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Analysis of Nutrients (N,P,K) in Bio Seeding Block Based on Sugarcane Waste

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Abstract. Macronutrients are very important in plants, because they have a significant role in the development of lants and very required to fulfill. Nitrogen, Potassium, and also Phosphorus are three important macronutrients. Bio seeding block is a seeding media made by soil block, it consists of a sugarcane waste. It is good for an environment, sensible, and rich in natural matters. The aims in this research, is to analyze the nutrient composition in bio seeding block. Bio seeding block products used waste from sugarcane, that consisted of bagasse, sugarcane filter cake, and ash from sugarcane. There are 4 treatments to analyze bio seeding block such as : Treatment A, with ratio between sugarcane filter cake : bagasse : and ash are 4 : 4 : 1, treatment B, with ratio are 5 : 3 : 1, treatment C, with ratio are 6 : 2 : 1, and treatment D, with ratio 7 : 1 : 1. The results show that the highest amount of N is in treatment D that is 0,439; the highest amount of P is in treatment B that is 2,170; and the highest amount of K is in treatment A that is 0,480. Based on plant growth tests (plant height, leaf width, and stem diameter) show that medium A is the fastest growing medium in the first 15 days and also has high number of main nutrients.
Keywords: Bio Seeding Block, Macronutrients, Nitrogen, Phosphorus and Potassium

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1 Introduction

Bio Seeding Block is a seed medium manufactured by Soil Block. Natural-friendly, rational, and rich in natural matters is the reason of sugar cane waste mainly used as cattle feed, handicraft and bio-fuel. The innovation of the organic seed block is that it is a soil block seedling that uses sugarcane waste as the main raw material and does not use plastic bags. Ready to use for horticultural seed cultivation. Most people use plastic bags as media, which is not environmentally friendly. Organic seed block products are an innovation in agricultural products. The main reason of this research is because a lot of sugar cane waste produced as the effect of the increasing sugar's production in Indonesia. The development of sugar production from 2017 to 2021. It tends to sway. Sugar production was high in 2018. It decreased by 2.17 million tons compared to 19.25 thousand tons (0.88%). Meanwhile, sugar production in 2019 was 2.23 million pieces.tons increased by 55.32 thousand tons (2.55%) compared to the same period last year 2018. Sugar production in 2020 reached 2.12 million tons. A decrease of 103.65 thousand tons (4.65 percent) compared to 2019 will increase again in 2021 224.93 thousand tons (10.60%) to 2.35 million tons (Indonesia Statiscic Beaureu, 2021) [1].

This product consists of bagasse from sugar cane, filter cake and sugar cane ash. All of this waste have great fuctuin for plant [2]. Macronutrients are very important in plants, because they have significant role in the development of plants and required to fulfill. Nitrogen, Potassium and also Phosphorus are three important macronutrients. The purpose and ojective of this study was to analyze the nutritional content within organic seed blocks. Our organic seed block products consist of sugar cane waste such as : it is made from bagasse, sugar cane filter cake and ash. There are 4 treatments to analyse bio seeding block such as : Treatment A, with ratio between sugarcane filter cake : bagasse : and ash are 4 : 4 : 1, treatment B, with ratio are 5 : 3 : 1, treatment C, with ratio are 6 : 2 : 1, and treatment D, with ratio 7 : 1 : 1. Beside analyze main macronutrients, this research also analyze the different effects of plant height, leaf width, number of leaves, stem diameter based on all treatments.

2 Literature review

2.1 Main macronutrient

The main macronutrients are nitrogen, phosphorus and potassium. Macronutrients are fertilizers that plants require in the highest amounts. Uninterrupted plant production can reduce nutrient stores in the soil. Cumulative depletion can reduce production's amount, crop yields, soil fertility and cause degradation. Primary macronutrients play an important role in enhancing crop quality. The three major nutrients are nitrogen, potassium and phosphorus. Good plant nutrition is essential for crop production. Nitrogen (N) is an important nutrient that required for plant production, but nitrogen deficiency can cause yellowing of plant leaves and affect tillering of grains. Phosphorus (P), like N, is an essential nutrient, altering cell division and processes of carbohydrate. Phosphorus has important function by stabilizing membrane structure [3].

2.2 Role of nitrogen

Nitrogen is the most important nutrient for plant production. Nitrogen is very important for enzymes, chlorophyll, proteins, etc. Nitrogen stimulates root growth and plant development, as well as uptake of other nutrients. Therefore, with the exception of legumes, which fix nitrogen from the atmosphere, plants usually respond quickly to nitrogen supplementation [4]. Nitrogen plays an important function in physiological. It gives dark green color, growth and leaves's development, stems and etc [5]. Nitrogen is also required for energy conversion. [6]

2.3 Role of phosporus

Phosphorus is a macronutrient that involved on growth. Phosphorus is a key component of the photosynthetic process, involved in the production of sugars and starches, and also solar energy's conversion into chemical energy and proper maturation of plants (Zewdie and Reta, 2021) [7]. Phosphorus is an important nutrient during plant growth, especially in the early stages [8]. In sugarcane, it is important for root establishment and for improving sugarcane yield and quality [2].

2.4 Role of pottasium

Potassium (K) is an important macronutrient for increasing plant productivity [7]. Potassium (K) plays an important function for plant nutrient, water uptake, nutrient transport, and even plant growth [9]. To achieve high plant productivity, the amount of potassium in the plant must be maintained and controlled.

3 Research method

3.1 Research types

The data in this study are quantitative. Quantitative data are systematic data and relate to problems encountered in the field. Quantitative research shows that the research is based on what is happening in the field.

3.2 Research design

This study arranged using a four treatments and 5 replications. The formulation of treatments based on form and function of each medium, such as filter cake has similar form with land, therefore it needed big numbers of ratio to formulate.

Tabel 1. Research design

Treatment	**Ratio Percentage**		
	Filter cake	**Bagasse**	**Ash**
Treatment A	4	4	1
Treatment B	5	3	1
Treatment C	6	2	1
Treatment D	7	1	1

Bagasse has similar form with dry plant, therefore it needed with smaller amount than filter cake. Ash has a similar form with sand, therefore it is needed with the smallest ratio, because if we add many ashes, the seeding block will be vulnerable and easily broken before it is used.

3.3 Data collection methods

All data for this study were collected by Industri Gula Glenmore (Glenmore Sugarcane Industry) and conducted at Industri Gula Glenmore. The schedule for this study is May 2022 to November 2022.

4 Research result

4.1 Manufacturing process of organic seed blocks from sugar cane waste

Organic Seed Block products use sugar cane waste from : bagasse, sugar cane filter cake and ash. Treatment of sugar cane waste is relatively simple and can be easily implemented by local communities. Five media with different percentages of filter cake, bagasse and ash were used in this study. The manufacturing process is shown in Figure 1.

Fig.1. Bio seeding block from sugarcane waste

4.2 Macronutrient in bio seeding block

There are 5 media in this research, with different ratio percentages between filter cake, bagasse, and ash. All 5 media show different results of macronutrients in the Bio Seeding Block. There are 4 treatments to analyze bio seeding block such as : Treatment A the ratio between sugarcane filter cake : bagasse : and ash are 4 : 4 : 1, treatment B the ratio are 5 : 3 : 1, treatment C the ratio are 6 : 2 : 1, and treatment D the ratio 7 : 1 : 1. The results show in Table 2.

Table 2. Macronutrient in bio seeding block

No	Parameter	Unit	Test Result			
			A	B	C	D
1.	N total	%	0.436	0.366	0.372	0.439
2.	P_2O_5	%	1.183	2.170	1.276	1.543
3.	K_2O	%	0.480	0.383	0.434	0.297

Table 2 showed that the highest amount of N is in treatment D that is 0,439; the highest amount of P is in treatment B that is 2,170; and the highest amount of K is in treatment A that is 0,480. There are 3 macronutrients that analyze in this research, such as : Nitrogen. Nitrogen stimulates root growth and plant development, as well as uptake of other nutrients. Phosphorus is an important component of the photosynthetic that participates in the formation of sugars and oils, as well as assisting in the conversion of solar energy and plant maturation. Potassium plays an important role for nutrient transport and plant growth. As the result of this research, we can see that for root growth and crop development, we can use treatment D; to proper plant maturation we can use treatment B, and to physiological processes we can use treatment A.

4.3 Analysis results of anova and duncan's multiple range test (DMRT)

The results of the Anova and Duncan Multiple Range Test (DMRT) on the study parameters (plant height, leaf width, number of leaves, stem diameter) for the application of cane molasses to lettuce, the data shown in Table 3.

Table 3. Anova analysis's result

No	Parameter	Sig.
1	Plant height	0,000
2	Leaf width	0,000
3	Stem diameter	0,000
4	Number of leaves	0,219

Treatment was effective in terms of Sig score ($P<0.05$). Therefore, the leaf number parameter cannot be further tested with Duncan's multiple range test (DMRT), with result 0,219. Duncan's double range test results are shown in Table 4.

Table 4. Mean analysis results of plant height, leaf width, and stem diameter

No	Parameter	Treatment			
		Treatment A	Treatment B	Treatment C	Treatment D
1	Plant height	1, 195^{b}	1, 177^{b}	1, 270^{a}	1, 239^{a}
2	Number of leaves	0, 365^{a}	0, 367^{a}	0, 345^{b}	0, 377^{a}
3	Stem diameter	0, 037^{a}	0, 034^{b}	0, 034^{b}	0, 034^{b}

Follow-up results using Duncan's multiple distance test revealed that the optimal parameter for plant height when treated with medium C was significantly different from medium A and medium B, but not significantly different from medium D. The leaf width parameter was the best treatment on medium D and differed significantly from medium C, but not significantly from medium A and medium B. The stem diameter parameters from the three treatments, medium B, medium C, and medium D, were not significantly different, but differed significantly from medium A, which showed the best values. Based on plant growth tests (plant height, leaf width, stem diameter) show that medium A is the fastest growing medium in the first 15 days. Bio Seeding Block is also suitable to use for household, industry, and etc, because it has reacheable's price. Selling price for this product is Rp 5.500,00 per unit [10].

5 Conclusion

Based on the analysis and evaluation of macronutrients in bio seeding blocks, it can be concluded that the application of macronutrients is of great importance for harvest. The following conclusions can be drawn from the research conducted : The highest N content is treatment D, 0.439. The highest P level is treatment B, 2170. The highest K level for treatment A is 0.480. Based on plant growth tests (plant height, leaf width, stem diameter) show that medium A is the fastest growing medium in the first 15 days and also has the main nutrients that are needed by plant.

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