



Growth Response of Several Varieties of Oil Palm Sprouts (*Elaeis guineensis* Jacq.) Towards Application of Biological Fertilizer in Pre-Nursery

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ARTICLE INFO

Article history:

Received 27 Januari 2022

Revised 19 Maret 2022

Accepted 11 April 2022

Available online:

<https://talenta.usu.ac.id/joa>

E-ISSN: 2963-2013

P-ISSN: 2337-6597

How to cite:

Bangun, I.M. Charloq & Irsal (2022). Growth Response of several varieties of oil palm sprouts (*Elaeis guineensis* Jacq) towards application of biological fertilizer in pre-nursery. Jurnal Agroteknologi, 10(2), 24-28.



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<https://doi.org/10.32734/joa.v10i2.9098>

ABSTRACT

This research was conducted at the Faculty of Agriculture, University of North Sumatra, Medan from September 23, 2021 to December 14, 2021. The study used a factorial completely randomized design, the first factor being the DxP Yangambi varieties, the DxP Simalungun varieties, and the DxP Dumpy varieties and the second factor being the application of biological fertilizers consisting of: 0 g/l water, 2,5 g/l, 5 g/l water, 7,5 g/l water. The results showed that the PPKS DxP Dumpy varieties significantly increased plant height at 8, 10, and 11 weeks of age of oil palm (*Elaeis guineensis* Jacq.) seedlings in pre-nursery. The application of biofertilizers did not significantly increase the growth of oil palm (*Elaeis guineensis* Jacq.) seedlings in the pre-nursery. The interaction of biological fertilizer application with varieties significantly increased plant height from 7-12 weeks of age on oil palm (*Elaeis guineensis* Jacq.) seedlings in pre-nursery

Keyword: Oil palm, varieties, biofertilizers

ABSTRAK

Penelitian ini dilaksanakan di Fakultas Pertanian Universitas Sumatera Utara Medan pada tanggal 23 September 2021 sampai dengan 14 Desember 2021. Penelitian menggunakan rancangan acak lengkap faktorial, faktor pertama adalah varietas DxP Yangambi, varietas DxP Simalungun, dan varietas DxP Dumpy dan faktor kedua adalah pemberian pupuk hayati yang terdiri dari: 0 g/l air, 2,5 g/l, 5 g/l air, 7,5 g/l air. Hasil penelitian menunjukkan bahwa varietas PPKS DxP Dumpy mampu meningkatkan tinggi tanaman secara nyata pada umur bibit kelapa sawit (*Elaeis guineensis* Jacq.) umur 8, 10, dan 11 minggu pada pre-nursery. Penerapan pupuk hayati tidak meningkatkan pertumbuhan bibit kelapa sawit (*Elaeis guineensis* Jacq.) secara signifikan pada pre-nursery. Interaksi aplikasi pupuk hayati dengan varietas nyata meningkatkan tinggi tanaman umur 7-12 minggu pada bibit kelapa sawit (*Elaeis guineensis* Jacq.) di pre-nursery

Keyword: Kelapa sawit, varietas, pupuk hayati

1. Introduction

Oil palm (*Elaeis guineensis* Jacq.) originating in West Africa, is one of the important plantation commodities in Indonesia and is the largest source of foreign exchange for the country (Fauzi and Putra, 2019). The use of high-yielding varieties alone is not enough to produce good planting material with high production. According to Jannah et al (2012), breeding is the first step in a series of oil palm cultivation activities that greatly affect the productivity and age of plants produced. At this stage, fertilizing and watering are such important aspects that it is necessary to consider and plan well to obtain optimum growth of seedlings. The quality of oil palm seeds is very real influencing the yield and quality of oil palm, therefore the use of superior seeds is the main requirement in the development of oil palm cultivation (Pahan, 2010).

Biological fertilizer with the trade name Decohumat which has the advantage of being effective for decomposing organic matter, straw, and plant residues is directly dilahan without the need for closure. Effective for sterilizing microbes of wilt disease, root rot, and moler in the growing medium and plant residues.

Improve and restore soil fertility levels that are already oversaturated by chemical fertilizers by increasing the cation exchange capacity and soil pH and increasing crop productivity and plant resistance to disease attacks.

Based on the description above, the author is interested in researching the growth response of several varieties of oil palm sprouts (*Elaeis guineensis* Jacq.) to the application of biological fertilizers in the Pre-Nursery.

2. Materials and Methods

This research was carried out on the experimental land of the Faculty of Agriculture, University of North Sumatra, Medan with an altitude of 32 meters above sea level from September to December 2021. The materials used in this study were oil palm sprout seeds consisting of PPKS varieties DXP Yangambi, DXP Simalungun, DXP Dumpy as the object of observation, Decohumic Biofertilizers with the active ingredient *Streptomyces* sp., 2.7×10^5 CFU / gram, *Trichoderma* sp., 1.5×10^6 CFU / gram, and Humic Acid 41.97%, polybag size 1 kg (15 cm x 22 cm), topsoil. This experiment used a factorial Complete Randomized Design (CRD) with 2 factors where Factor I was oil palm seeds with 3 varieties, where V1 (DXP Yangambi), V2 (DXP Simalungun), V3 (DXP Dumpy) and Factor II of biofertilizer application with 4 levels, where H0: 0% (0 grams / L of water) control / without the application of biofertilizers, H1: 0.25% (2.5 grams / L of water), H2: 0.5% (5 grams / L of water), H3: 0.75% (7.5 grams / L of water). Fertilizer is applied as much as 300 ml on the polybag and each treatment.

The land is prepared as well as possible in a flat, open, strategic, and safe area. The used area is cleared of weeds and plant root residues. An experimental plot with a size of 100 cm x 100 cm was made with a distance between plots of 50 cm and a distance between tests of 100 cm. Shading is made using 60% paranets. Previously, a shading frame from bamboo with a height of 2m from above the ground level was first installed, while the size of the length and width of the shade were adjusted to the existing conditions of the plot.

Each polybag is planted with 1 seed at a depth of 2 cm from the surface of the planting medium. Watering on oil palm plants is carried out every morning and evening. But also look at the environmental conditions. If there has been raining or is happening, there is no need for watering. The observed parameter is the height of the plant from the age of the plant 4 weeks to 12 weeks after planting.

3. Results and Discussion

Plant Height

The effect of palm oil varieties DXP Yangambi (V_1), DXP Simalungun (V_2), DXP Dumpy (V_3) on plant height at the age of 4 to 12 MST, showed a noticeable effect at the age of 8, 10, and 11 MST, while the effect was not real at the age of 4, 5, 6, 7, 9 and 10 MST. And for the application of biological fertilizers to each type of variety exerts an unreal influence on the age of 4 to 12 MST.

The average plant height at the age of 12 MST shows that the DXP Dumpy (V_3) variety has the highest average of 20.30 cm compared to other varieties. This was in accordance with the Palm Oil Research Center (2018), which states that the DXP Dumpy (V_3) variety has a relatively large stem density, thereby reducing the potential for falling, and has an adaptability to marginal areas, especially in tidal lands and peat areas.

The results of the analysis data showed that the interaction between the treatment of varieties and the application of biological fertilizers to plant height had a noticeable influence. This was in accordance with the literature of Sighn, et al., (2011) which states that biological fertilizers when applied to seeds or soil, the microorganisms contained in them will multiply and play an active role in providing nutrients to increase plant productivity.

Table 1. The average plant height of oil palm varieties with the application of biological fertilizers.

MST Age	Variety	Biological Fertilizers (g/l)				Average
		H ₀ : 0	H ₁ : 2,5	H ₂ : 5	H ₃ : 7,5	
	cm.....				
4	V ₁ : Yangambi	5,55	5,75	5,28	4,67	5,31
	V ₂ : Simalungun	5,01	5,49	5,25	4,22	4,99
	V ₃ : Dumpy	5,54	5,56	5,27	5,15	5,38
	Average	5,36	5,60	5,27	4,68	
5	V ₁ : Yangambi	7,24	7,45	6,97	5,99	6,91
	V ₂ : Simalungun	6,70	7,09	6,85	6,89	6,88
	V ₃ : Dumpy	7,15	6,95	7,04	6,64	6,94
	Average	7,03	7,16	6,95	6,51	
6	V ₁ : Yangambi	9,42	10,01	9,53	7,91	9,22
	V ₂ : Simalungun	8,85	9,41	9,47	9,96	9,42
	V ₃ : Dumpy	10,14	9,41	9,29	9,11	9,49
	Average	9,47	9,61	9,43	8,99	
7	V ₁ : Yangambi	11,27b	11,55ab	11,47ab	9,29a	10,90
	V ₂ : Simalungun	10,21a	11,21a	11,53ab	12,15b	11,27
	V ₃ : Dumpy	12,46c	11,48ab	11,09a	11,65b	11,67
	Average	11,31	11,41	11,37	11,03	
8	V ₁ : Yangambi	13,83b	13,77a	14,32a	11,70b	13,40a
	V ₂ : Simalungun	12,39a	13,17ab	13,51ab	14,91a	13,50a
	V ₃ : Dumpy	15,65c	14,84b	13,63ab	14,49b	14,65b
	Average	13,96	13,92	13,82	13,70	
9	V ₁ : Yangambi	15,91b	15,51ab	15,46ab	13,36a	15,06
	V ₂ : Simalungun	14,19a	14,39a	14,68a	16,93b	15,05
	V ₃ : Dumpy	17,21c	16,69b	15,07ab	16,24b	16,30
	Average	15,77	15,53	15,07	15,51	
10	V ₁ : Yangambi	16,98b	17,29b	16,89ab	14,99a	16,53a
	V ₂ : Simalungun	15,12a	15,47a	15,99a	18,21b	16,20a
	V ₃ : Dumpy	18,73c	18,13b	16,56ab	17,45b	17,72b
	Average	16,94	16,96	16,48	16,88	
11	V ₁ : Yangambi	18,20b	18,82b	18,24b	16,43a	17,92ab
	V ₂ : Simalungun	16,48a	16,85a	17,13a	19,65b	17,53a
	V ₃ : Dumpy	19,88b	19,44b	17,56ab	18,71b	18,90b
	Average	18,19	18,37	17,65	18,26	
12	V ₁ : Yangambi	19,39b	19,91b	19,91b	17,77a	19,24
	V ₂ : Simalungun	17,75a	18,26a	18,49a	21,09b	18,90
	V ₃ : Dumpy	21,50c	20,85b	18,67ab	20,19b	20,30
	Average	19,55	19,67	19,02	19,69	

Note: Numbers followed by the same notation in the same row and column showed no significant difference according to the Duncan's Multiple Range Test (DMRT) at 5% level

The combination of D x P Dumpy variety treatment with a biofertilizer dose of 7.5 g/l of water (V₃H₃) resulted in the highest average at plant height. This is thought to be due to the influence of microorganisms contained in biological fertilizers that maximize the absorption of nutrients for oil palm plants so that they are good for plant growth. This was in accordance with the literature of Supriyo et al (2014) which states that biological fertilizers contain living microorganisms, and added to the soil in the form of inoculants or other forms can increase the availability of nutrients for plants. Biological fertilizers can increase plant yields and increase the efficiency of using inorganic fertilizers so that inorganic fertilizers can be reduced by up to 50%.

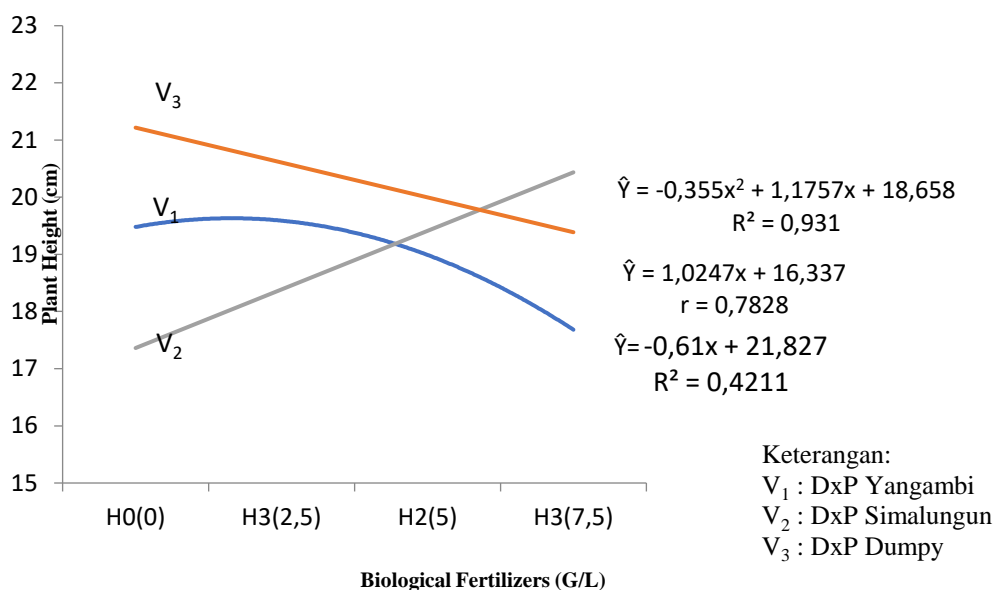


Figure 1. Relationship between Plant Height and Biofertilizers on Oil Palm Sprout Varieties at 12 WAP

From Figure 1, it is seen that the relationship between the treatment of varieties and biological fertilizers to plant height of 12 MST in the treatment of DxP Yangambi (V₁) varieties there is a negative quadratic relationship with the maximum value of the treatment of applying biological fertilizers (H) is 2.5g (H₁) with a plant height of 19.91cm. For the treatment of the Simalungun (V₂) DxP variety, there is a positive linear relationship which means that the greater the dose of biofertilizer application, the higher the plant. For the DxP Dumpy (V₃) Variety treatment, there is a negative linear relationship which means that the higher the dose of biological fertilizer, the lower the plant height.

4. Conclusion

The DxP Dumpy variety has a higher plant height compared to other varieties and is higher at the age of 8 MST, 10 MST, and 11 MST in oil palm seedlings (*Elaeis guineensis* Jacq.) in the pre-nursery. The interaction of biofertilizer application with plant varieties has a noticeable influence on increasing the height of oil palm seed plants (*Elaeis guineensis* Jacq.) in pre-nursery.

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