

# Level Knowledge of Farmers on The Implementation of Balanced Fertilizer; Ratio of Fertilizer to Land Area for Increasing Production

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Received: July 30, 2023

Revised: September 18, 2023

Accepted: September 25, 2023

Published: September 30, 2023

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DOI: [10.29303/jppipa.v9i9.5116](https://doi.org/10.29303/jppipa.v9i9.5116)

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**Abstract:** The nature of farmers' dependence on chemical fertilizers or inorganic fertilizers makes farmers even more helpless when subsidized fertilizers are scarce. The agricultural system in Central Lombok is mostly rainfed, because this area is classified as a tropical area. The research location is in Masjuring Village, West Sub-District, Central Lombok Regency, West Nusa Tenggara which will be carried out for 8 months, namely from November 2022-June 2023, the data comes from primary and secondary data. The research results were analyzed using SPSS Version 21 analysis which showed that the majority of farmers were very supportive of research activities because they received great benefits in carrying out farming activities. Prior to the implementation of the research activities, the majority of farmers had low knowledge of balanced fertilizers, both the concept, purpose and benefits of applying balanced fertilizers which were in ranges 2 and 3, namely they did not know and did not know and after the activity there was an increase in knowledge related to the effectiveness of program implementation. will be applied. Based on the results of the Spearman rank test using SPSS, it is known that the significance value or sig (2-tailed) is 0.0380 because the sig (2-tailed) value is  $0.0380 < 0.005$ , which means that there is a significant relationship between the knowledge level of farmers and the effectiveness of fertilizer application. balanced. The higher the farmer's knowledge of various aspects related to the program, the higher the farmer's awareness of the benefits of the program.

**Keywords:** Farmers; Fertilizer; Increasing Production; Land Area; Level Knowledge

## Introduction

Indonesia is an agrarian country, with most of the population making a living as farmers (Rozaki et al., 2021). The plant that is widely cultivated by farmers in Indonesia is rice (Dwiningsih & Alkahtani, 2022; Hidayat et al., 2020). Paddy which produces rice is a staple food that is needed by the people of Indonesia (Fatimah et al., 2020). Therefore, rice as a producer of rice must receive good attention regarding land, seeds, fertilizers, cultivation methods and post-harvest. Applying fertilizer to plants can accelerate growth and increase production (J. Chen et al., 2020; Shaji et al., 2021; Wang et al., 2020). The use of fertilizers directed at

applying balanced and organic fertilizers according to recommendations needs to be supported by providing access to obtain fertilizers at affordable prices (Villalobos et al., 2020).

Central Lombok is a district dominated by the agricultural sector (Alfian et al., 2022; Ninggrat et al., 2022). The economy of the people of central Lombok still depends on agricultural products ranging from food crops to plantations (Ayu et al., 2022; Ninggrat et al., 2022; Wiryono & Johari, 2023). Central Lombok Regency with an area of 120,839 Ha, of 79% or 95,214 ha of land used for agriculture, more than half or 54% is paddy fields, the remainder is divided into 23% forest

## How to Cite:

Herdiana, H., & Hermawan, Y. (2023). Level Knowledge of Farmers on The Implementation of Balanced Fertilizer; Ratio of Fertilizer to Land Area for Increasing Production. *Jurnal Penelitian Pendidikan IPA*, 9(9), 7280–7287. <https://doi.org/10.29303/jppipa.v9i9.5116>

respectively, 19% fields and gardens, ponds/ empang 2% and last pond under 1%.

The area of rice fields in Central Lombok Regency reaches 54,562 ha (Ayu et al., 2021), consisting of: Technical Irrigation (20,087 ha), Simple Irrigation (2,985 ha), Irrigation ½ Technical Irrigation Rural/Non PU - Rain Fist 19,033 ha. : 540 ha, 11,917 ha. The agricultural system in Central Lombok is mostly rainfed, because this area is classified as a tropical area (Ayu et al., 2023).

Masjuring Village is a new village resulting from the division of Bonder Village which is included in the Praya Barat sub-district area. In general, people in this area have a livelihood as farmers. Because the Masjuring village area is classified as tropical and the rainfed farming system with the main crop planted is rice with rice planting activities once a year (Abbruzzini et al., 2021), the farmers in this area have to look for additional work to meet their needs (Lanuhu & others, 2021).

## Method

### Research Area Determination Method

The determination of the research area was carried out purposively, namely deliberately, by choosing Masjuring village as the research location, namely conducting a case study on the "Sambang Paer" farmer group on the grounds that this farmer group was an active farmer group with 51 members. This research will be conducted for 8 months, from November 2022 - June 2023.

### Sampling method

In this study the method of determining the sample using the Accidental method (tracing) (Qiu et al., 2020). This accidental sample method is a sample taken from an active group. The research sample was taken using this method from lowland rice farmers (Mutakin et al., 2021) in Masjuring village. The number of farmers who were sampled in this study were 51 farmers who were members of the Sambang Paer Farmer Group in Masjuring Village.

### Data analysis method

The data collected in this study are secondary data and primary data (Ruggiano & Perry, 2019). Farmer's knowledge level (Var X) on the use of balanced fertilizer, namely between the ratio of fertilizer to land area (Yu et al., 2023). consisting of 4 questions) and benefits (consisting of 3 questions) each of which is measured using a score with a scale of 5-1 (Totally don't know, don't know, don't know, know and really know) is measured from the score, namely very don't know for score range 1-17; don't know for a score range of 18-41; do not know for the range of scores 46-65; Know for a score range of 66-90 and very Know for scores 91-100.

While the Y variable (Var Y) in this study is the effectiveness of balanced fertilizer application measured from indicators of the level of knowledge (Expósito & Velasco, 2020), control and supervision of balanced fertilizer use between the ratio and land area which will have an impact on increasing productivity (Ji et al., 2023; Lim et al., 2023) in accordance with the principle of 5 precise indicators, namely: the aspect of the right type (consisting of 3 questions), aspects of the right dose (consisting of 2 questions), aspects of the right place (consisting of 3 questions), aspects of the right time (consisting of 3 questions), exact method (consisting of 3 questions) Farmers' understanding of the application Balanced fertilizers were analyzed descriptively, while the relationship between farmer knowledge and the effectiveness of applying balanced fertilizers used the Rank Spearman SPSS Correlation Version 21 (Listiana et al., 2021; Zhang et al., 2021).

## Result and Discussion

### *The Level of Farmers' Knowledge of the Application of Balanced Fertilizers by Paying Attention to the Ratio of Fertilizer to the Area of the Land*

The level of knowledge of farmers regarding the application of balanced fertilizers is still lacking because they do not receive information and guidance (Chi et al., 2022). For more details, see the Table 1.

**Table 1.** Distribution of Respondents Based on the Level of Farmers' Knowledge of the Ratio of Fertilizer Use to Land Area Before the Research Implementatio

Knowledge Category	Level	Range	Amount	Percentage
Very Ignorant		1 - 17	5	9.8
Don't know		18-41	12	23.5
Do not know		42-65	26	51.0
Know		66-90	8	15.7
Very know		91-100	0	0.0
Total			51	100

Table 1 shows that the distribution of respondents based on the level of farmers' knowledge of the ratio of fertilizer use to land area, namely 51.0%, is in the uninformed category, meaning that farmers have basically received information about the benefits of using balanced fertilizers but do not have sufficient understanding to apply them. This is due to the lack of socialization and guidance from related institutions, be it from groups, villages, extension workers and others.

*Knowledge of Balanced Fertilizer Application based on 5 indicators, namely scope, fertilization concept, objectives and benefits prior to research*

Based on the results of in-depth interviews using a questionnaire by focusing questions on 5 scopes, the

concept of fertilization, objectives and benefits with the spread of the frequency of respondents to questions on each indicator.

**Table 2.** Frequency distribution of farmers per indicator in the variable Knowledge of the ratio of fertilizer use by area with indicators of scope, concept of fertilization, objectives and benefits before conducting research

A list of questions	Frequency distribution of respondents per score (Person)				
	1 Very Ignorant	2 Don't know	3 Do not know	4 Know	5 Very know
<b>SCOPE</b>					
The importance of fertilization	1	15	15	10	10
An important role in efforts to increase crop yields	15	20	10	6	0
Fertilization provides all the sufficient nutrient needs for plants	5	25	15	5	1
Fertilizer allocation	6	15	25	5	0
Total	27	75	65	26	11
<b>FERTILIZATION CONCEPT</b>					
Increasing productivity and quality of agricultural products	1	5	25	15	5
Increase fertilization efficiency	1	4	20	22	4
Increasing soil fertility and sustainability	2	15	20	10	4
Avoid environmental pollution and plant poisoning	10	15	10	10	6
Total	14	39	75	57	19
<b>OBJECTIVE</b>					
Increase production and quality of results	10	15	10	10	6
Increase efficiency	5	10	15	10	11
Maintain soil fertility	6	10	15	15	5
Reduce environmental pollution	10	15	10	10	6
Total	31	50	50	45	28
<b>BENEFIT</b>					
Providing the right amount of fertilizer, at the right time and with the appropriate type of fertilizer needed, fertilization will be more efficient, yields will be high and income will increase.	15	15	10	8	3
Environmental pollution can be avoided, soil fertility is maintained and rice production is sustainable;	10	15	15	10	1
Reduce costs	1	10	15	15	10
Total	26	40	40	33	14

Table 2 shows the frequency distribution of respondents per indicator in the variable knowledge of the ratio of fertilizer use to area with scope indicators, fertilization concepts, objectives and benefits indicating that farmers' knowledge of the scope is in range 2, i.e. do not know with a total of 75 meaning for understanding the scope farmers do not know about the use of balanced fertilizers because they have never received information about this (Effendy & Diantoro, 2020). Knowledge of the concept of fertilization is in the range 3 with a total of 75, i.e. they don't know. Farmers' knowledge of the goals and benefits of fertilization by respondents was in the range 2 and 3, namely between not knowing and not knowing, meaning that farmers' knowledge of the benefits and purposes of using balanced fertilizers is that some farmers do not know and some already know.

*The distribution of the percentage increase in farmers' knowledge of fertilizers is balanced by taking into account the ratio of fertilizers and land area after the study*

The Figure 1 shows an increase in farmers' knowledge about the application of balanced fertilizers by taking into account the fertilizer ratio and land area (Y. Chen et al., 2021). Where from 51 respondents there were 54.9% (28 people) stated that their understanding increased after socialization and counseling. This has a positive impact on related agencies in that there is an openness of farmers to information and are willing to accept the programs provided as long as they are given continuous assistance and guidance (Van Campenhout et al., 2021).

Table 4 shows that there is an increase in farmers' knowledge of balanced fertilizer from the 5 right

indicators, namely the right type, right dose, right place, right time and right method where these 5 indicators are in range 4, namely tofu, which means farmers already know clearly the 5 indicators right on the benefits of

balanced fertilizer after the implementation of balanced fertilizer application activities between the ratio of fertilizer to the area of land.

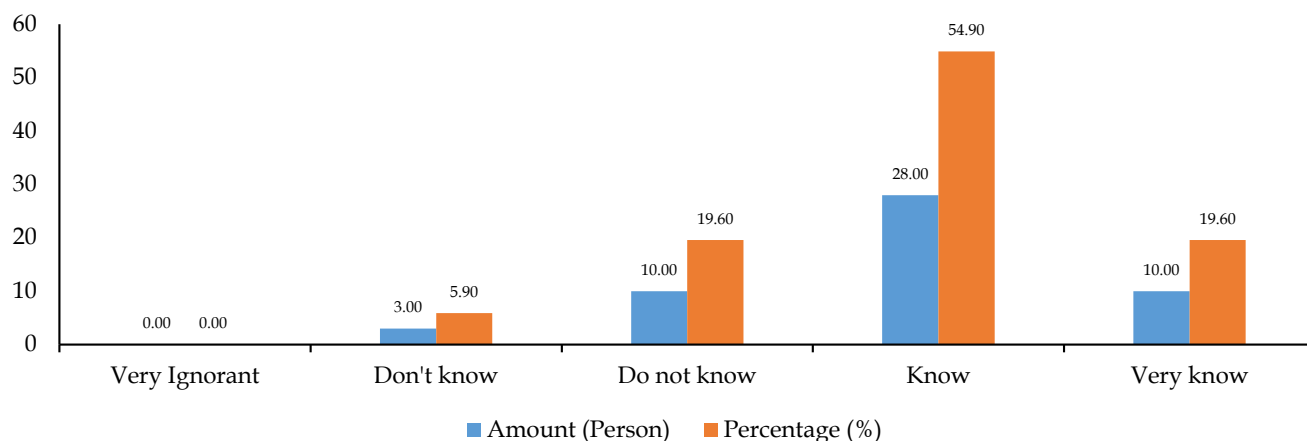


Figure 1. Increased farmer knowledge about balanced fertilizers

Table 3. The distribution of farmers' responses based on the level of effectiveness in the implementation of the balanced fertilizer application program between the fertilizer ratio and the area of land in research activities was measured from the 5 correct indicators, namely the right type, the right dosage, the right place, the right time and the right method.

A list of questions	Frequency distribution of respondents per score (Person)					Total Respondents
	1	2	3	4	5	
	Very Ignorant	Don't know	Do not know	Know	Very know	
<b>Exact Aspect Type</b>						
When fertilizing, you must be precise in determining the type of fertilizer needed by the plant	0	1	10	28	12	51
The urea element in replacing the elements N, SP36 and P has a great influence on fertilization results	3	5	15	23	5	51
If the wrong fertilizer is used, the plants we fertilize will not be good	0	1	5	30	15	51
<b>Total</b>	3	7	30	81	32	
<b>Aspects of Correct Dosage</b>						
When fertilizing, the dose given must be appropriate or in accordance with the plant's needs	5	8	12	23	3	51
The correct dose is intended so that the dose given is not too much or too little. If a little fertilizer is given to the plant, the plant still lacks the required elements, too much of the plant will of course be over dosed and can become toxic.	0	1	9	36	5	51
<b>Total</b>	5	9	21	59	8	
<b>Right Place</b>						
Fertilization must pay attention to the place and location of the plant so that fertilizer can be applied appropriately.	1	3	7	30	10	51
Plant locations that are at high altitudes with strong wind conditions, it is recommended to use liquid fertilizer	2	1	2	20	26	51

A list of questions	Frequency distribution of respondents per score (Person)					Total Respondents
	1	2	3	4	5	
	Very Ignorant	Don't know	Do not know	Know	Very know	
The principle of using the right place must pay attention to how the fertilizer is placed on the plants.	1	5	5	19	21	51
Total	4	9	14	69	57	
Timely Aspect						
Providing good and correct fertilizer should be adjusted to when the plant needs more nutrient intake or at the right time.	5	7	6	23	10	51
Fertilize on time so that plants can grow and develop optimally	0	1	3	40	7	51
Fertilizer application is adjusted to the growth and development phase of the plant	1	1	6	31	12	51
Total	6	9	15	94	29	
Aspects of the Right Way						
Fertilization is done appropriately and must be correct	0	0	1	20	30	51
The wrong way to apply fertilizer will cause the fertilizer to be wasted or leached by water and denitrified so that it cannot be absorbed or captured directly by plants.	3	5	8	25	10	51
Fertilization must be correct and on target.	0	0	1	35	15	51
Total	3	5	10	80	55	

*The relationship between the level of knowledge and the effectiveness of implementing a balanced fertilizer application program between the fertilizer ratio and the area of land*

To find out the extent of the relationship between the level of farmer knowledge and the effectiveness of the implementation of balanced fertilizer application, it was tested using the Spearman correlation rank test analysis with SPSS version 21. The results of the SPSS (Angka & Herdiana, 2019) Spearman rank analysis test as seen Table 4.

Based on the results of Spearman's rank analysis with SPSS in Table 4, it is known that the significance value or sig (2-tailed) is 0.0380 because the sig (2-tailed) value is 0.0380 < smaller than 0.005, meaning that there is a significant relationship between the knowledge level

of farmers and the effectiveness of balanced fertilizer application. To see the closeness of the relationship between the two variables from the SPSS output variable, a correlation coefficient of 0.521\*\* is obtained, meaning that the level of strength of the relationship (correlation) between the effectiveness of balanced fertilizer application and farmers' knowledge of balanced fertilizer application is 0.521, meaning that they have a strong relationship. While the correlation coefficient on the SPSS test results is positive, namely 0.512, so that the relationship between the two variables is unidirectional (unidirectional relationship type), meaning that the more effective the application of balanced fertilizers is, the more knowledge the farmers have.

**Table 4.** Correlation of farmers' knowledge of balanced fertilizer

Matrix		Effectiveness of applying balanced fertilizer	Farmers' Knowledge of Balanced Fertilizer
Spearman's rho	Effectiveness of applying balanced fertilizer	Correlation Coefficient	1.000
		Sig. (2-tailed)	.
		N	51
	Farmers' Knowledge of Balanced Fertilizer	Correlation Coefficient	0.512**
		Sig. (2-tailed)	0.0380
		N	51

**Table 5.** The relationship between knowledge and increased knowledge of farmers on the ratio of fertilizer use to land area

Variabel (X)	Increasing Farmers' Knowledge of the Ratio of Fertilizer Use to Land Area (Y)	
	Correlation (r)	Sig (2-tailed)
Farmer Knowledge	0.512	0.038

The results of data analysis in Table 6 show that the correlation coefficient (r) is 0.512, and the Sig. (2-tailed) 0.0380, which means that there is a strong relationship between the effectiveness of balanced fertilizer application and farmers' knowledge of balanced fertilizer application.

## Conclusion

The majority of farmers responded positively to research activities, prior to the implementation of research activities the majority of farmers had low knowledge of balanced fertilizers both the concept, purpose and benefits of applying balanced fertilizers which were in ranges 2 and 3 i.e. did not know and did not know and after the activity there was an increase knowledge related to the effectiveness of the implementation of the program to be implemented. Based on the results of the Spearman rank test using SPSS, it is known that the significance value or sig (2-tailed) is 0.0380 because the sig (2-tailed) value is 0.0380 < smaller than 0.005, which means that there is a significant relationship between the knowledge level of farmers and the effectiveness of fertilizer application. balanced. To see the closeness of the relationship between the two variables from the SPSS output variable, a correlation coefficient of 0.521\*\* is obtained, meaning that the level of strength of the relationship (correlation) between the effectiveness of balanced fertilizer application and farmers' knowledge of balanced fertilizer application is 0.521, meaning that they have a strong relationship. While the correlation coefficient on the SPSS test results is positive, namely 0.512, so that the relationship between the two variables is unidirectional (unidirectional relationship type), meaning that the more effective the application of balanced fertilizers is, the more knowledge the farmers have. Based on the findings above, it is suggested that related parties, both from extension agents, farmer groups, and villages, continue to provide guidance and monitoring so that farmers in Masjuring village, especially the Sambang Paer farmer group know, understand and apply balanced fertilizers between organic and inorganic fertilizers so as to have a positive

impact on the environment and increase farmer productivity.

## Acknowledgments

The implementation of the research activities was supported and motivated by many parties, it was inseparable from all parties involved during the research activities. All staff at the Bonder village office, extension workers and masjuring village extension coordinators, the research team and students involved in the research.

## Author Contributions

This paper was written by two people, namely H and YH. This paper was completed with team collaboration at each stage.

## Funding

This research received no external funding.

## Conflicts of Interest

The authors declare no conflict of interest.

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