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Effect of Blotong Compost Bio Fertilizer on Early Growth of Sugar Cane (*Saccarum Officinarum*)

Pengaruh Pupuk Bio Kompos Blotong Terhadap Pertumbuhan Awal Tanaman Tebu (*Saccarum Officinarum*)

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ABSTRACT

Bio-compost can help increase water holding capacity, because in addition to containing a lot of organic matter, it also makes the soil hygroscopic and the structure becomes crumbly. Giving Blotong bio compost at a dose of 10 tons / ha is very good because it increases the initial growth of sugarcane and can increase production. The purpose of the study was to determine the effect of bio-compost blotong on the growth of sugarcane (Saccharum officinarum). The research was conducted in the field of Tegal which is located in the village of Blabak, Kandat sub-district, Kediri Regency. altitude of 100 mdpl. This research was conducted in the field using a single factor Randomized Block Design (RBD) with 6 treatments, where the treatment factors for blotong doses were: B0 = 0 tons ha^{-1}, B1 = 5 tons ha^{-1}, B2 = 10 tons ha^{-1}, B3 = 15 tons ha^{-1}, B4 = 20 tons ha^{-1}, B5 = 25 tons ha^{-1}. Parameters of observations made consisted of: Growth Percentage, Plant Height, Number of Leaves, Number of Tillers, Stem Diameter. The results of the research on the treatment of Blotong bio-compost fertilizer were significantly different, the highest percentage of plant shoot growth at a dose of 20 tons ha^{-1} was 89.17%. Plant height with a dose of 20 tons ha^{-1} is 94.75 cm. The highest number of leaves of the plant was 16.25 cm. The highest number of tillers of sugarcane was 9.22, and the diameter of the stem of the highest sugarcane was 15.95 cm.

Keywords: Bio Compost; Sugar Cane; Soil Fertilizer

INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is a plantation/industrial plant that has an important role, because the stem contains liquid sugar. About 65% of sugar production in the world comes from sugar cane. Sugarcane also produces molasses by-products, alcohol, which can be used for the pharmaceutical industry, food industry, and other industries that use materials from the sugar industry. (Aiyelari, 2015; Singh et al., 2011; Sukmadjaja & Mulyana, 2011).

The success of the sugarcane plant is determined by the initial growth of the sugarcane plant. Therefore, the use of good seeds will allow good results to be obtained. The seeds used as planting material, among others, come from nurseries in the form of shoot cuttings or stem cuttings taken from plants aged 6-8 months (Djasmin., 1984). Sugarcane cultivation is one of the most important growth phases in determining plant success, namely the germination phase because the germination phase is a critical period in the life of the sugarcane plant (Putra et al., 2016). In addition to plant factors, soil is also very influential on growth, because the soil is less fertile then production cannot be maximized. One of the efforts to overcome this problem is by providing organic materials. According to Juradi et al., (2020) Agricultural land, especially sugarcane farming, has begun to be displaced towards the slopes of the mountains and dry lands that have obstacles

such as infertile soil and difficult irrigation systems. Dry land is usually minimal in soil microbes due to the lack of nutrients.

The use of concentrated chemical fertilizers and high doses for a long period of time also causes a decline in soil fertility in sugarcane farming lands. The result of abandoning the use of organic fertilizers has an impact on the shrinkage of soil organic matter content. Agricultural systems can be sustainable if the soil organic matter content is more than 2% (Hoyle, 2013). Soil organic matter in addition to providing complete plant nutrients will also improve soil structure, so that the soil will be more crumbly (Itelima et al., 2018) However, if the addition of organic matter is not given in the long term, the physical fertility will decrease (Syavitri et al., 2019).

Blotong or filter cake is sugar cane sap dirt from the sugar-making process. The percentage of blotong produced per hectare of sugarcane plantation is 4-5%. Blotong is a waste that is problematic for sugar factories and the community because wet blotong causes a bad smell. However, blotong can be used as organic fertilizer. According to (Hartanto, 2017) The content of certain nutrients in blotong is quite high, for example, it contains elements of N, P, and K respectively 1.04%, 6.14% and 0.485% (Teshome et al., 2014); (Tangkoonboribun., 2007); (Hawalid & Widodo, 2018) studied the effect of application of soil-enhancing organic matter on sugarcane yields. The organic material used is filter cake, but the results are still not optimal. This means that in addition to improving the physical properties of the soil, blotong compost is also useful as a source of nutrients that can benefit plants.

In addition to saving expenses for inorganic fertilizer needs, the use of blotong waste is an effort to utilize waste towards a zero-waste industry. Giving Blotong bio-compost at a dose of 10 tons / ha is highly recommended because it increases the early growth of sugarcane sugar cane and can increase production (Hartono et al., 2016). The purpose of this study was to determine the effect of giving a dose of bio-compost on the growth of sugarcane plants (*Saccharum officinarum*)

MATERIALS AND METHOD

This research was conducted in the field of Tegal which is in the village of Blabak, Kandat sub-district, Kediri district. Which is located at an altitude of 100 MDPL. The experiment was carried out in December 2021 – May 2022. The sugarcane seeds used were varieties PS 80 - 1424. The study used a Randomized Block Design (RBD) consisting of one factor with 6 treatments, which was repeated four times: Treatment factor dose of bio-compost: B0 = 0 Bio compost, B1 = Dose of 5 tons ha^{-1}, B2 = Dose of 10 tons ha^{-1}, B3 = Dose of 15 tons ha^{-1}, B4 = Dose of 20 tons ha^{-1}, and B5 = Dose of 25 tons ha^{-1}.

The land is plowed using a tractor followed by making a juringan with a distance of 1 meter, making a plot with a size of 2 x 5 meters, the distance between plots is 0.5 meters, the distance between blocks is 1 meter, the length of the juringan is 2 m in 30 cm and the width is 40 cm. Juringan soil one week before planting was mixed with bio-compost according to the treatment. The seeds used came from shoot cuttings that were 7 months old. After that, the seeds were cut into 2 buds, then dipped in 5% lysol solution. Fertilizers used in this are ZA fertilizer with a dose of 6 kw/ha, SP - 36 fertilizer with a dose of 1 kw ha^{-1}. SP-36 fertilizer is given one week before planting as a basic fertilizer. ZA fertilizer is given 2 times: fertilizer I is given at the age of 15 days after planting with a dose of 3 kw ha^{-1}. The second fertilizer was given at the age of 30 days after planting with a dose of 3 kw ha^{-1}.

Observations were made when the plants were 15 days after planting, observations were made on plant samples that were determined randomly, namely five stems of plant samples for each treatment plot. Parameters of observations made consisted of: Percentage of shoot growth, plant height, measured from the soil surface to the highest canopy, number of leaves, counted leaves that had fully opened,

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number of tillers, counted tillers that had grown on the soil surface, stem diameter. Observational data were analyzed using variance, and continued with the 5% BNT test.

RESULTS AND DISCUSSION

Percentage Growing Shoots

The results of the analysis showed the effect of giving bio-compost blotong a very significant effect on the percentage of shoots growing in sugarcane, at the age of 7 days after planting.

Table 1. The Effect of Blotong Dosage on the Percentage of Sugarcane Shoots Growing at 7 DAP

Treatment (ton ha$^{-1)}$	Percentage Growing Shoots (%)
0	50.56 a
5	65.50 ab
10	70.83 b
15	79.17 bc
20	89.25 c
25	72.55 bc
BNT 5%	17.34

Note: The numbers followed by the same letter in the same column are not significantly different in the BNT uji test (p= 0,05)

From the test results in Table 1. That the treatment of bio-compost blotong was significantly different, where the % growth of plant shoots was highest in the bio-compost treatment with a dose of 20 tons ha-^{1} (B4), which was 89.17%. This is due to the administration of a dose of bio-compost blotong 20 tons ha^{-1} can keep the soil loose, maintain the moisture of stem cuttings and accelerate the development of buds faster to appear on the soil surface. The availability of nutrients in the soil is an important factor that supports the growth of sugarcane plants, along with the physical and biological characteristics of the soil. The ability of the soil to provide nutrients is determined by the content of soil organic matter and soil moisture (Zulkarnain & Prasetya, 2011)

Sugarcane Plant Height

The results of the analysis showed that the effect of bio-compost blotong was very significant on the growth of sugarcane plant height, at the age of 14, 28, 42, 56, 70 and 84 days after planting.

Table 2. Effect of Blotong Bio Compost on Sugar Cane Plant Height Growth

Treatment (ton ha^{-1})	Plant height (cm)				
	14 dap	28 dap	42 dap	56 dap	70 dap
0	4.50 a	7.25 a	20.50 a	42.00a	58.75 a
5	5.50 ab	8.50 bc	22.00ab	44.00b	68.00 b
10	6.25 b	9.00 cd	23.00bc	44.75b	66.75 b
15	6.25 b	9.25 cd	23075 c	44.50c	69.50 b
20	6.75 b	9.5 d	25.75 d	47.00c	74.50 c
25	4.75 a	8.00 ab	21.00 a	44.25a	61.25 a
BNT = 5%	1.49	0.85	1.62	1.72	4.44

Note: The numbers followed by the same letter in the same column are not significantly different in the BNT test (p = 0.05)

Number of Sugarcane Leaves

The analysis of variance showed that the effect of bio-compost blotong was very significant on the growth of the number of leaves of sugarcane plants, in each treatment at the age of 14, 28, 42, 56, 70 and 84 days after planting.

Table 3. The Effect of Blotong Bio Compost on the Growth of Sugar Cane Leaves

Treatment (ton ha^{-1})	Number of leaves (sheet)				
	14 dap	28 dap	42 dap	56 dap	70 dap
0	2.50 a	7.50 a	9.50 a	12.25a	12.75a
5	4.00 bc	8.00 ab	10.25 b	12.50a	13.00ab

10	4.00 bc	8.50 bc	11.50 bc	13.2 5b	13.5 0bc
15	4.75 c	8.75 bc	12.25 cd	13.2 5b	13.7 5c
20	4.25 bc	9.25 c	13.00 d	14.5 0c	15.2 5d
25	3.75 b	8.75 bc	10.25 b	13.2 5b	13.5 0bc
BNT 5%	0.85	0.85	0.96	0.84	0.44

Note: The numbers followed by the same letter in the same column are not significantly different in the BNT test (p = 0.05)

The results of the analysis of Table 3 that the treatment doses of bio-compost blotong were significantly different, where the highest number of plant leaves was achieved with the application of bio-compost blotong with a dose of 20 tons ha-1, which was 16.25 cm and the lowest number of plant leaves in the treatment without bio-compost was 14.00 cm. High nitrogen nutrients from bio-compost blotong that are applied will stimulate sugarcane growth through the formation of chlorophyll so that plant leaves will be greener and increase leaf function in the photosynthesis process. (Girma Abejehu, 2014)

Number of tillers of Sugarcane

The optimal tiller formation begins when the plant is 8-12 WAP. The analysis of variance showed that the effect of giving a dose of bio-compost blotong had a very significant effect on the growth of the number of tillers of sugarcane plants, at each treatment at the age of 56, 70, and 84 days after planting.

Table 4. The Influence of Blotong Bio Compost on the Growth of Sugar Cane Saplings

Treatment (ton ha-1)	Number of tillers		
	56 dap	70 dap	84 dap
0	3.05 a	4.25	5.58 a
5	3.78 b	4.96a	6.60 b
10	4.17 b	5.83b	7.35 c
15	4.11 b	7.43d	9.22 e
20	5.10 d	6.80cd	8.45 d
25	3.89 b	6.15bc	7.90cd
BNT = 5%	0.47	0.71	0.69

Note: The numbers followed by the same letter in the same column are not significantly different in the BNT test (p = 0.05)

The results of the analysis of Table 4 can be seen that the treatment with doses of Bio-compost blotong was significantly different in each observation, where the highest number of tillers of sugarcane was given to the dose of bio-compost blotong with a dose of 20 tons ha^{-1}, which was an average of 9.22 stems and the lowest number of tillers. in the treatment without bio-compost blotong, the average was 5.58 stems. This is because the application of organic matter from bio-compost blotong with a dose of 20 tons ha^{-1} can provide maximum macronutrients so that the growth of the number of tillers shows the greatest number.

The effect of bio-compost organic fertilizer on the number of tillers has a very real effect because the organic matter of blotong has a high nutrient content, especially nitrogen and phosphorus elements, so that it can form plant growth to be faster and larger and as a building block for protein, cell nuclei so that plants will increase or decrease. Form greater growth, especially the number of tillers. Sugarcane plants, if there is a lack or excess of growth elements, the number of tillers will decrease, and the leaves will turn blue-green as a result of the increase in anthocyanin pigment levels and cause inhibition of the photosynthesis process. (Girma Abejehu, 2014), stated that giving an excessive dose of bio-compost will cause root rot, reduce CO_2 efficiency and sucrose levels, resulting in reduced tiller formation and stunted growth.

Sugarcane Stem Diameter

The stem of the sugarcane plant is a storage place for food reserves or the results of assimilation. The results of the analysis of variance showed that the effect of giving bio-compost blotong had a very significant

effect on the growth of sugarcane stem diameter.

Table 5. Effect of Blotong Bio Compost on Sugar Cane Stem Diameter Growth

Treatment (ton ha-[1])	Plant diameter (cm)		
	56 dap	70 dap	84 dap
0	9.35 a	11.22a	11.63a
5	10.09 a	12.08b	12.66b
10	13.01 c	14.83d	15.28d
15	14.03 d	15.82e	15.95d
20	12.38bc	13.96c	14.27c
25	12.01 b	13.75c	14.01c
BNT = 5%	0.79	0.53	0.67

Note: The numbers followed by the same letter in the same column are not significantly different in the BNT test (p = 0.05)

The results of the analysis in Table 5 can be seen that the treatment doses of bio-compost blotong were significantly different, where the highest stem diameter of sugarcane was achieved at a dose of 15 tons ha^{-1}, which was 15.95 cm. This is due to the application of organic material of bio-compost blotong with a dose of 15 tons ha^{-1} can provide maximum macronutrients, the soil becomes loose, aeration is good, so it can support the growth of stem diameter to be large.

Organic matter from bio-compost blotong has benefits, namely: it can act as a reserve material and nutrient supply material for plants, increase cation exchange capacity, provide phosphate elements that are more quickly available in a larger pH range, act as a buffer against sudden changes in acidity, toxicity and temperature in the soil and can increase the availability of plant nutrients, which were previously unavailable.

CONCLUSIONS

From the results of the research on the effect of giving various doses of bio-compost blotong on the initial growth of sugarcane plants, it can be concluded that the dose of bio-compost blotong on vegetative growth, especially the percentage of shoot growth, plant height and number of leaves at all ages of observation, number of tillers and stem diameter had a significant effect. The treatment dose of bio compost 15 tons ha^{-1} showed the best treatment at an average number of tillers of 9.22 stems and a stem diameter of 15.95 cm. While the dose of bio compost blotong 20 tons ha^{-1} showed the best treatment for the percentage of shoot growth 89.25%, plant height 94.75 cm, and the number of leaves 16.25 strands.

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