

VARIOUS IMPACTS OF DOSAGE AND TIME OF BIO-ORGANIC FERTILIZER APPLICATION TO THE GROWTH AND PRODUCTION OF SHALLOT (*Allium ascalonicum* L.)

Arvita Netti Sihaloho¹, Wahyunita Sitinjak²

Lecturer in the Faculty of Agriculture, Universitas Simalungun

Lecturer in the Faculty of Agriculture, Universitas Simalungun

Jalan Sisingamangaraja Barat, Pematangsiantar 21139, Sumatera Utara, Indonesia;

Email: netti.haloho@gmail.com, lucy88sitinjak@gmail.com

Abstract

Organic matter has the ability to improve physical, chemical and biological properties of the soil to support crop productivity. Provision of bio-organic fertilizer will increase the growth and production of shallots. The aim of this study was to obtain the dosage and time of application of bio-organic fertilizer on the growth and production of shallots (*Allium Ascalonicum* L.). The study used a factorial randomized block design of two factors with three replications. The first factor is the dose of bio-organic fertilizer with 3 levels, namely: P1 = 425 gram bio-organic fertilizer/ plot, P2 = 525 gram bio-organic fertilizer/ plot, P3 = 625 gram bio-organic fertilizer/ plot, while the second factor when the application of bio-organic fertilizer: W1 = 2 MBT, W2 = 1 MBT, W3 = 1 MST, W4 = 2 MST. The parameters observed were: Plant Height (cm), Number of Cloves (tubers), Wet Weight per Plot (g), Dry Weight per Plot (g), Wet Plant Weight Sample (g), and Dry Weight of Sample Plant (g). The results showed that various doses and time of application of bio-organic fertilizer independently affected the growth of 8 MST onion height, number of cloves, plots plant wet weight, plots plant dry weight, plots plant wet weight, sample plant dry weight. The interaction of the effects of various doses with the time of application of bio-organic fertilizer did not affect all observed parameters.

Keywords: *Shallot, Bio-organic Fertilizer, Application Time.*

INTRODUCTION

Shallot (*Allium Ascalonicum* L.) is a horticultural commodity which is classified as vegetable spices. This spice vegetable is needed especially as a supplement to spices in order to add flavor and delight of the dish. Besides being a spice in cuisine, shallots can also be used as a traditional medicine which is very valuable for health. Shallots are classified as a commodity that has a high selling value in the market. The central area of production and onion entrepreneurs needs to be increased, bearing in mind that consumer demand over time continues to increase in line with population growth and increased purchasing power. Considering the need for increasing onions, the businessman provides bright prospects.

Based on data from the Central Statistics Agency (BPS) the productivity of shallot plants in northern Sumatra in 2014 was the production of shallot bulbs in 2014 amounting to 1,242 tons. Compared to 2013, production decreased by 112.5 tons (-8.31 percent). This decrease was caused by a reduction in harvested area of -29 hectares (-9.57 percent) although productivity rose by 0.06 tons per hectare (1.39 percent) compared to 2013 (North Sumatra Central Statistics Agency, 2014)

One way out to improve land quality is the use of bioorganic fertilizers. However, the use of bioorganic fertilizers to replace chemical fertilizers in Indonesia thus far has not been widespread (Leszczynska and Malina, 2011). Agricultural lands continue to experience degradation, which is marked by a decrease in soil organic matter levels due to the use of chemical fertilizers that are not accompanied by bioorganic fertilizers. Compost is obtained from weathering plant materials or organic waste such as straw, husks, foliage, grasses, organic processing plant waste, and organic waste that occurs due to human treatment (Musnamar, 2009).

Ginting (2010) states that organic fertilizer can be stem from decomposition of organic materials such as plant leaves and animal dung. Organic fertilizers have several kinds, namely manure, green manure, bokashi and compost. Organic fertilizers have advantages compared to the type of inorganic fertilizers. Some of the advantages of organic fertilizer include: 1) contains complete macro and micro nutrients, but in small amounts, 2) can improve soil structure, 3) improve the life of microorganisms in the soil.

Organic matter has the ability to improve the physical, chemical and biological properties of the soil to support crop productivity. The use of organic fertilizers must be at the right concentration. Use of the right concentration of liquid organic fertilizer can improve growth, accelerate harvest, extend the period or age of production and can increase crop yields. (Marliah, et al, 2012).

Addition of organic matter will release nutrients such as N, P, K Ca, Mg, etc. and increase the availability of nutrients for plants. In the improvement of soil biological properties, namely organic matter, it can increase the population of soil microorganisms that play a major role in the decomposition process. The role of organic matter in improving the physical properties of the soil is by changing the structure of the soil to loose so that aeration becomes better. This study aims to obtain the dose and time of application of bio-organic fertilizer on the growth and production of shallots (*Allium Ascalonicum* L.).

RESEARCH METHODS

This research was conducted from February to April 2019, located in Nagori Bah Gunung, Bandar Hulan Subdistrict, Simalungun District with a height of \pm 400 above sea level. The research design used factorial randomized block design (RBD) with 2 treatment factors, the first factor i.e. application

dosage of bio organic fertilizer with 3 levels: P1 = 425 gram bioorganic fertilizer / plot = 14.16 gram / plant, P2 = 525 gram bioorganic fertilizer / plot = 17.5 gram / plant, P3 = 625 gram bioorganic fertilizer / plot = 20.83 grams / plant and the second factor is the time of application of fertilizer with 4 levels: W1 = 2 MBT (weeks not yet planted), W2 = 1 MBT (weeks not yet planted), W3 = 1 MST (weeks after planting), W4 = 2 MST (weeks after planting). Observed parameters were plant height, number of flakes per plant, wet weight per sample, dry weight per sample, wet weight per plot, dry weight per plot.

RESULTS AND DISCUSSION

Treatment of Various Doses of Bio-Organic Fertilizer on Growth and Production of Shallots.

Based on the results of analysis of variance showed that the treatment of various doses of bio-organic fertilizer significantly affected plant height (cm) at ages 2, 4, 6 and 8 MST, number of cloves per plant sample, wet weight per sample, wet weight per plot, dry weight per sample and dry weight per plot. The difference between treatments can be known by conducting a 5% honest difference test (BNJ), it can be seen in Tables 1 and 2. This is due to the application of bioorganic fertilizers that can increase the ability of soil microbial activation. Leszczynska and Malina (2011) stated that the application of organic matter as organic fertilizer can increase nutrient levels, increase chemical ability, enhance physical ability and increase soil microbial activity. The results of the study (Sugianta, et al. 2008) show that the application of organic fertilizer can efficiently around 50% inorganic fertilizer even though the actual contribution of N, P, and K from organic fertilizers is relatively small, around 0-10% depending on the mineralization level of the organic fertilizer.

Table 1. Mean Difference Test for Plant Height (cm) Age 2,4,6 and 8 MST, with Dose Treatment and Time and Interaction

Treatment	Plant Height (cm)			
	2 MST	4 MST	6 MST	8 MST
W1	16.88 c	23.41 bc	30.26 d	31.98 d
W2	21.92 b	28.53 a	37.17 a	40.23 a
W3	18.19 a	25.29 b	34.60 b	38.52 b
W4	17.99 ab	22.79 bc	33.04 c	35.95 c
P1	17.50 c	23.60c	32.86c	35.53c
P2	18.64 b	25.08b	33.77b	36.54b
P3	20.10 a	26.43 a	34.67 a	37.87 a

Note: Figures followed by the same notation in the same treatment and the same column are significantly different according to BNJ 5%.

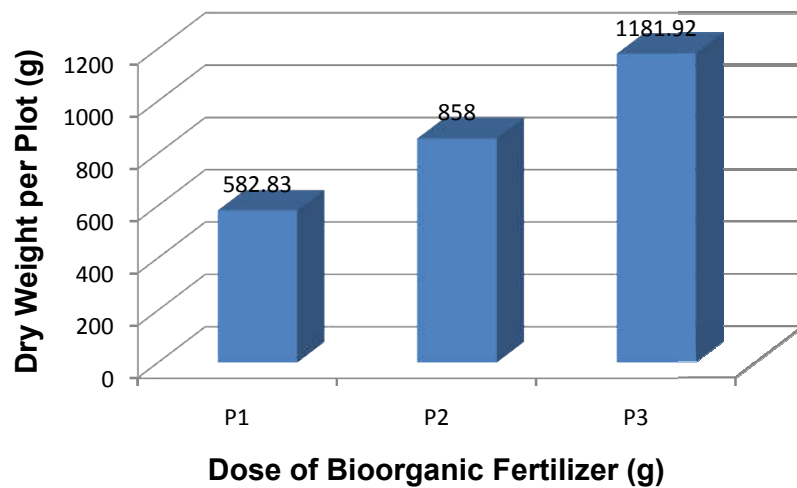
The addition of bio-organic fertilizer into the soil causes the soil to become loose. Loose soil has good soil pores for air circulation and can hold soil water better than rigid and dense soil (Lestariningsih, 2012)

Table 2. Difference Test of Average Number of Cloves per Sample Plant, Weight of Samples (g) Wet Weight of Tubers per Plot (g), Dry Weight of Tubers per Sample (g), and Dry Weight per Plot (g) with Dose Treatment and Time and Interaction.

Treatment	Number of cloves / sample plants	Wet Weight of Sample (g)	Wet Weight per Plot (g)	Dry Weight per Sample (g)	Dry Weight per Plot (g)
W1	6.20 b	38.56 d	862.67 c	32.11 bc	735.22 c
W2	7.29 ab	43.11 b	1113.44 ab	35.33 b	961.22 ab
W3	8.44 a	48.11 a	1142.22 a	40.78 a	987.56 a
W4	6.94 b	39.44 c	975.11 b	29.78 c	813.00 b
P1	5.95 c	38.25 c	700.33 c	28.33 c	582.83 c
P2	7.03 b	42.92 b	1016.08 b	36.17 b	858.00 b
P3	8.68 a	45.75 a	1353.67 a	39.00 a	1181.92 a

Note: Figures followed by the same notation in the same treatment and column are significantly different according to BNJ 5%.

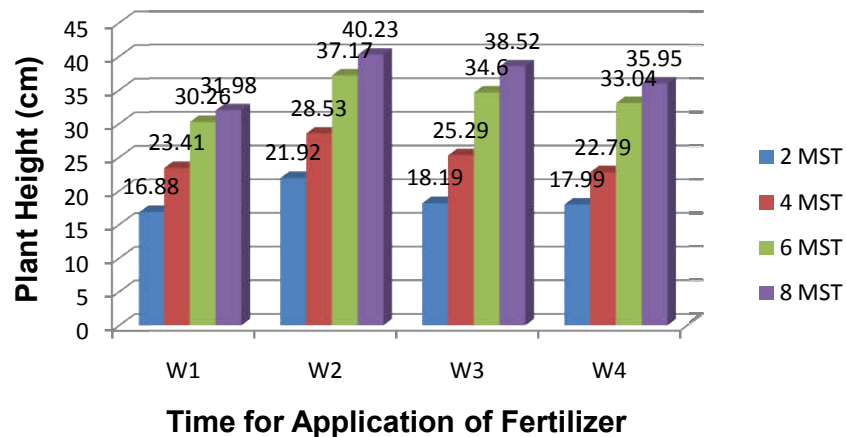
The increase in bio-organic dose from the lowest dose (425 gram / plot) to the highest dose (625 gram / plot) which shows a significant increase in all observations made. This is purportedly because the higher the dose of bio-organic fertilizer, the better the results of vegetative growth so that the weight of the fresh weight of the tubers may be heavy and large and affect the tuber weight. In accordance with Martajaya M, et al., (2010) the application of organic fertilizer can improve or increase fertility in the soil compared to inorganic fertilizers.



Various Treatment Time for Application of Bio Organic Fertilizer to Growth and Production of Shallots

Based on the results of analysis of variance showed that the various treatments of the application of bio organic fertilizer significantly affected plant height (cm) at ages 2, 4, 6 and 8 MST, number of cloves per plant sample, wet weight per sample, wet weight per plot, weight dry per sample as well as dry weight per plot. Differences between treatments can be identified by conducting a 5% honest difference test (BNJ) that can be seen in Tables 1 and 2

Various times of application of bio-organic fertilizer have a significant effect on all parameters of observation; it is thought to carry out a metabolic process of acid requiring nutrients, especially during the vegetative period. Nutrients absorbed by plants can be used to encourage cell division and the formation of new cells to form plant organs such as leaves, stems, and roots that can better facilitate the process of photosynthesis. Photosynthates produced from this process can be used in tuber formation.



The treatment of applying organic fertilizer with the right time can affect soil fertility and nutrient supply for plants can be absorbed well so that the growth rate of plants can develop well, although the results of analysis of variance show no significant effect between treatments. According to (Karsono et al 2000 in Yadi et al 2012), plant growth and production is determined by the rate of photosynthesis that is controlled by the availability of nutrients.

Interaction of Various Doses and Time of Application of Bio Organic Fertilizer on Growth and Production of Shallots

The results of analysis of variance show that the various treatments of the application of bio organic fertilizer have no significant effect on all observational parameters. This is consistent with the opinion of Stell and Torrie (1991) who states that if the interaction effect is not significantly different then it can be concluded that the treatment factors act independently of oneanother. The dosage and time of application of organic fertilizer most often affect and are mutually sustainable towards maximum production (Budiyanto, et al 2017).

CONCLUSION

Based on the results of data analysis and field trials it can be concluded as follows:

1. The treatment of various doses and the time of application of bioorganic fertilizer show a significant effect on all parameters of observation.
2. The treatment for plant height is found in the P2 treatment, while the other parameters are in the P3 treatment while the highest treatment for plant height is in the W2 treatment, for other parameters there is in the W3 treatment.
3. The combination of bioorganic fertilizer dosage and time of application does not affect all parameters.

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