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Test On The Implementation of Compound Biodive Poc Inincreasing The Germination Rate of Sugar Cane Cuttings (*Sugar Factory*l.)

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ABSTRACT

The aim of this research was to determine the effect of various concentrations of compound biological liquid organic fertilizer (POC) on the germination of plant cuttings. This research method uses a Randomized Group Design (RAK), with 1 treatment factor, namely Biological POC Concentration (K) consisting of 8 treatment levels, namely 0 ml, 1 ml, 2 ml, 3 ml, 4 ml, 5 ml, 6 ml, and 7 ml Biological POC per liter of water. This experiment was repeated 3 times with each treatment containing 2 sample plants, so that 24 treatments were obtained. Results The best statistical value was achieved by the K4 treatment, namely a concentration of 4 ml of Biological POC per liter of water for all observed parameters, including the percentage increase in growth compared to the control treatment so that the K4 treatment was considered more effective and efficient in the initial growth of sugarcane cuttings.

Keywords: Sprouts, POC, Fertilizer, Plants, Sugarcane.

1. INTRODUCTION

Indonesia is a country with quite large sugar producing potential. With its position below the equator, it is good enough capital to make this agricultural country an opportunity to achieve sugar self-sufficiency. However, the facts say otherwise, currently Indonesia always imports sugar even though the Government itself says Indonesia will be able to be self-sufficient in sugar. In supporting the national sugar self-sufficiency program, the initial stage of activity is to increase the production and productivity of sugar cane plants. Sugar production is a synergy of the productivity of sugar cane plants as raw materials and the performance of sugar factories. Sugarcane productivity is determined by genetic factors, namely varieties, environmental factors, namely cultivation techniques and the interaction of the two. Plant productivity will be optimal if these two factors are managed well (Gunawan et al., 2017)

During the economic crisis, the agricultural sector was a sector that was strong enough to face economic shocks and turned out to be reliable in the recovery of the national economy. One

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sub-sector that has quite large potential is the plantation sub-sector. The contribution of the plantation sub-sector to GDP was around 3.30 percent in 2018 or was first in the Agriculture, Livestock, Hunting and Agricultural Services sectors. Sugar cane as a raw material for the sugar industry is one of the plantation commodities that has a strategic role in the Indonesian economy (Martauli, 2018).

Sugar is a staple food that plays an important role for Indonesian society. According to Istiqomah, (2020) that in terms of share of household expenditure, sugar has a significant contribution with a share of around 4% in the last 10 years, second only to rice. In terms of frequency, sugar is consumed every day, whether consumed directly or indirectly through processed foods and drinks. In terms of consumption participation, sugar is consumed by all groups of society and all age levels .

The sugarcane area in Indonesia in the 2015-2018 period generally decreased every year. The average growth in sugarcane area in Indonesia in 2015-2019 was 0.05% and the area was around 440,085 ha/year with a productivity of 5,271 tons/ha; Meanwhile, sugar cane production in 2019 was 2,450,000 tons, with a growth rate of 12.67%. The highest area growth rate occurred in 2019 at 8.54% from an area of 417,576 ha to 453,238 ha, while the lowest growth rate occurred in 2017 at -3.31% from an area of 445,075 ha to 430,363 ha (Istiqomah, 2020) .

Various efforts to improve sugarcane cultivation techniques continue to be carried out, including research into the initial or vegetative growth of the plant. Good sugarcane germination will be achieved if internal factors (genetics) and external factors such as climate, soil and cultivation techniques are in optimal conditions. Deviations from optimal conditions will cause the germination ability of sugar cane plants to quickly decrease.

Providing fertilizer is important and must be adjusted to the plant's nutrient needs at the right dosage because applying too much or too little fertilizer will disrupt plant growth and damage the soil ecosystem. Germination is a critical phase for the life of sugar cane plants, good germination is a good basic capital for the success of the garden (Gunawan, 2018a).

Harjadi (1991), stated that germination is a complex series of processes of morphological, biochemical and physiological growth. Under the conditions that the initial needs for the growth of sugarcane plants are met, such as the availability of sufficient nutrients, water, air and sunlight, then in the first week the shoots change into short spurs and the roots begin to emerge. The second week the spurs have reached a height of 10 to 15 cm and the roots have grown a lot. At the beginning of the third week the leaves begin to grow and open and the shoots reach a height of 20

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to 25 cm and in the fourth week they already have 4 to 6 leaves and this is accompanied by the growth of seedlings.

When planning sugarcane cultivation, several things must be taken into account, including: the availability of planting materials, namely sugarcane seeds, good growing media, fertilization and other plant maintenance measures. One effort that can be taken to overcome this is by applying biological liquid organic fertilizer, namely fertilizer containing nutrients that have slow release characteristics and are composed of macro and micro nutrients, as well as other benefits as pesticides and herbicides. organic so as to help optimal plant growth. Therefore, in this case the research will use compound biological POC as a fertilizer application for the initial growth of sugar cane plants.

2. RESEARCH METHODS

This research used a Randomized Group Design (RAK), with 1 treatment factor, namely Biological POC Concentration (K) consisting of 8 treatment levels, namely 0 ml, 1 ml, 2 ml, 3 ml, 4 ml, 5 ml, 6 ml, and 7 ml Biological POC per liter of water. This experiment was repeated 3 times with each treatment containing 2 sample plants, so that 24 treatments were obtained. To use data analysis tools using Excel.

3. RESULTS AND DISCUSSION

Germination Speed

The results of the statistical analysis show that the concentration treatment of Liquid Organic Fertilizer (POC) gives a significant influence (F Calculated > F5%) on the germination speed variable at the beginning of germination, as shown in the variance results in Appendix 1. The average results of observations of germination speed due to Biological POC concentration treatment on sugarcane stem cuttings at the beginning of germination is presented in table 1.

Table 1. Average speed of germination of sugar cane stem cuttings (days) in various treatments and increase in germination speed (%) compared to control.

Treatment	Average Germination Speed of Sugarcane Plants (Days)	Increase in Germination Rate (%) Against Control
K0	6,33 b	0,00
K1	5,00 ab	21,01
K2	5,67 ab	10,43

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Treatment	Average Germination Speed of Sugarcane Plants (Days)	Increase in Germination Rate (%) Against Control
K3	5,33 ab	15,80
K4	3,67 a	42,02
K5	4,33 ab	31,59
K6	4,33 ab	31,59
K7	3,33 a	47,39
BNJ 5%	2,35	

Note: The numbers next to the same letter, in the same column are not significantly different (BNJ 5%).

Table 1 above shows that of all the treatments with various concentrations of Biological POC on sugar cane cuttings, there was a significant difference to the control treatment (without giving Biological POC) and the highest value was achieved by the K7 treatment, namely 3.33 days with a percentage increase in germination speed of 47. 39% which tends to be insignificantly different from the K4 treatment of 3.67 days with a percentage increase in germination speed of 42.02% in the initial observation of germination of sugar cane cuttings.

Biological liquid organic fertilizer can have a positive influence on the germination rate of sugarcane cuttings (Gunawan, 2018b). The following are several factors that can influence the effect of biological liquid organic fertilizer on the germination of sugar cane cuttings:

a. Nutrient Content: Biological liquid organic fertilizers generally contain important nutrients such as nitrogen, phosphorus and potassium, as well as other microelements. This nutrient can speed up the germination process and increase the growth strength of sugarcane seeds.
b. Hormonal Stimulation: Some biological liquid organic fertilizers contain natural compounds such as auxin, cytokinin and gibberellin. These compounds can stimulate the production of growth hormones in plants, thereby accelerating the germination and growth of sugarcane cuttings.
c. Microbial Activity: Biological liquid organic fertilizer also contains beneficial microorganisms such as bacteria and fungi. These microbes can help improve soil health and break down organic matter into nutrients that are more easily absorbed by plants. With more fertile soil, sugarcane cuttings have optimal conditions for rapid germination.
d. Water Availability: Biological liquid organic fertilizers generally have the property of binding water and increasing the soil's ability to retain water. This is important to maintain the moisture required by the sugarcane cuttings during the germination process.

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The results of this study provide an illustration that the application of biological organic fertilizer has an effect on increasing the physiological effects of plants during the germination of sugar cane cuttings, which in turn causes optimal germination acceleration at certain concentrations compared to the control treatment.

Plant Length

The results of statistical analysis show that the Biological POC concentration treatment has a significant influence (F Calculated>F5%) on the plant length variable when observing plants aged 21 days, 28 days and 35 days after planting as shown in the results of variance analysis in Appendix 2. In table 2 The following shows that from giving various concentrations of Biological PO to sugarcane stem cuttings there was a significant difference to the control treatment (without Biological POC) and the K5 treatment gave the highest value at the end of the observation at 35 days after planting at 136.67 cm which tended to be insignificantly different. with K3 treatment of 135.00 cm and K4 treatment of 135.33 cm. The average results of observations of plant length as a result of the Biological POC concentration treatment on sugarcane stem cuttings at various ages of observation are presented in table 2.

Table 2. Average shoot length of sugarcane stem cuttings (cm) at various ages of observation (days after planting).

Treatment	Average Shoot Length (cm)			
	14	21	28	35
K0	36,67	63,00 a	78,00 a	96,00 a
K1	39,33	71,33 ab	90,00 ab	118,00 ab
K2	43,33	78,00 ab	103,67 ab	122,67 ab
K3	39,33	75,00 ab	100,00 ab	135,00 b
K4	52,33	86,33 b	113,67 b	135,33 b
K5	45,00	81,00 ab	105,33 ab	136,67 b
K6	43,67	82,67 ab	109,33 b	128,00 ab
K7	49,33	85,00 b	107,33 b	131,00 ab
BNJ 5%	tn	20,81	28,16	36,39

Note: The numbers next to the same letter, in the same column are not significantly different (BNJ 5%).

Furthermore, the results of calculating the percentage increase in plant length for the control treatment as shown in Table 3 show that the K5 treatment gave the highest increase value

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of 42.36%, which tends to be insignificantly different from the K3 treatment of 40.63% and the K4 treatment of 40.97%, although Statistically, this increase was not significantly different from other treatments where biological POC was administered.

Table 3. Percentage Increase in Average Shoot Length of Sugarcane Cuttings (%) at Various Observation Ages Compared to the Control Treatment.

Treatment	Percentage Increase in Average Shoot Length (%)			
	14	21	28	35
K0	0,00	0,00	0,00	0,00
K1	7,27	13,23	15,38	22,92
K2	18,18	23,81	32,91	27,78
K3	7,27	19,05	28,21	40,63
K4	42,73	37,04	45,73	40,97
K5	22,73	28,57	35,04	42,36
K6	19,09	31,22	40,17	33,33
K7	34,55	34,92	37,61	36,46

The biological technology developed for liquid organic fertilizer is an implementation of the concept of ecological agriculture by considering production cost efficiency. The application of biological technology in the organic fertilizer production process is to create a "nutrient element" which has unique characteristics that are able to improve soil fertility, both physical, chemical and biological properties of the soil due to the presence of beneficial soil microbial content and the ability to fix nutrients from the air to increase the availability of the elements. nutrients that increase soil fertility, so that overall biological organic fertilizer can play a significant role in stimulating and increasing the growth of roots, stems and leaves.

Number of Leaves

The results of statistical analysis show that the Biological POC concentration treatment has a significant influence (F Calculated>F5%) on the variable number of leaves at the age of 28, 35 days after planting, as shown in the results of variance in Appendix 3. In table 4 below, the treatments of various concentrations Biological POC on sugar cane stem cuttings in the number of leaves variable showed a significant difference compared to the control treatment (without Biological POC treatment) but it was seen that the K4 treatment gave a better value, namely 9.00 compared to the other treatments, although it was not significantly different from the K5, K6

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treatments. , and K7 respectively were 8.67 at the age of 35 days after planting. The average observation results for the number of leaves at various ages of observation are presented in table 4.

Table 4. Average number of leaves from sugar cane stem cuttings at various ages of observation (days after planting).

Treatment	Average Number of Leaves from Sugarcane Plant Cuttings			
	14	21	28	35
K0	2,67	3,67	4,00 a	7,00 a
K1	3,00	3,67	4,33 ab	8,33 bc
K2	2,67	4,00	4,67 ab	7,67 a
K3	3,33	4,00	5,00 b	8,00 b
K4	3,33	4,00	5,00 b	9,00 c
K5	3,00	3,67	5,00 b	8,67 bc
K6	3,00	4,00	5,00 b	8,67 bc
K7	3,00	3,67	4,67 ab	8,67 bc
BNJ 5%	tn	tn	0,96	0,94

Note: The numbers next to the same letter, in the same column are not significantly different (BNJ 5%).

Furthermore, the results of calculating the percentage increase in the number of leaves compared to the control treatment showed that the K4 treatment gave an increase value of 28.57% higher than the other treatments, although statistically this increase was not significantly different from the K5, K6 and K7 treatments, each of which was 23. 81%. The average percentage increase in the number of leaves due to the Bio PO concentration treatment compared to the control treatment is presented in table 5.

Table 5. Percentage Increase in Average Number of Leaves from Sugarcane Plant Cuttings (%) at Various Observation Ages Compared to the Control Treatment.

Treatment	Percentage Increase in Average Number of Leaves (%)			
	14	21	28	35
K0	0,00	0,00	0,00	0,00
K1	12,50	0,00	8,33	19,05
K2	0,00	9,09	16,67	9,52
K3	25,00	9,09	25,00	14,29

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Treatment	Percentage Increase in Average Number of Leaves (%)			
K4	25,00	9,09	25,00	28,57
K5	12,50	0,00	25,00	23,81
K6	12,50	9,09	25,00	23,81
K7	12,50	0,00	16,67	23,81

Fertilization is the act of providing additional nutrient elements to the soil complex, which can either directly or indirectly contribute nutrients to plants. The aim is to improve soil fertility levels so that plants get sufficient nutrition to improve the quality and quantity of plant growth. According to (Simanungkalit et al., 2006) that biological liquid organic fertilizer can improve soil quality by increasing the organic matter content and increasing soil microbial activity. Healthy soil provides a good environment for plant roots to absorb nutrients and water efficiently, which in turn influences better leaf growth.

Root Length and Number of Roots

The results of statistical analysis show that the Biological POC concentration treatment has a significant influence (F Calculated > F5%) on the variable root length and number of roots of sugar cane plants at the age of 35 days after planting, as shown in the results of variance in Appendix 4. In table 6 below, it shows that Biological POC concentration treatment on sugar cane stem cuttings both in the root length and root number variables showed significant differences compared to the control treatment and it was seen that the K4 treatment tended to give better values, namely 27.33 cm and 16.33 respectively compared to other treatments in age observation 35 days after planting. The average results of observations of root length and number of roots in sugarcane cuttings are presented in table 6.

Table 6. Average Root Length (cm) and Number of Roots of Sugarcane Stem Cuttings (cm) and Percentage Increase in Values Compared to Control Treatment at Observation Age 35 days after Planting.

Treatment	Average Age Observation 35 Days After Planting		Average Percentage (%) Improvement Against Control Treatment	
	Root Length	Number of Roots	Root Length	Number of Roots
K0	17,00 a	6,00 a	0,00	0,00
K1	20,00 ab	8,00 ab	17,65	33,33

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Treatment	Root Length	Number of Roots	Root Length	Number of Roots
K2	25,67 ab	12,33 ab	50,98	105,56
K3	29,00 ab	11,33 ab	70,59	88,89
K4	32,00 b	16,33 b	88,24	172,22
K5	27,33 ab	16,00 b	60,78	166,67
K6	23,67 ab	15,33 b	39,22	155,56
K7	26,67 ab	15,00 b	56,86	150,00
BNJ 5%	13,61	8,41		

Note: The numbers next to the same letter, in the same column are not significantly different (BNJ 5%).

Furthermore, the results of calculating the percentage increase in root length and number of roots compared to the control treatment show that the K4 treatment tends to provide an increase value of 88.24% and 172.22% respectively higher than the other treatments, although statistically the increase is not significantly different in terms of magnitude. percentage increase in root length and number of roots achieved by other treatments.

According toMansyur et al., (2021) that biological liquid organic fertilizer contains macro and micro elements needed for plant growth and development. Improvements in the physical, chemical and biological properties of the soil due to the provision of biological POC encourage conditions for improving the degree of soil acidity at a neutral pH which then has an impact on increasing the optimization of nutrient absorption by plant roots at the beginning of the plant's growth period which can stimulate longer and more root growth. so that it can increase the absorption of nutrients for plants.

Wet Weight per Plant and Dry Weight per Plant

The results of statistical analysis show that the Biological POC concentration treatment has a significant influence (F Calculated > F5%) on the variables of wet weight per plant and dry weight per sugarcane plant at the age of 35 days after planting, as shown in the results of variance in Appendix 5. The average -The average results of observations of the wet weight and dry weight variables per plant are presented in table 7.

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Table 7. Average Wet Weight per Plant and Dry Weight per Sugarcane Plant (grams) and Percentage Increase in Weight Compared to Control Treatment at Age Observation 35 days after Planting.

Treatment	Average Weight (grams) at Age Observation 35 Days After Planting		Average Percentage (%) Improvement Against Control Treatment	
	Wet Weight per Plant	Dry Weight per Plant	Wet Weight per Plant	Dry Weight per Plant
K0	60,00 a	17,17 a	0,00	0,00
K1	73,33 ab	18,67 ab	22,22	8,74
K2	83,33 bc	18,83 ab	38,89	9,71
K3	88,00 bcd	19,00 ab	46,67	10,68
K4	102,67 cd	22,50 b	71,11	31,07
K5	99,00 cd	21,17 ab	65,00	23,30
K6	100,33 cd	21,83 ab	67,22	27,18
K7	106,00 d	22,00 ab	76,67	28,16
BNJ 5%	21,96	4,83		

Note: The numbers next to the same letter, in the same column are not significantly different (BNJ 5%).

In table 7 above, the Biological POC concentration treatment on sugar cane stem cuttings in the wet weight and dry weight variables per plant shows a significant difference compared to the treatment without Biological POC (control), however the K4 treatment tends to give better values, namely 102, respectively. 67 grams and 22.50 grams compared to other treatments, although statistically it was not significantly different from other treatments at 35 days after planting. Furthermore, the results of calculating the percentage increase in wet weight per plant compared to the control treatment showed that the K4 treatment gave an increase value of 71.11% respectively in the variable wet weight per plant and 31.07% in the variable dry weight per plant which tended to be higher than the treatment. others, although statistically this increase was not significantly different from the percentage increase in wet weight and dry weight per plant achieved by other treatments.

The application of biological technology in the manufacture of liquid organic fertilizer has been proven to be able to increase nutrient absorption, protect plants from pests and diseases, and increase plant productivity through efficiency and saving land resources (Qisthi et al., 2021).

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4. CONCLUSION

There was a significant effect of Biological POC concentration on increasing the growth of sugarcane cuttings on all observed parameters studied, including: germination speed, plant length, number of leaves, root length, number of roots, wet weight per plant and dry weight per plant. The best statistical value was achieved by the K4 treatment, namely a concentration of 4 ml of Biological POC per liter of water for all observation parameters, including the percentage increase in growth compared to the control treatment so that the K4 treatment was considered more effective and efficient in the initial growth of sugarcane cuttings.

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