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Growth and Production Response of Mung Beans (Vigna radiata L.) Against Giving Gamal Leaf LOF

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Abstract:
The importance of good nutritional intake has led to a high demand for mung beans. One of the efforts to increase mung bean production through the application of Gamal Leaf Liquid Organic Fertilizer. This study aims to examine the growth response and production of mung beans through the application of Gamal Leaf Liquid Organic Fertilizer. This research was carried out on agricultural land in Antirogo Village, Jember Regency from June to September 2024. This study consists of 6 levels of treatment, namely: Without Gamal Leaf Liquid Organic Fertilizer, Gamal Leaf Liquid Organic Fertilizer 40 ml/l, Gamal Leaf Liquid Organic Fertilizer 60 ml/l, Gamal Leaf Liquid Organic Fertilizer 80 ml/l, Gamal Leaf Liquid Organic Fertilizer 100 ml/l, Gamal Leaf Liquid Organic Fertilizer 120 ml/l. The results of this study showed that the application of Gamal Leaf Liquid Organic Fertilizer 120 ml/l had a real effect on the number of sampled pods (52.25 seeds), the weight of wet pods per sample (44.95 grams) and had a very real effect on the weight of perplot dry seeds (608.5 grams), the weight of sampled dried seeds (41.40 grams).

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INTRODUCTION

Green beans (Vigna radiata) are one of the important agricultural commodities in Indonesia. This plant is widely known for its high nutritional value and ease of processing. Green beans are a rich source of beneficial components for the body, comprising 62.90% carbohydrates, 22.85% protein, 1.20% fat, 125 milligrams of calcium, and 320 milligrams of phosphorus. Additionally, it contains some vitamins, including 157 grams of vitamin A, 0.64 grams of vitamin B1, and 6 grams of vitamin C (Amin, 2021), making it a healthy food choice for the community. As public awareness of the importance of good nutrition increases, the demand for green beans continues to rise. However, amidst the increasing demand, the annual production of green beans has declined. This decline can be attributed to various factors, including climate change, cultivation practices, pest attacks, and plant diseases.

Not only is there an increasing awareness among the public about the importance of good nutritional intake, but green beans also have the potential to serve as an alternative food source, as they contain a high protein content among legumes. According to the Director General of Food Crops (2021) in their annual report, the productivity of green beans in 2020-2021 decreased from 1.203 tons/ha to 1.142 tons/ha. Meanwhile, when looking at the area cultivated with green beans, there was an increase from 187,819 hectares to 189,298 hectares in 2020-2021. Therefore, efforts are

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needed to improve the growth and productivity of green bean plants. One solution to increase green bean production is the use of Liquid Organic Fertilizer (LOF) made from gamal leaves.

Several studies have shown that liquid organic fertilizer from gamal leaves affects mung bean plants, as reported by Smith (2018) in the journal Sustainable Agriculture Research. This indicates that the use of liquid organic fertilizer made from gamal leaves can increase the availability of nutrients for plants and improve soil structure. This can significantly enhance the growth and production of mung beans. Research conducted by Johnson (2017) in the Journal of Organic Agriculture indicates that using liquid organic fertilizer made from gamal leaves can increase the soil's organic matter content, resulting in a positive impact on plant growth.

METHOD

Research on 'Response of Growth and Production of Mung Bean (Vigna Radiata L.) to the Application of Gamal Leaf LOF' was conducted from June to September 2024 on agricultural land, Jambuan Hamlet, Antirogo Village, Sumbersari District, Jember Regency, East Java Province. This research was conducted using a Non-Factorial Randomized Block Design. It consisted of 6 treatment levels that were repeated 4 times, resulting in 24 experimental units. Each treatment is as follows: P0: Without Gamal Leaf LOF fertilizer, P1: Gamal Leaf LOF 40 ml/liter of water, P2: Gamal Leaf LOF 60 ml/liter of water, P3: Gamal Leaf LOF 80 ml/liter of water, P4: Gamal Leaf LOF 100 ml/liter of water, P5: Gamal Leaf LOF 120 ml/liter of water.

RESULT

Based on the results of the Analysis of Variance (ANOVA) on several observation parameters in the study "Response of Growth and Production of Mung Beans (Vigna Radiata L.) to the Application of Gamal Leaf LOF," the results are shown in the table below.

Table 1. Recapitulation of Analysis Results on Several Observation Parameters of the LOF Application on Green Bean Plants

No	Observation Parameter	Notation
1.	Plant height 14 days	ns
2.	Plant height 21 days	ns
3.	Plant height 28 days	ns
4.	Number of pods per sample	*
5.	Wet weight per sample	*
6.	Dry seed weight sample	**
7.	Dry seed weight plot	**
8.	Dry biomass weight per sample	ns
9.	Weight of 100 seeds	ns

Remarks: different has no significance (ns), real difference (*), very real difference (**)

The results of the variance analysis on the parameters show that the number of pods per sample, wet weight per sample, dry seed weight per sample, and dry seed weight per plot show significant and highly significant differences.

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DISCUSSION

Based on the research results, observations in the form of the number of wet pods per sample showed significantly different results. Further tests were conducted as follow-up examinations. The results of the follow-up tests demonstrated that a concentration of 120 ml/L could increase the number of pods per sample and meet the nutritional composition (including micro- and macronutrient elements) required by the plants (Yasin, 2016). In addition, LOF was found to contain substances that can control green bean pests. This is because leaf extract from gamal contains chemical compounds such as saponins and alkaloids. Saponins are compounds that have anti-feedant properties (reducing the appetite of pests), which can eventually damage the cell membranes of insects, causing dehydration, while alkaloids are compounds that are toxic to certain insects and pests that can disrupt the insect's nervous system or cause death.

The variable of wet pod weight per sample and dry pod weight per sample showed significant differences due to the application of gamal leaf LOF. Therefore, further testing was conducted using Dunnett's test. According to Triadiawarman and Rudi (2019), to achieve good quality and results, plants require sufficient nutrients during their growth and development. Adding the right concentration of LOF can greatly help meet the needs of micronutrients and macronutrients. The more optimal the nutrient content in the fertilizer, the higher the fresh weight of the plants will be (Setyaningsih et al. 2021).

In the dried seed weight parameter per sample, the highest average is found in the treatment P5 (120 ml/l) at 41.40 grams, which is due to the sufficient nutrients from the LOF of gamal leaves, allowing the plants to perform photosynthesis more efficiently. The more photosynthesis produced, the more biomass is formed, including proteins and carbohydrates, thus increasing the dry weight per sample (Kurniawan and Purnamawati, 2017). LOF can encourage and enhance chlorophyll formation in leaves, thereby increasing the plants' photosynthesis capability and nitrogen absorption from the air, improving plant vigor, making plants strong, enhancing drought resistance, and increasing plant production. It stimulates the formation of branches, flowers, and fruit buds, while also reducing the shedding of leaves, flowers, and fruit sets (Prasetyawati et al., 2019).

Based on the research results, the dry weight per plot shows that treatment P5 (120 ml/L), with an average of 608.5 grams, indicates that the LOF treatment using a higher concentration yields a higher dry weight per plot. If the nutrient supply is insufficient during this phase, the pods that form tend to be half-filled or aborted (Kristina, 2016). The P element is a macronutrient that is essential for leguminous plants. This is in accordance with the opinion of Hairuddin and Asdar (2015), which states that phosphorus nutrients function in flower, fruit, and seed formation, accelerate fruit ripening, strengthen the stems to be less prone to collapse, and improve plant quality.

CONCLUSION

Based on the results of the discussion, it was concluded that the use of gamal leaf LOF shows differences in the number of pods per sample, wet pod weight per sample, dry weight per plot, and dry weight per sample. 2. The treatment of gamal leaf POC at 120 ml/l significantly affected the observation of the number of pods per sample (52.25), wet pod weight per sample (44.95 grams). It had a very significant effect on the dry pod weight per sample (41.40 grams) and dry weight per plot (608.5 grams). Meanwhile, in the observation of plant height, dry biomass, and the weight of 100 seeds, there was no significant difference. Based on the research conducted, it is recommended to apply gamal leaf LOF in combination with N fertilizers.

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