

## Production of Siam Mutiara Rice in Batu Merah Village, Lampihong District, Balangan Regency

Alfi Maulana<sup>1\*</sup>, Tuty Heiriyani<sup>2</sup>, dan Ronny Mulyawan<sup>3</sup>

<sup>1,2,3</sup>Agroekoteknologi, Fakultas Pertanian, Universitas Lambung Mangkurat, Indonesia

\*Corresponding author. Email: ronny.mulyawan@ulm.ac.id

### Abstract

*Rice (*Oryza sativa* L.) is an important food crop because it produces rice which is a staple food source, as in Indonesia rice is the main commodity in supporting people's food. One of the causes of high and low rice production is the use of appropriate fertilizers. Generally farmers only using inorganic fertilizers at doses that are not as recommended so that it often results in a decrease in rice production. This is due to the limited knowledge of farmers about fertilizer doses. This study aims to determine rice production due to the use of inorganic fertilizers in Batu Merah Village, Lampihong District, Balangan Regency. The method used in this research is descriptive quantitative. Data collection on rice production by way of surveys and questionnaires to 10 respondent farmers in the field, to determine the yield of rice production in 10 paddy fields with an average area of study area, around ( $\pm 9.7$  ha) or  $9.798 \text{ m}^2$ . The farmers used inorganic fertilizers twice, before planting with a dose of 75 kg/ha of urea, 30 kg/ha of SP-36, and 30 kg/ha of NPK fertilizer. The second fertilization when the rice plants are two months old, with a dose of 50 kg/ha of urea, 20 kg/ha of SP-36 fertilizer, and 20 kg/ha of NPK fertilizer. The yield of rice production from the research area yielded an average of around 2.99 t/ha. The main factor for high and low production results is caused by differences in the area of paddy fields owned by farmers.*

*Keywords: Inorganic Fertilizers, Local Rice Varieties, Rice Production*

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### 1. Introduction

Rice (*Oryza sativa* L.) is an important food crop because it produces rice which is a staple food source, as in Indonesia rice is the main commodity in supporting people's food. Rice as a food crop is consumed by approximately 90% of the total population of Indonesia for daily staple food [2][22].

One of the results of rice production is determined by the application of fertilizer and land area. The recommended dose of fertilizer for lowland rice plants is 250 kg Urea/ha, 100 kg SP-36/ha and 100 kg KCl/ha [1]. Based on its contribution to rice production in South Kalimantan, irrigated rice fields rank first, followed by rain-fed rice fields, tidal swamp, lebak swamp, and paddy fields [2][23].

Optimum utilization of this land accompanied by appropriate policies will be able to increase rice production in South Kalimantan. Balangan Regency has an area of 188,377 ha, with a dry land area of 188.377 ha and a paddy field area of 23.675 ha. Morphologically, the Balangan Regency area consists of mountainous areas on the East and North sides and lowlands to swamps on the West and South sides. Most of Balangan Regency's area is on a slope of 0 to 2 m which is  $130.298 \text{ km}^2$ . This means that most of the Balangan area is in a sloping area or rainfed area for agriculture. Only  $29.970 \text{ km}^2$  is located on a slope class above 40 m.

Farmers in South Kalimantan, especially in Balangan District, tend to plant Siamese rice, a local variety, in their paddy fields. Besides being cultivated for generations and suitable for their environment, they are also more expensive than superior rice. Siamese rice which is the prima donna

is Siam Mutiara rice, Siamese pearl rice compared to other types of Siamese rice such as Siam Sani, Siam Unus is indeed the most expensive, because the grains are slimmer and the color of the rice is white, shiny like pearls and the fragrance is stronger than Siamese rice. other. One of the disadvantages of local rice is its longevity and low yield [2].

Lack of farmers' knowledge about appropriate fertilization, especially in lowland rice cultivation, is also the cause of the low production. Fertilizer is an organic or inorganic substance that contains one or more nutrients with the intention of adding nutrients needed to improve growth and production. Inorganic fertilizers are essential elements for plant growth either at high or low levels. The term inorganic is generally associated with artificial fertilizers, which contain mixed nutrients and provide ionic forms of nutrients that can be absorbed by plants. To support normal plant growth, a minimum of 16 elements are needed in it and there must be 3 absolute elements, namely nitrogen, phosphorus and potassium [21][24][14].

This fertilizer is not obtained in nature, but is the result of ingredients in a factory, because inorganic fertilizers are made by humans, the nutrient content can vary and be adjusted to the needs of plants. Compared to organic fertilizers, inorganic fertilizers have the following advantages, the nutrient content in inorganic fertilizers is made precisely and several types of inorganic fertilizers can be applied directly thereby saving time. Besides having advantages, this fertilizer also has weaknesses, namely not all inorganic fertilizers contain complete elements (macro and micro). In fact, some contain only one element. In addition, the use of inorganic fertilizers must also be wise, if used incorrectly, it can trigger water pollution and disrupt the ecosystem in it, must also be in accordance with the recommended dosage and not excessive, because if excessive can cause plant death [4][15][20]. Soil fertility is the quality of the soil for farming, determined by the physical, chemical and biological properties of the soil. The diversity of soil composition, especially soil chemistry, is able to support agricultural commodities with the availability of nutrients in the soil so that there is soil called fertile soil and vice versa [6][8][19]. Based on this, research was conducted on rice production due to the use of inorganic fertilizers in Batu Merah Village, Lampihong District, Balangan Regency

## **2. Materials and Methods**

The implementation of this research was carried out in June 2021. The method used in this research is descriptive quantitative research. Conduct field surveys and conduct direct interviews with 10 Siam Mutiara rice farmer respondents, in order to find out rice production due to the use of inorganic fertilizers in Batu Merah Village, Lampihong District, Balangan Regency. The data that has been obtained is presented in the form of tables or figures then the data is described.

Implementation in this research begins with field survey research. The survey was conducted to find rice farmers who use inorganic fertilizers with the same type of rice (Siam Mutiara), total area rice production 10 ha and have 10 years of farming experience in Batu Merah Village, Lampihong District, Balangan Regency. Sample code SR (Soil Ricefield) 1 to 10 for each rice production area taken in the field.

Data collection uses methods through direct activities to the field to identify the agricultural land of farmers who cultivate paddy rice by using inorganic fertilizers on their paddy fields. In this study, researchers took an approach to collect primary data and secondary data as follows:

### **a. Primary data.**

The data was taken directly using a survey method of 10 selected lowland rice farmers, by conducting direct interviews with respondents (farmers), who used inorganic fertilizers at the time of fertilization, to find out the yield of rice production on their paddy fields.

### **b. Secondary Data**

Data obtained or collected by researchers from existing sources. Such as the Agriculture Office of Balangan Regency and secondary data taken include: land area, production, fertilization.

Data processing. The research data are tabulated in the Microsoft Excel 2010 application, then presented in the form of tables or figures. Furthermore, data interpretation of rice production and soil fertility is carried out.

### **3. Result and Discussion**

#### **Research Location Characteristics**

In South Kalimantan, the area of paddy harvested land in 2018 was around 582.702 ha. Topographically, Balangan Regency is mostly plains/mountain areas. The water area consists of 3.026 ha of swamps and 5.537 ha of rivers. There is one small sub-district in this district, namely, Lampihong District, its area is around 96.96 Km<sup>2</sup>. Rice production in Batu Merah Village, Lampihong District, Balangan Regency, relies on rice cultivated on rain-fed land, because the area is surrounded by mountains. a total of 27 villages in this sub-district, the majority of farmers plant the local Siam Mutiara variety in their fields. Siamese pearl rice is the most expensive compared to other Siamese rice, because the grain is slimmer, the color of the rice is shiny white like pearls and the fragrance is stronger.

Farmers in Batu Merah Village, Lampihong District, Balangan District, explained their land area in the local language, such as (Borong), for example, the area of land owned (30 Borong) which means 1 ha or 10.000 m<sup>2</sup> and some farmers who have Paddy fields are limited or not up to 1 ha, for example (15 wholesale) which means half a ha. It was also explained that rice paddy fields per (1 wholesale) produce about ( $\pm$  100 kg DGH) dry grain harvest, which means that in an area of 30 (borong) or 1 ha, it produces around ( $\pm$  3.000 kg DGH) or 3 t / ha, in order to facilitate calculations, the author takes the scale of hectares (ha) or square meters (m<sup>2</sup>). The highest production yield was in the SR 3 sample code, which produced 9 t / 3 ha of rice production, while the SR 9 & SR 10 sample codes were lower, producing around 1.5 t / 0.50 ha of rice land, in the area of paddy fields.

Based on research field survey information, in Batu Merah Village, Lampihong District, Balangan Regency, South Kalimantan, it was conducted on 10 rice farmers' paddy fields with an average study area of around 10 ha. The main factor is high and low production yields, due to the different paddy fields owned by rice farmers, seen in the SR 3 sample code research paddy fields which have the highest rice production yields because the land area is the largest. This is because the rice fields of the respondents whose soil samples were taken in this study are located close together, the process of cultivating the land, planting to harvesting is almost the same.

The farmers used inorganic fertilizers twice, after land preparation or before planting with a dose of 75 kg/ha of urea, 30 kg/ha of SP-36, and 30 kg/ha of NPK fertilizer. The second fertilization is done when the rice plants are two months old with a dose of 50 kg/ha of urea, 20 kg/ha of SP-36, and 20 kg/ha of NPK fertilizer. The method of fertilization is by spreading and (*tugal*) on paddy fields. Another source, the low yield of rice production may be due to agricultural systems that have not been maximized, such as fertilization, water control, pest and disease management, which are expected to increase rice production.

The fertilization process carried out by farmers tends to be not optimal or not in accordance with the recommended dosage for the use of inorganic fertilizers. Fertilizer application to rice plants on an area of 1 ha, generally requires 300 kg of Urea (Nitrogen), 100 kg of SP-36 (Phosphorus) and 100 kg of KCl (Potassium) [7]. Farmers only apply fertilizer once so that a lot of nutrients will be leached or evaporated from the land. Rice plants require a lot of N nutrients compared to P or K nutrients. Urea fertilizer application needs to be done 3 times, so that N fertilizer is more efficiently absorbed by rice plants. While KCl fertilization is done 2 times, so that the grain filling process

becomes better. Factors influence the success of plant cultivation, namely the application of fertilization time and how large the number of doses is given to plants, the effect of one element on yields is that it can increase production yields [3][12][13].

### **Rice Production Data Information**

Based on Table 1, the results of rice production from the area of land that has been converted, Siam Mutiara rice production at the study site resulted in an average rice production of around 2.99 t/ha. The results of the survey at the research location, from 10 rice paddy farmer respondents, their rice production has not met optimal results.

Compared to the place of origin of Siam Mutiara rice, from Anjir Pasar Village, Barito Kuala District, the rice production yields obtained in Batu Merah Village, Lampihong District are lower. Local rice production for 1 hectare is around 4 tons while superior rice is around 7 tons per hectare. This type of rice is suitable for planting in Anjir District, if planted outside Anjir District the results will be different, both in taste and grain shape [2]

Tabel 1. Information on Farmers' Land in Lampihong Village

No.	Sampel Code	Name	Land Area (ha)	Types of Inorganic Fertilizers and Fertilization Doses			Rice Production Harvested Dry Grain (t/ha)
				Urea (Kg/ha)	SP-36 (Kg/ha)	NPK (Kg/ha)	
1	SR 1	Faturrahman	1 ha	125 kg	50 kg	50 kg	3 t / ha
2	SR 2	Suriansyah	0.67 ha	84 kg	33.85 kg	33.5 kg	2.98 t / ha
3	SR 3	Hormansyah	3 ha	375 kg	150 kg	150 kg	3 t / ha
4	SR 4	Khairani	0.44 ha	43 kg	22.2 kg	22.2 kg	2.95 t / ha
5	SR 5	Supian Suri	1 ha	125 kg	50 kg	50 kg	3 t / ha
6	SR 6	Effendi	1 ha	125 kg	50 kg	50 kg	3 t / ha
7	SR 7	Tamjidillah	1 ha	125 kg	50 kg	50 kg	3 t / ha
8	SR 8	Husni Nafarin	0.67 ha	84 kg	33.85 kg	33.85 kg	2.98 t / ha
9	SR 9	Syaiful Anwar	0.50 ha	63 kg	25 kg	25 kg	3 t / ha
10	SR 10	Muhammad Aini	0.50 ha	63 kg	25 kg	25 kg	3 t / ha
Average			0.97 ha	121.2 kg	48.99 kg	48.99 kg	2.99 t / ha

Nitrogen, Phosphorus and Potassium nutrients are the main factors in supporting lowland rice productivity. The response of rice to nitrogen, phosphorus and potassium is influenced by several factors, one of which is the use of organic matter. High organic matter content will affect nutrient mineralization through microorganism activities [11]. Organic matter is the main key in increasing soil productivity and fertilization efficiency. In addition, the use of lime in neutralizing soil acidity is also a factor that must be considered. Therefore, in plant cultivation, it is necessary to apply the right dosage and time of fertilization. The addition or proper management of organic matter in rice planting will improve soil health which will have an impact on increasing the productivity of rice plants. The addition of lime at the beginning of tillage is also the key to the success of a crop cultivation, especially in rice [5][9][18]. In addition, other factors such as water management are also important in this study, because for irrigation all the sampled farmers only use pump irrigation which has not been running optimally and tends to also maximize rainfall. Utilization of irrigation [15][17].

Most of the farmers in Batu Merah Village, Lampihong District, Balangan Regency, still use the traditional farming system, especially with close spacing of 15 x 15 cm or 20 x 20 cm. In addition, farmers also use a farming system by means of a shifting system. This system is by planting seeds in small plots or using containers, after the age of the seedlings ( $\pm$  21 days) after that, the seeds are

transferred to the fields. It is believed that this cropping system does not require many special requirements, but also does not have many risks. However, the seeds used are relatively large. This cropping system tends to produce low productivity because the population of the plants planted cannot be counted, making it difficult to determine the exact fertilizer requirement according to the recommended dosage.

The use of spacing is basically giving the possibility of plants to grow well without experiencing a lot of competition in terms of taking water, nutrients and sunlight. At the research location, most farmers use a spacing of 10 cm - 20 cm. Plant spacing in rice cultivation with a transplanting system is one of the most important production factors as a determinant of achieving increased production. With very dense spacing, production costs increase and if the plant population is very wide, it decreases, eventually resulting in decreased crop yields [10][16][25].

#### 4. Conclusion

Siam Mutiara rice production in the study area on average ( $\pm 9.7$  ha) produces around 2.93 t/ha Siam Mutiara rice, so Siam Mutiara rice production is low and not optimal in paddy fields in Batu Merah Village, Lampihong District, Balangan Regency, due to the low knowledge of farmers in land management and cropping systems that can be used by farmers in determining the appropriate dose of organic fertilizer use.

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