

Effect of P Fertilization dosage and Black Soybean (*Glycine max* (L.) Varieties on the Quality in Rainfed Rice Land

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Abstract

An important nutrient problem in rainfed land is phosphorus, due to low nutrient availability, whereas P is very important for plants when filling seeds. This study aims to evaluate the effect of P fertilization dosage and black soybean (*glycine max* L.) varieties on the quality in rainfed rice land. This study was conducted in rainfed land, Desa Panti Gemi Kecamatan Stabat, Langkat, Sumatera Utara. The research used split plot design with two factors. The first factor was P fertilizer, it were 0 kg TSP kg/ha, 75 kg TSP kg/ha, 150 kg TSP kg/ha, 225 kg TSP kg/ha, 300 kg TSP kg/ha and the second factor was varieties, it Detam 1 variety and Mallika variety. The result indicated that P fertilizer up to 225 kg kg / ha TSP on black soybean plants showed significant effect on increase protein content. The Detam 1 variety showed the highest effect on P uptake. Whereas the combination of two factors was no significant effect.

Keywords: P fertilizer, variety, black soybean

Introduction

The rapid growth of the soy sauce industry and the increasing public demand for black soybeans are not matched by an increase in black soybean production. Domestic black soybean production is only able to meet 30% of the needs supplied from Java and the rest is imported (Ministry of Agriculture 2009). An important nutrient problem in dry land is phosphorus, due to low nutrient availability, whereas P is very important for plants when filling seeds. Phosphorus is generally not a car and does not move far from its original place so it often causes deficiency. This deficiency in nutrients results in low-energy plants so that cells cannot divide which results in stunted plant growth, slow fruit ripening, incomplete seed formation, low crop production and reduced yield quality (Soepardi, 1983).

Black soybeans have a protein content which also varies from 37-41%. Mino glutamic acid content in black soybeans is slightly higher than yellow soybeans, so the black soybean flavor is more palatable than yellow soybeans (Balitkabi, 2013), besides that in black soybeans contains anthocyanin which functions as a causative agent in red, orange, purple, and blue. The use of natural coloring agents, for example anthocyanin pigments is still limited to a number of food products, such as beverage products (fruit juice, juice, and milk) (Saati, et al, 2006). The high and low anthocyanins are influenced by nutrients, pH and sunlight. Mualim (2009) obtained results on fertilization did not significantly affect the anthocyanin content of kolesom leaves, but PK fertilization (100 kg SP-36 / ha and 100 kg KCl / ha) caused the highest production of kolesom leaf anthocyanin.

From the description above, the researcher is interested in knowing whether there is a relationship between TSP fertilizer and varieties to the quality of black soybean plants in rainfed rice fields.

Materials and Methods

The ingredients used in this study are: Mallika black soybean varieties and Detam 2, TSP fertilizer, banlate systemic functionides and decisive insecticides.

The tools used in this study are: hoes, tripe machetes, brood, handsprayer, analytic scales, ovens, centrifuges, pH meters, Thermo Scientific Genesys™ 10S UV-Vis Spectrophotometers, blenders, glass beams, test tubes, pipettes, pumpkins measuring, 0.05 mes sieve, sample plot board, meter, calculator and stationery.

This research was conducted using the Split Plot Design (RPT) with two factors examined, namely:

1. Factor of TSP fertilizer (P) with five levels as the main plot

P0 = 0 kg TSP / ha

P1 = 75 kg TSP / ha

P2 = 150 kg TSP / ha

P3 = 225 kg TSP / ha

P4 = 300 kg TSP / ha

2. Variety Factor (V) with two levels: as subplot

V1 = Mallika

V2 = Detam 1

From these two factors, 10 combinations of treatment plots were obtained in which each treatment was repeated 3 times to obtain 30 experimental units, each unit consisting of 60 plants so that the total population of this plant was 1800 plants (Appendix 3). In each research unit 6 plants

were sampled (Appendix 4). Data from the results of the study were analyzed by ANOVA and continued with a mean difference test according to Duncan (DMRT).

Results and Discussion

P uptake by plants

The results of analysis of P uptake data by plants showed that varieties significantly affected, P uptake of Detam 1 (V2) varieties, namely 1.12 g / plant higher than Mallika Variety (V1) which was 0.66 g / plant. Whereas P fertilization treatment and the combination of fertilization with varieties did not have a significant effect.

Table 1. Average P uptake by plants in treatment of P fertilization and varieties

| Fertilization (kg/ha) | P Varieties | | Average |
|-----------------------|----------------------|---------|---------|
| | Mallika | Detam 1 | |
| | ----- g/tanaman----- | | |
| P ₀ (0) | 0.42 | 1.16 | 0.79 |
| P ₁ (75) | 0.54 | 1.40 | 0.97 |
| P ₂ (150) | 0.51 | 1.16 | 0.83 |
| P ₃ (225) | 0.83 | 0.74 | 0.78 |
| P ₄ (300) | 1.02 | 1.15 | 1.09 |
| Average | 0.66b | 1.12a | |

Description: The number on the same row and column followed by the same letter are not significantly different at the 5% level

The following histogram of the relationship of varieties with P uptake by plants is presented in Figure 1

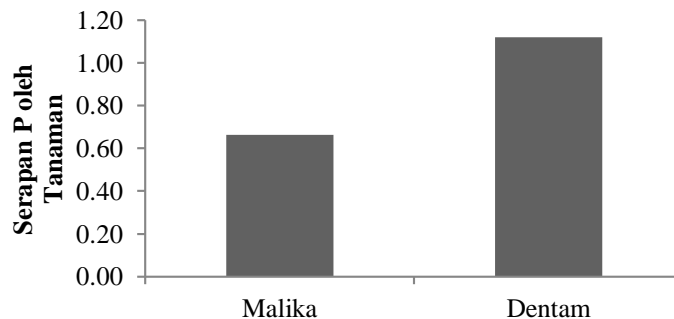


Figure 1. Histogram of the relationship of varieties with P uptake by plants

Figure 1 shows that the Detam 1 variety showed the highest effect on P uptake by plants compared to Malika varieties. This is presumably due to the adaptability of the Detam 1 variety. The highest P uptake is found in Detam 1 variety which is 1.12% compared to Mallika which is 0.66%. According to Kuntastuti (2006), the phosphorus content of soybean seeds shows the phosphorus element absorbed into the soybean seeds and the amount P which is needed and absorbed by plants is relatively small, which is about 10-20% of the amount of fertilizer given.

The results of the research that the authors have done show that the variety detam 1 shows relatively higher yields for P uptake, compared to

Mallika Varieties. This happens not apart from the genetic abilities possessed by Mallika varieties. In relatively good environmental conditions, Mallika varieties have a relatively higher average potential yield. Besides this, Mallika varieties also have resistance to disease and lack of water.

Protein content

The results of the analysis of protein content data showed that TSP fertilization treatment had a significant effect on P3 fertilization (225 Kg / Ha) which was 29.55 significantly different from the treatment of P1, P2 and P4. While the treatment of varieties and the combination of the two treatments have an effect not real.

Table 2. Average levels of black soybean protein fertilization treatment and varieties.

| Fertilization P (kg/ha) | Varietas | | Average |
|-------------------------|----------|---------|---------|
| | Mallika | Detam 1 | |
| P ₀ (0) | 28.59 | 28.52 | 28.55ab |

| | | | |
|----------|-------|-------|--------|
| P1 (75) | 29.26 | 29.24 | 29.25a |
| P2 (150) | 29.43 | 29.59 | 29.51a |
| P3 (225) | 29.53 | 29.56 | 29.55a |
| P4 (300) | 29.21 | 28.89 | 29.05a |
| Average | 29.20 | 29.16 | |

Description: The number on the same row and column followed by the same letter are not significantly different at the 5% level

The following graph of the relationship between P fertilization treatment and protein content is presented in Figure 2

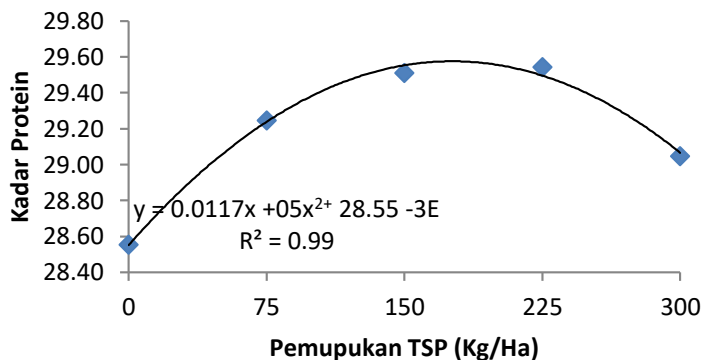


Figure 2. Relationship graph of P fertilization and plant protein content varieties.

Figure 2 shows that P fertilization has a significant relationship of protein content expressed by linear equation, that is $y = 0.0017x + 05x^2 + 28.55 - 3r = 0.99$, this indicates that an increase in protein content can be caused by an increase in fertilizer P. Protein levels are influenced by the addition of P. fertilizer dosage. In the picture it is shown that TSP fertilization at a dose of 225 kg / ha gives the best protein content.

The results of research reports on soy and P fertilizer with different doses in acidic soils depend on pH, soil fertility and the nature of genotypes. reported that the results of balanced nutrition and soybean yield were inadequate (Boswell and Anderson., 1976). Schulze, (2007) reported that protein content in soybeans was influenced by fertilization. Research Results Devi, et. al. (2012) The content of oil and protein from soybean seeds is significantly influenced by various sources of phosphorus. Application of CNS (super phosfat fertilizer) + PSP (partial solubilized phosphate) was produced significantly with higher oil content (18.53%), and protein content (35.35%) and the lowest was in control.

Protein levels will increase in line with the addition of P fertilizer. Fertilizing P at a dose of 300 kg / ha gives the best protein content. Wilkinson

(1994) in Wijaya (2008), who stated that P also took part in protein synthesis and carbohydrate synthesis.

Anthocyanin content

From the results of the analysis of research data it was found that P fertilization and did not show a significant effect on anthocyanin content in black soybean seeds cultivated in rainfed rice fields.

Conclusion

From the results of research and data analysis carried out on the research, the authors can conclude that:

1. Detam 1 variety has a significant effect on P uptake by plants as much as 1.12 g
2. Fertilization of TSP with P3 level (225 kg / ha) can increase protein levels by 29.55%
3. The combination of varieties and P fertilization did not show a significant effect on improving the quality of black soybeans.

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