

Application of Balanced Fertilization to Rice Farmers in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency

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ABSTRACT

Soil fertility depletion due to the use of chemical fertilizers is one of the causes of low productivity of rice plants. The purpose of this study is to determine the application of balanced fertilization to rice farmers in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency, and to design an empowerment design that supports the implementation of a balanced fertilization system. This research was carried out from January to June 2024 in Darat Sawah Ulu Village, Seginim District, Bengkulu Province. This study uses a quantitative descriptive approach with a survey method using a questionnaire as an instrument used in the research. The sample used was 40 respondents. The level of balanced fertilization application in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency is in the high category with the average percentage of 5 correct application is 77.214%. Agricultural extension workers need to provide assistance to maintain the sustainability of the implementation of this highly balanced fertilizer with appropriate programs.

Keyword: application, balanced fertilization, rice

INTRODUCTION

Land degradation is a temporary or long-term decrease in land efficiency (Wahyunto et al. 2014). Land degradation will have a direct impact on the environment and the socio-economic conditions of local communities. The losses caused by the decline in land value are enormous, reaching \$490 billion annually, and have an impact on the welfare and employment of about 1.5 billion people (or about 20% of the total population) (Dooley et al. 2015). This condition will reduce the gross domestic product of the agricultural sector around the world by 3-7%. The causes of the decline in soil value are disintegration, loss of additives and natural materials, accumulation of salts in the root area (salinization), accumulation of toxic mixtures from human activity. Improper

policies in the agricultural sector, monoculture cultivation, excessive use of fertilizers and pesticides, and agricultural activities on slopes that result in soil erosion can also contribute to land degradation (Dooley et al. 2015; Wahyunto et al. 2014).

According to Wahyunto (2014), land degradation has an impact on 48.2 million ha or 25.1% of Indonesia's territory and is included in the category of heavily degraded land. Meanwhile, based on BPS information (2018), 9.45 million ha of severely damaged land and 4.55 million ha of damaged land with a total area of 14.01 million ha. Chemical fertilizer adhesive residues that change the physical, chemical, and biological properties of the soil are one of the factors causing the excessive

use of chemical fertilizers, thereby contributing to land degradation. Organic matter in the soil provides the energy and nutrients needed by microorganisms to grow and develop (Susanti, et al. 2019). The consequence that occurs if the natural material of the soil is reduced is that the level of soil fertility will decrease, this is because there is no decay and mineralization process because microorganisms need nutrients (Putra, et al. 2017). Soil microorganisms are an important part of the biological system that plays a role in the process of decay and ionization of soil organic matter and compost materials, so that organic matter is available to plants. With a decrease in the number of bacteria living in the soil, the amount of fertilizer available will decrease, regardless of whether the portion of manure material is expanded to increase the nutrient levels in the soil, this is because the supplements in the artificial compost can not be ionized. However, in reality, in the field, the use of synthetic compost is getting bigger with a larger portion, so that there will be the development of materials that cannot be consumed by plants in large quantities. This will have an impact on reducing the amount of production, especially for swamp rice farmers.

Farmers have made efforts to increase rice production, especially paddy rice, by using superior varieties and the use of various recommended fertilizers. According to Effendy and Badri (2020), the use of fertilizers, especially inorganic fertilizers, is often uncontrolled, resulting in excessive doses that are detrimental to soil biology and texture. One of the recommended efforts to reduce this impact is the use and use of balanced fertilizers. However, most farmers (86.25%) are still in the medium classification in innovating the use of balanced fertilizers. Based on

research by Effendy and Sudiro in Ciamis (2020), a similar study also shows that the reason why the development of customized preparations has not been fully carried out by farmers. The idea behind balanced fertilization is to ensure that the soil has enough of the necessary nutrients in a balanced manner. The purpose of proper preparation is to improve the efficiency and quality of agricultural products, increase fertility efficiency, increase maturity and management, and prevent crop damage and environmental pollution. Fertilizers do not all settle through soil testing as indicated by the status of dosing and plant needs. The use of organic matter and biofertilizers to maintain inorganic fertilizers can prevent land degradation while improving its efficiency and effectiveness.

The application of balanced fertilizers must be adjusted to soil nutrient conditions as well as rice productivity and varieties. Counseling on balanced fertilization has been carried out, but implementation in the field is still not optimal.

According to data from the 2022 Village Program, Darat Sawah Ulu Village has a population of 1037 people from 328 families. The area of rice fields of 167 ha consists of 80 ha of technical irrigation paddy fields and 87 ha of semi-technical irrigated paddy fields with an average rice production of approximately 5-5.5 tons/ha. With the majority of work as rice farmers, the implementation of proper fertilization is very important to improve soil conditions so that it can increase rice productivity. This study seeks to determine the application of balanced fertilization to rice farmers (*oryza sativa* L) in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency so that it can be improved and improved sustainably

MATERIAL AND METHODS

The research was carried out from January 2024 to June 2024 in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency. The research population is a farmer group in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency. The population comes from eight farmer groups. Sampling was carried out by simple

random sampling. The sample taken is 15% of the total number of existing populations. If the number of farmer population is more than one hundred people, sampling is carried out with the sampling procedure referring to the procedure put forward by Arikunto (2017), that if the population is more than one hundred people, samples can be taken between

10% to 25% and if the population is equal to or less than a hundred people, all must be taken. Based on these considerations, in this study, from 160 active members of the population in the farmer group in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency, a sample of 25% was determined, namely 40 farmers. Data collection is carried out using questionnaires which are then analyzed using descriptive analysis techniques,

according to Sugiyono (2018), statistics is a tool to analyze data by describing or explaining data that has been obtained without the purpose of drawing conclusions or broad generalizations.

The level of application of balanced fertilization is categorized as follows:

- High = > 66,66%
- Medium = 33,33% - 66,66%
- Low = < 33,33

RESULTS AND DISCUSSION

Characteristics of Respondents by Age

Characteristics of respondents by age can be seen in Table 1.

Table 1. Characteristics of Farmers Based on Age.

No	Categories	Number of farmers	Percentage (%)
Age (year)			
1	20 - 40	7	17,5
2	41 - 60	31	77,5
3	61 - 80	2	5
Jumlah		40	100

Source: Primary data processing (2024)

Based on Table 1, the age of farmers is still in the productive age. According to the Ministry of Health of the Republic of Indonesia (2011), the age of 15-64 years is the productive age. The age of farmers who are still productive makes these farmers able to carry out their farming activities better and more optimally. According to Effendy &

Yunika (2020), the application of cultivation according to the applicable system is influenced by the age factor, so that with a productive age, farmers will easily accept and adopt and implement agricultural innovations. This is also in line with research conducted by Afifah et al., (2021) that age is a factor that can affect farmers in implementing certain agricultural systems.

Characteristics of Respondents Based on Length of Farming.

The characteristics of respondents based on the length of farming can be seen in Table 2. Tabel 2.

Table 2. Characteristics of Farmers Based on Length of Farming.

No	Categories	Number of farmers	Percentage (%)
Length of Farming (years)			
1	1 - 20	14	35
2	21 - 40	24	60
3	41 - 60	2	5
Sum		40	100

Source: Primary data processing (2024)

Based on Table 2. It can be known that most farmers have been cultivating rice paddy for 21-40 years. The length of experience of farmers in rice

farming provides knowledge and skills regarding the application of a balanced rice fertilization system. Long farming experience has an impact on making the right decisions and provides farmers

with knowledge and skills to increase the yield and number of paddy rice harvests (Prajatino, 2021). The experience of rice cultivation is obtained from the hereditary habit of using natural materials in carrying out cultivation activities. This is also in

line with research conducted by Afifah (2021) that farmers who have been farming paddy fields for a long time will find it easier to implement a system or innovatio

Characteristics of Respondents Based on Education Level

The characteristics of respondents at the education level can be seen in Table 3.

Table 3. Characteristics of Farmers Based on Education Level.

No	Categories	Number of People	Percentage (%)
Tingkat Pendidikan			
1	College	-	-
2	High Scholl	19	47,5
3	Elementery School	9	22,5
4	Prumary School	12	30
Jumlah		40	100

Source: Primary data processing (2024)

Based on Table 3. It can be known that the highest formal education of farmers is at the upper secondary education level. The farmers in this study have the highest level of education at the high school level, but there are still farmers with elementary and junior high school education which if combined the number is still above 50%. Lack of awareness about the importance of formal **Proper Application Rate of Balanced Fertilization Type**

The level of application of the right variable of the type of balanced fertilization in rice farmers (*Oryza sativa* L) in Darat Sawah Ulu Village, Seginim

education and economic circumstances make the level of formal education low. This is in line with Prajatino et al., (2021) that the low formal education of farmers in implementing agriculture is due to their inability to bear the cost of learning and lack of awareness of formal education. With a low level of education, it will affect the level of application of farmers and lack of appetite mencoba teknologi dan inovasi baru.

District, South Bengkulu Regency based on the results of the study using a questionnaire obtained the following data :

Table 4. Levels Application of Balanced Fertilization Types.

No.	Variable	Average	Note
Exact Type			
1.	Farmers carry out complete fertilization including N, P and K	72 %	High
2.	Farmers fertilize according to soil type	69,125 %	High
Average		70,56 %	High

Source; Primary data (2024)

Based on the data above, the results were obtained that the level of application of the right type of balanced fertilization was at the level of 70.56%. This indicates that farmers in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency have understood the selection and application of the appropriate type of fertilizer,

because fertilizers that are suitable for the type needed by plants can have an impact on the yield of the crop in accordance with the statement of Fitriani (2022) with the application of fertilization in accordance with the type of soil and plants, it is expected according to the soil nutrient status, then the needs of plants and yield targets can be achieved.

Correct Application Rate of Balanced Fertilization Dosage

The level of application of the right variable of balanced fertilization dose in rice farmers (*Oryza sativa* L) in Darat Sawah Ulu Village, Seginim

District, South Bengkulu Regency based on the results of the study using a questionnaire obtained the following data:

Table 5. Level of Correct Application of Balanced Fertilizer Doses

No.	Variable	Average	Note
Right Dosage			
1.	Farmers fertilize with the composition N/P/K (5/1/1) in accordance with the recommendations of Minister of Agriculture Regulation No.13 of 2022	65 %	Medium
Average		65 %	Medium

Source: Primary data (2024)

Based on the data above, the results were obtained that the level of correct application of the balanced fertilization dose in the appropriate and very appropriate answers was at the level of 65%. This indicates that farmers in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency still do not understand the application of fertilizer doses in accordance with the provisions of Ministerial Regulation No. 13 of 2022 that for the Bengkulu Province area, South Bengkulu Regency, Seginim District in accordance with geographical conditions and soil structure, the recommended

dose is 250 kg N, 50 kg P, 50 kg K. The application of fertilizer in accordance with the dosage greatly affects plants, this is in line with the statement of Rangga (2017) which states that fertilizer dosage plays a very important role in plant growth and plant resistance to disease. Fertilizing according to the recommended dosage is very little paid attention because of the lack of knowledge of farmers regarding the dangers of land degradation, crop damage due to fertilizer overdose, and the calculation of the recommended dosage of plants is too complicated for farmers (Kesuma, 2022).

Timely Application Rate of Balanced Fertilization

The level of timely application of balanced fertilization variables in paddy rice farmers (*Oryza*

sativa L) in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency based on the results of the study using a questionnaire obtained the following data:

Table 6. Rate of Timely Application of Balanced Fertilization

No.	Variabel	Average	Note
On Time			
1.	Farmers fertilize three times	78,25 %	High
	a. The first fertilization is on the 7th to 10th day after planting		
	b. Second fertilization on days 15 to 21 after planting		
	c. The third fertilization is on the 35th to 40th day after planting		
2.	Farmers fertilize in the morning	79,20 %	High
3.	Fertilization is done when the weather is hot	79,43 %	High
Average		78,96 %	High

Source: Primary data (2024)

Based on the data above, the results were obtained that the level of timely application of balanced fertilization was at an average level of 78.96%. This indicates that farmers in Darat Sawah Ulu

Village, Seginim District, South Bengkulu Regency have applied fertilizers in accordance with the right time. The application of fertilizer in accordance with the set time is also inseparable

from other supporting factors such as the availability of fertilizer, this is stated by Lubis (2011) the success of timely fertilization is highly determined by logistics (fertilizer procurement), garden infrastructure, transportation facilities, fertilizer dosage, as well as the skills of fertilizer sowers and weather conditions. According to Yahya (2018), the scarce availability of fertilizer

Precise Application Rate of Balanced Fertilization Form

The level of application of the right variable form of Balanced Fertilization in Paddy Rice Farmers

for farmers is the reason for the provision of basic fertilizers, the first and second follow-up fertilizers are not on time. As for the components of the correct shape and the right way of application, the whole farmer fertilizes in the right way, namely through the process of spreading evenly over the entire planting area.

(*Oryza sativa* L) in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency based on the results of the research using a questionnaire, the following data were obtained:

Table 7. Level of Appropriate Application of Balanced Fertilization Forms

No.	Variable	Average	Note
Application of Balanced Fertilization Forms			
1.	Farmers use granular fertilizer on dry rice fields	80,15 %	High
2.	Farmers use liquid fertilizer on swampy rice fields prone to flooding	82, 20 %	High
Average		81,17 %	High

Source: Primary data (2024)

Based on the data above, the results were obtained that the level of application of the right form of balanced fertilization was at an average level of 81.17%. This indicates that farmers in Darat Sawah Ulu Village, Seginim District, South Bengkulu

Regency have applied fertilizers in accordance with the right form. Because Darat Sawah Ulu Village is an area with little rainfall so there are no flood-prone rice fields in this area, this is what causes farmers to mostly only use granular fertilizer

The Right Application Rate of Balanced Fertilization

The level of application of the right variable method of balanced fertilization in Paddy Rice Farmers (*Oryza sativa* L) in Darat Sawah Ulu

Village, Seginim District, South Bengkulu Regency based on the results of the research using a questionnaire, the following data were obtained:

Table 8. Level of Appropriate Application of Balanced Fertilization Method.

No.	Variable	Average	Note
The Right Use			
1.	Farmers use N fertilizer alone without mixing it with other fertilizers	90,8 %	High
2.	Farmers mix P, K fertilizer evenly before applying	90,1 %	High
3.	The way to apply granular fertilizer is to spread it evenly	89, 25 %	High
4.	How to apply liquid fertilizer evenly by spraying	91,4 %	High
Average		90,38 %	High

Source: Primary data (2024)

Based on the data above, the results were obtained that the level of proper application of balanced fertilization methods was at an average level of

90.38%. This indicates that farmers in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency have applied fertilizer in the right way.

This is inseparable from the role of agricultural extension workers on duty in this area who have provided training on the correct way to fertilize. According to Sehar (2022), counseling related to the right way of fertilization has been carried out

for a long time and is a priority material to be counseled to farmers to implement balanced fertilization.

Based on the data above, the data can be concluded as follows:

Table 9. Level of Application of Balanced Fertilization

No.	Five Role	Percentage (%)	Note
1	Exactly the kind	70,56	High
2	Right dose	65	Medium
3	On time	78,96	High
4	Exact shape	81,17	High
5	Exactly the way	90,38	High
Average		77,214	High

Source: Primary data (2024)

Based on the research data, it is known that the level of application of balanced fertilization is in the high category with an average percentage rate of 77.214%. In the field, it was found that the high level of application was influenced by the role of agricultural extension workers in empowering

farmers in assisting the implementation of a balanced fertilization system for paddy fields.

In the correct application of doses, this is due to the lack of socialization and availability of appropriate dose measurement tools so that farmers only design the doses used.

CONCLUSION

The level of Balanced Fertilization Application in Darat Sawah Ulu Village, Seginim District, South Bengkulu Regency is in the high category with the average percentage of 5 correct application is 77.214%.

Agricultural extension workers need to provide assistance to maintain the sustainability of the implementation of this highly balanced fertilizer with appropriate programs

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