

The Effect Of KNO₃ And Kieserite Fertilization On The Growth Of Palm Oil (*Elaeis guineensis* Jacq.) Seeds That Attack Leaf Flot In Main Nursery

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Abstract. Quality seeds can be met if during their growth can take place well and produce healthy plants. One of the obstacles in maintenance activities is the recovery of seedling growth after a severe attack of leaf spot disease at the age of 5-6 months in the main nursery. The way that can be done is to test the effectiveness of nitrogen and magnesium fertilization on the recovery of seedling growth. This study aims to obtain the best concentration of nitrogen fertilizer and magnesium fertilizer in optimizing the growth of oil palm seedlings that have been attacked by diseases in the main nursery. The research will be carried out at the Lampung State Polytechnic's Oil Palm Nursery Unit. The experimental design used was a factorial randomized design (RAF) 2 x 3 with 5 replications. The first factor of treatment was KNO₃ fertilization and the second factor was kieserite fertilization. The first factor is KNO₃ fertilization with a concentration of 1% and 2%. The second factor is kieserite fertilization which consists of doses of 0 g, 5 g, and 10 g. The observed variables were seedling height, seedling diameter, number of midribs, level of greenness of leaves and leaf area of tillers. Observational data will be analyzed by F test at level = 5%. If the results of the analysis of variance are significant, it will be continued with the further test of the smallest significant difference (BNT) at the level of = 5%. The results showed that the application of 2% KNO₃ fertilizer with the addition of 10 g of kieserite was able to produce the best growth recovery on all observed variables.

1. Introduction

Quality seeds are one of the determining factors for the success of oil palm production. Good and correct nurseries are supported by planting media and good maintenance. According to [1], the productivity of a plant can be determined by the quality of the planting material and the technical culture treatment applied. The main purpose of nurseries is to provide quality seeds with criteria that are fresh, healthy, and sturdy. However, at the oil palm nursery stage, both in the pre-nursery and in the main-nursery, there are various obstacles such as disease attacks. One of the diseases that interfere with oil palm nurseries is leaf spot disease. Leaf spot disease (*Curvularia sp.*) is a pathogen for oil palm plants in Indonesia which is usually found on the leaves of oil palm seedlings. The intensity of leaf spot disease caused by *Curvularia sp.* in oil palm nurseries reached 38% [2].

Efforts can be made to cure leaf spot disease, namely by pruning the affected leaves so that they do not spread to other leaves. Fungicides are very effective for controlling leaf spot disease on oil palm seedlings in main nurseries [3]. However, continuous application of fungicides will interfere with the growth of oil palm seedlings. Therefore, to optimize the growth of oil palm plants, such as before leaf spot disease, it is necessary to add other fertilizers besides compound NPK fertilizers [4].

One other fertilizer that can be added is a fertilizer that can meet the nutrient needs of Potassium, Nitrogen, and Magnesium. The recommended dose of 50% NPK fertilizer was sufficient to

stimulate the growth of oil palm plants in the main nursery [5]. However, the application of basic NPK fertilizer alone has not been able to cure the growth of oil palm seedlings that have been attacked by the disease. Therefore, it is necessary to add other nutrients that are able to optimize the growth of oil palm seedlings properly. One of the nutrients that can be given is a dose of KNO₃ fertilizer. KNO₃ fertilizer is one source of nitrogen nutrients. One way that can be done to optimize the provision of nitrogen nutrients is by increasing the dose of KNO₃ fertilizer [6]. The application of KNO₃ fertilizer with a concentration of 1-2% was able to increase the growth of oil palm seedlings well in the main nursery. Red KNO₃ fertilizer contains the best elements, namely K (potassium) which is resistant to pests and diseases and N (Nitrogen) is an important component of all proteins.

Kieserite fertilizer contains the best element, namely Mg (Magnesium) which will play a role in the formation of leaf green matter (chlorophyll). Giving Kieserite fertilizer can increase chlorophyll so that the color of the leaves is more perfect green. The addition of Kieserite fertilizer is useful in the process of plant photosynthesis which forms chlorophyll in the leaves, so that plants can grow and develop optimally [7]. Therefore, it is necessary to test plants or growth parameters to see the best concentration of KNO₃ fertilizer and the best dose of Kieserite fertilizer that can cure the growth of oil palm seedlings affected by leaf spot disease.

2. Methods

This research was conducted at the Palm Oil Seedling Business Unit (UPKS) of Lampung State Polytechnic from June 2022 to November 2022. The tools used in this experiment were buckets, stirrers, measuring cups, analytical scales, meters, digital calipers, pruning shears, hand sprayer, and chlorophyll meter (Minolta SPAD-502 plus). The materials used in this experiment were oil palm seeds D x P Simalungun variety aged 5 months in the main nursery, NPK fertilizer (15-15-15) 5 g, KNO₃ 1% and 2%, Kieserite 5 g and 10 g, insecticides active ingredient Emamectin benzoate, fungicide with active ingredient Propineb 70%, and black polybag size 40 cm x 50 cm. The experimental design used a factorial randomized block design with two factors and six replications. The first factor is KNO₃ fertilizer with a concentration of 1% (K1) and a concentration of 2% (K2). The second factor is kieserite fertilizer with doses of 0g (P1), 5g (P2), and 10g (P3). Observations were made 6 months after the first treatment. Observation variables included seedling height, seedling stem diameter, number of leaves, and leaf greenness. If the results of the analysis of variance are significant, then proceed with the smallest significant difference test (BNT) at level = 5%.

3. Results and Discussion

The results showed that the application of KNO₃ with kieserite fertilizer had a significant effect on the growth of oil palm seedlings affected by leaf spot disease in the main nursery. This can be seen from the recapitulation of calculations on each observation variable showing significantly different results. The recapitulation of the calculation of each observation variable is presented in Table 1.

Table 1. Results of Variance Analysis of the Effect of KNO₃ and Kieserite on the Growth of Oil Palm Seedlings attacked by leaf spot in the main nursery.

Variabel Pengamatan	Signifikasi (Nilai F-Hitung Perlakuan)		
	KNO ₃	Kieserit	Interaksi
Tinggi Bibit	172,23*	375,92*	18,37*
Diameter Batang Bibit	64,49*	65,07*	6,43*
Jumlah Daun	104,72*	190,62*	8,19*
Tingkat Kehijauan Daun	105,19*	176,50*	6,49*

* = significant effect at the level $\alpha = 5\%$

The results of this study indicate that the application of KNO₃ fertilizer which was applied with the addition of kieserite fertilizer showed significantly different results on all the observed variables in Table 1. The interaction showed that the application of KNO₃ with a concentration of 2% and a dose of 10g kieserite fertilizer showed the best growth recovery results in all variables. observed observations (Table 2). The results of this study are in line with [4], that the application of KNO₃ with a frequency of fertilization once a week has an important role in the recovery of oil palm seedling growth in all observation variables. This is presumably because the KNO₃ fertilizer contains nitrogen and potassium nutrients which have a role in optimizing the growth of oil palm seedlings both in

healthy plants and in the growth recovery process in diseased plants. Element N can increase the absorption of several micro elements that have an important role in the greenness of leaves and play an important role in the photosynthesis process [8]. In addition, the K nutrients in KNO_3 fertilizer also complement each other and provide a role and support for plant growth. KNO_3 fertilizer, which stimulates and accelerates the growth of plant roots, as well as fertilizes and strengthens plant tissues. KNO_3 fertilizer can also be used on shallots, garlic, potatoes, carrots, chilies, tomatoes, watermelons, melons, cucumbers, cabbages, mustard greens, cauliflower, tobacco, soybeans, beans, rice, corn, apples, oranges, manga, grape, strawberry, clove, and chocolate. Application of KNO_3 fertilizer was also able to increase the growth and yield of Deli varieties of tobacco [9] and Virginia varieties of tobacco [10].

Apart from KNO_3 fertilization, kieserite fertilizer also plays a role in optimizing growth and as a plant-strengthening nutrient in the face of disease. Kieserite fertilizer is one of the inorganic fertilizers containing Mg and S nutrients, in the form of solid crystals with the chemical formula $MgSO_4 \cdot H_2O$, and is a secondary mineral that is easily soluble in water. Kieserite can also be called Magnesium fertilizer, because it contains high Mg nutrients. Kieserite fertilizer is also classified as a single fertilizer that is able to improve the physical and chemical properties of the soil. Kieserite fertilizer contains the element Mg (Magnesium) which plays a role in the formation of leaf green matter (chlorophyll). The addition of Kieserite fertilizer is useful in the process of plant photosynthesis which forms chlorophyll in the leaves, so that plants can grow and develop optimally [7]. Magnesium plays an important role in plant production as a constituent of chlorophyll where photosynthesis takes place and an activator of various enzymes that affect phosphate transfer. Therefore, the most important function of Mg in plants is the formation of chlorophyll. While sulfur (S) is an important nutrient to improve leaf quality, plant oil content, and resistance to low temperatures. The role of Kieserite fertilizer containing Magnesium Sulfate which can optimize leaf chlorophyll content is thought to be one of the important factors in restoring the growth of oil palm seedlings affected by leaf spot by optimizing the photosynthesis process that takes place in plants.

Table 2. LSD test results on average seedling height, seedling stem diameter, number of midribs and greenish level of leaves in seedlings affected by leaf spot disease.

Observation Variable	KNO_3 Concentration	Kieserite Fertilizer Dosage					
		0		5		10	
Tinggi Bibit	1%	115,15	c	118,40	b	126,18	a
		B		B		B	
	2%	117,53	c	125,91	b	130,20	a
		A		A		A	
BNT		1,26					
Diameter Batang Bibit	1%	5,98	c	6,07	b	6,28	a
		B		B		B	
	2%	6,18	c	6,22	b	6,69	a
		A		A		A	
BNT		0,11					
Jumlah Daun	1%	14,33	c	15,83	b	17,17	a
		B		B		B	
	2%	15,33	c	17	b	19,5	a
		A		A		A	
BNT		0,52					
Tingkat Kehijauan Daun	1%	55,14	c	58,14	a	60,38	b
		A		A		A	
	2%	57,3	c	60,18	a	64,55	b
		A		B		B	
BNT		0,97					

Information : 1. Numbers followed by the same letter show results that are not significantly different in the BNT test with a level of 5%.

2. Uppercase letters are read downwards and lowercase letters are read horizontally.

4. Conclusions

Based on the results of the study, it was found that 2% KNO₃ fertilization with 10g kieserite fertilization was the most effective and efficient treatment in optimizing the growth recovery of oil palm seedlings affected by leaf spot disease in the main nursery.

5. References

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