plants is very low. The costs incurred by farmers are very low because farmers who join the program are not justified in controlling pests and diseases using chemicals.

The farmers are accustomed to starting before planting rice before hand by taking precautions by cleaning all components that could cause pests and diseases. The principle of control that farmers do is to expel, infiltrate, provide discomfort and increase natural enemies so that no pest outbreak occurs. In addition farmers could make their own vegetable pesticides. This could be used and available around the farmer's environment.

### ***Water management***

In general, the application of the SRI pattern is more emphasized on saving patterns in water use. Significant efficiency of input is the use of irrigation water. The need for irrigation is only less water. The need for water per hectare turn decreased. This has an impact on the ability of irrigation water to irrigate rice fields. Especially in the dry season if the SRI pattern is applied on a wide scale. However, the current conditions cannot be felt because the application of the SRI is still limited and the most program locations are still scattered so that it had not impacted the extensive irrigation capacity of irrigation water.

The some areas of the SRI are be done at the locations not experienced irrigation problems so that they do not affect the fulfillment of irrigation widely. But

specifically in "Towoti" District where are two villages with irrigation water sources directly from the spring from the mountain so that it needs to deal with conservation. The condition of the farmers after the development of the SRI pattern is the problem of lack of water could be overcame, only the problem is the water regulation system. This was one aspect so that many public are interested in implementing the SRI pattern.

### ***Plant residual utilization***

The SRI pattern is able to save production facilities for wages of seeds, fertilizers and insecticides. However the SRI is more wasteful in the use of compost. If compost costs are accounted then the SRI of rice farming will generate little profit. The lack of availability of animal manure is an obstacle to the development of SRI, only the benefits at the program location are livestock assistance to farmer groups. This causes the use of compost had not been maximized.

The SRI program also changed the behavior of farmers. Especially in the utilization of rice crop residues after harvest, especially rice straw. Farmers involved in the SRI program are used to not burning their straw after harvesting. Straw is transported to the compost house to be used as raw material for fertilizer production and sometimes bought straw from the conventional farmers. With the abundance of raw materials for compost, this had a role in reducing the costs of farmers, especially in the fulfillment of fertilizer.

### ***Fertilizer utilization***

The SRI model did not recommend the use of chemical fertilizers. Without chemical use of fertilizers, it significantly reduced the cash costs of farmers although it is compensated by the use of a larger workforce in composting. If compost is valued at a market price of 500 Rupiahs per kg, then fertilizer

costs are more expensive than balanced fertilization patterns.

Based the observation from farmers after the SRI program, the use of synthetic fertilizers (Urea, SP36, ZA and NPK) became decreased. This was because the people who joined the program had not used chemical fertilizers, Even though the conventional farmers had also reduced the use of chemical fertilizers and replaced or added with organic fertilizer. The observations in the field with the high prices of chemical fertilizers affected farmers who changed their attitude, which used to be conventional rice farmers, now switched to SRI patterns.

In reference [8] the pattern of SRI farming in the study area developed in response to changes in soil and environmental ecology and the high price of chemical fertilizers. This caused the lack of use of chemical fertilizers and substituting organic fertilizer (compost) will reduce the cost of farming and maintain the ecology of the soil and the environment.

## II. CONCLUSION

Based on the ecological dimensions, the sustainability of organic farming with SRI pattern of rice cultivation in East Luwu Regency could be concluded:

- The SRI pattern can improve soil quality in the form of soil health, especially regarding sustainable chemical, physical and biological properties, the formation of organic rice land zones in the form of regional production and agro-tourism areas that can guarantee the sustainability of organic rice.
- The intensity and method of organizing organically disturbing crops in an environmentally friendly manner with ecosystems, and water management which aims to streamline water needs for crops and use of rice residues after harvest because the remaining waste is still absorbed and the use of an-

organic fertilizer is decreasing due to high usage organic fertilizer.

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