

## **EFFECTIVENESS OF FERTILIZATION TECHNIQUES ON GROWTH TWO VARIETIES OF PALM OIL SEEDS (*Elaeis guineensis* Jacq.) IN MAIN NURSERY**

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### **ABSTRACT**

This research was conducted to see the optimal level of fertilization in oil palms so that the macro and micronutrients are sufficient for the growth of oil palms. This research was carried out in the nursery area of the Soil Management Field Laboratory of the Indonesian Palm Oil Institute, Medan by observing soil characteristics. Soil analysis at the Soil, Plant, Fertilizer, and Water Laboratory at the Johor Agricultural Technology Study Center, North Sumatra, and the Analysis Laboratory at the Medan Oil Palm Research Center by observing soil analysis on chemical, physical, and cation exchange properties, as well as vegetative and fresh weight observations and dry plants. The study used a Completely Randomized Block Design where seedling height, stem circumference, number of leaf midribs, and leaf sheath length had the highest values in the sowing fertilization technique, as well as in the fresh weight of roots, shoots, and dry weight of roots, crowns also had the highest values in the sowing technique compared to sachets. and drip fertigation. This indicates that the growth and development of oil palm seedlings in the main nursery for PPKS 540 and SP-1 (Dumpy) varieties showed a positive response to the best growth increase in the sowing fertilization technique.

**Keywords:** *variety, main nursery, sow, sachet, drip fertigation*

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### **INTRODUCTION**

The supply of nutrients stored in the oil palm Pre Nursery seedlings is only sufficient for a maximum of 3 weeks at the start of the seedling growth so further nutrient requirements must be met by fertilization to supply the nutrient requirements needed by the oil palm seedlings and pay attention to fertilizer application. Therefore, the accuracy of the dosage of fertilizer during the nursery process is a very important factor. One of the efforts to increase growth and development can be done by applying fertilization effectively and efficiently, oil palm seedlings in their growth require several types of fertilizers that contain primary (N, P, and K), secondary (Ca, Mg, and S), and micronutrients (B, Zn, and Cu) (Mangoensoekarjo & Semangun, 2003).

Pahan (2011) stated that oil palm fertilization, whether it is nursery, immature, or mature, must refer to maximum effectiveness and efficiency factors. The effectiveness and efficiency of fertilization can be achieved by referring to the five proper fertilization factors (5T), namely the right type, right dose, right time, right method, and right target (Pardamean, 2014).

The usual method of fertilization is by means of a sowing system to support plant growth and development. By means of the NPK fertilizer distribution system, it will be more effective in providing plant nutrients when watering is done and fertilizer is sprinkled, so that the soil medium is still wet and the plant roots effectively absorb nutrients back into the soil (Yusuf, 2019).

The process of watering and fertilizing oil palm plants is one of the important factors that affect the growth and development of a plant. Water and nutrients which are put together are

called fertigation which act as external factors in the process of plant growth, development, and plant productivity (Sinulingga et al., 2015). Therefore a system is needed to control the distribution of a liquid fertilizer solution with water (fertigation) and is done by dripping into the plant media so that it can have an effect on plant growth and development (Arsyad et al., 2012).

Paper filter sachet bags are made of small, loose-fiber paper which is often used as a tea powder filter. The function of the sachet bag is as a tea filter so that the water produced is clean from the tea powder, and the use of this sachet bag for fertilizer in fertilization is to filter the fertilizer and so that the filtered fertilizer will be immediately liquid and clean so that it is more effective in absorbing nutrients by plant roots (Agung et al., 2019).

## **METHOD**

The research was carried out in the nursery area of the Soil Management Field Laboratory of the Indonesian Palm Oil Institute Medan. The time of research was carried out for 5 months from January to May 2023.

The structure of this study was based on 2 factors in the study, namely factor 1. Oil Palm Seed Varieties with 2 levels of comparison, factor 2 of Fertilization Application Techniques with 3 levels of comparison. The spacing of the nursery is 70 x 70 x 70 cm with a distance between trees of 32 cm and a distance between rows of plants of 62 cm

The study used a factorial Complete Randomized Block Design with a combination of 2 x 3 treatments. Oil Palm Varieties with 2 levels of comparison: 1. Varieties PPKS 540, 2. Varieties Sungai Pancur-1 (Dumpy). Fertilization Application Techniques with 3 levels of comparison: 1. Sow Fertilization System, 2. Sachet System, and 3. Drip Fertigation System.

Observation Parameters and Indicators: Plant Height (cm), Number of Leaf Sheaths (strands), Plant Stem Circumference (cm), Leaf Sheath Length (cm). Analysis of Fresh Weight and Dry Weight: Root fresh weight (g), crown fresh weight (g), root dry weight (g), crown dry weight (g), Preliminary Soil Analysis.

## **RESULTS AND DISCUSSION**

### **Soil Characteristics for Growing Media**

The soil used as a planting medium for this oil palm nursery research is topsoil originating from Tanjung Morawa, Deli Serdang Regency, North Sumatra. To find out the results of the initial soil analysis, an analysis of several observation parameters was carried out, namely as listed in Table 1 as follows.

Table 1. Preliminary Analysis of Soil as a Planting Media

<b>Texture</b>	<b>Method of Analysis</b>	<b>Units</b>	<b>Results</b>	<b>Description</b>
✓ Sand	IK 0.1.9.0 (Hydrometer)	%	80,74	Loam Sandy
✓ Dust			16,85	
✓ Clay			2,41	

<b>Parameter</b>	<b>Method of Analysis</b>	<b>Units</b>	<b>Results</b>	<b>Description</b>
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C-Organic	IK 0.1.5.0 (Spectrofotometry)	%	4,61	h
N-Total	IK 0.1.6.0 (Kjedhal)	%	0,53	h
P <sub>2</sub> O <sub>5</sub> -avl (P-Bray I)	IK 0.1.7.0 (Spectrofotometry)	ppm P	1,75	vl
K <sub>2</sub> O Potential Ex. HCl. 25%	AAS/Amm Acetat 1N	me.100 g <sup>-1</sup>	0,15	vl
CEC	Volumetry/NaCl 10%	me.100 g <sup>-1</sup>	39,86	h
pH H <sub>2</sub> O	IK 0.1.3.0 (Elektrometry)	---	6,4	h (A bit Sour)
Al-dd	IK 0.1.4.0 (Titrimetry)	me.100 g <sup>-1</sup>	0	nm
K-dd	IK 0.1.8.0 (AAS)	me.100 g <sup>-1</sup>	0,16	l
Mg-dd	IK 0.1.8.0 (AAS)	me.100 g <sup>-1</sup>	2,11	h

(Description: criteria for planting media, h = High, l = Low, m = Medium, sl = Slightly Low, vl = Very Low, vh = Very High, nm = Not Measurable)

The soil texture of the sand fraction is 80.74%, the silt fraction is 16.85%, the clay fraction is 2.41%. Oil palm seeds will be able to grow on sand to clay textures, the lower the clay content, the better the growth of oil palm seedlings in the main nursery (Ruhnayat & Martini, 2015). At this pH can be seen in Table 12, with a pH of H<sub>2</sub>O 6.4 with slightly sour criteria and high status. This proves that it is very suitable for planting oil palm in nurseries with a pH of 5.5 – 7, very good for planting oil palm seeds, and where the chemical and biological conditions are at the optimum point in the soil (Siregar & Marzuki, 2011).

When the C-Organic conditions are high, it can be said that the C-Organic content is the activity of microorganisms in the soil which break down organic matter. Organic matter plays a very important role in the soil as a determinant of soil fertility (Hanafiah, 2019). Organic matter has a very large influence on soil Cation Exchange Capacity (CEC), this is due to the role of decomposing organic matter by microorganisms which can produce humus which can increase CEC (Pinus & Marsono, 2000).

In Table 1 it is known that the value of Magnesium can be exchanged (Mg-dd) with high criteria, potassium can be exchanged (K-dd) with low criteria, and aluminum can be exchanged (Al-dd) with criteria that cannot be measured. This is because the availability of nutrients is closely related to the activity of H<sup>+</sup> ions or pH in the soil solution. This means that one of the nutrients is in lower amounts, such as K and Mg, which means that the levels are more difficult to absorb (Wahyuni, 2018).

## Plant Growth

### Plant Height

The results of the measurement test from observing the height of the seedlings can be seen in Table 2 as follows:

Table 2. Average Plant Height (cm)20 WAP

Variety	Fertilization Technique			Average Vn
	Sow	Sachets	Drip Fertigation	
PPKS 540	49,3 c	47,9 abc	47,6 abc	<b>48,3 a</b>
SP-1 (Dumpy)	48,3 abc	45,4 ab	45,2 a	<b>46,3 a</b>
<b>Total V x F</b>	<b>97,6</b>	<b>93,3</b>	<b>92,7</b>	
<b>Average Fn</b>	48,8	46,7	46,4	

Description: Numbers followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ( $\alpha = 0.05$ )

The results of the research at 16 WAP to 20 WAP on the PPKS 540 and SP-1 varieties of oil palm seedlings increased 100% in the sowing fertilization technique. The application of the sprinkle fertilization technique system gets good plant response results so that growth becomes optimal in increasing plant height.

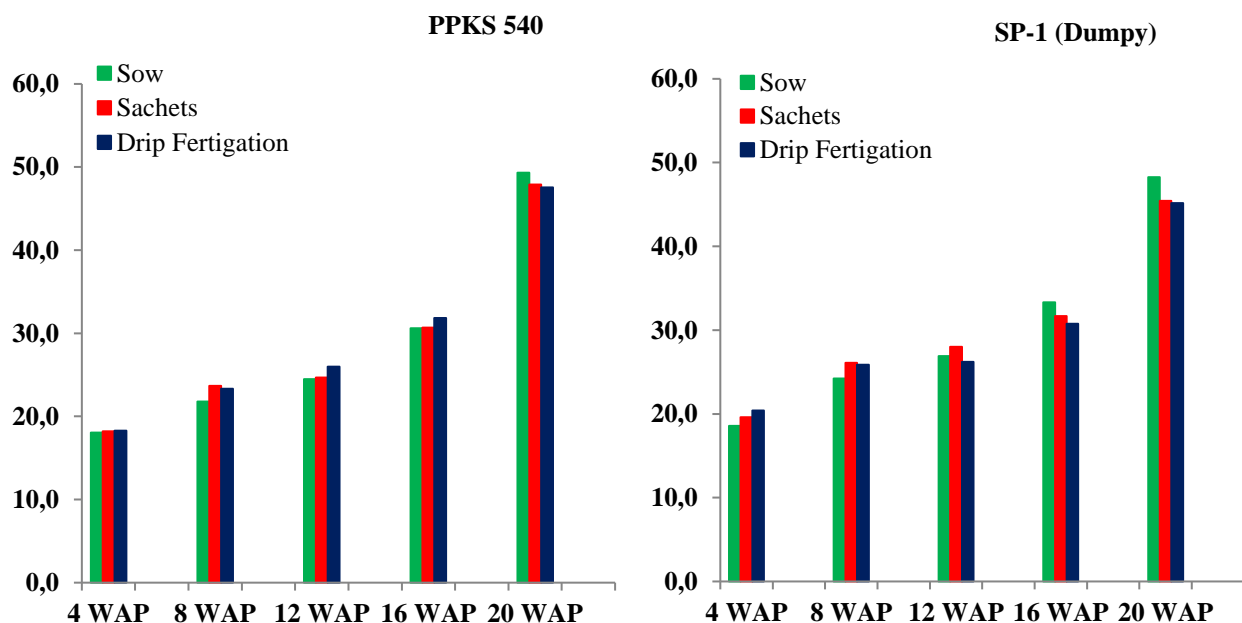


Figure 1. Graph of Mean Plant Height 20 WAP

It can be stated that the applied sprinkler system fertilization technique and the application of the right dose of fertilizer according to the age of the plant will have a better effect than the low dose in increasing growth yields, and the application of the sprinkler given is more effective because the nutrients dissolve directly into the plant. in the soil and can be absorbed

either by plant roots directly because the media where it grows is first moistened with water. In this case, the treatment of the sowing fertilization technique system was a good treatment and showed the final results in the best growth in the height of the seedlings.

According to Pinus & Marsono (2000) in Lubis et al. (2015), the addition of chemical elements, one of which is the mineral element nitrogen (N) can stimulate vegetative growth, namely in plant branches, stems and leaves which are one of the constituent components of amino acids, proteins, and the formation of protoplasm. cells in plants thereby stimulating growth in plant height. The nutrient phosphorus (P) can play a role in plants as a component of certain enzymes and certain proteins, as well as the role of ATP (Adenosine Triphosphate), RNA (Ribonucleic Acid), DNA (Deoxyribonucleic Acid) and the role of Fitin in the energy transfer reaction cycle (Lubis et al., 2015). This is also in accordance with the opinion of Yosephine et al. (2022) stated that the process of increasing the height of oil palm seedlings takes precedence over a cell or an increase in the number of cells in the leaves resulting in an increase in size occurring, if these nutrients are sufficient and the balance of nutrients for plant height proves that the plant grows well and fresh.

### **Stem Circumference**

The results of the measurement test from observing the circumference of the oil palm seedlings can be seen in Table 3 as follows:

Table 3. Average Plant Stem Circumference (cm) 20 WAP

Variety	Fertilization Technique			Average Vn
	Sow	Sachets	Drip Fertigation	
<b>PPKS 540</b>	7,8 bc	7,6 abc	7,6 abc	<b>7,7 a</b>
<b>SP-1 (Dumpy)</b>	7,8 bc	7,5 a	7,5 ab	<b>7,6 a</b>
<b>Total V x F</b>	<b>15,5</b>	<b>15,2</b>	<b>15,1</b>	
<b>Average Fn</b>	7,8	7,6	7,6	

Description: Numbers followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ( $\alpha = 0.05$ )

The growth of the girth of the seedlings at the age of 4 WAP (Week After Planting) showed the same development of the girth of the seedlings but at the age of 16 WAP and 20 WAP, there was a large growth of the girth of up to 100%. In the growth and development of stem circumference in the PPKS 540 variety it was 7.8 cm in the sowing fertilization technique, while in the SP-1 (Dumpy) variety it was 7.8 cm.

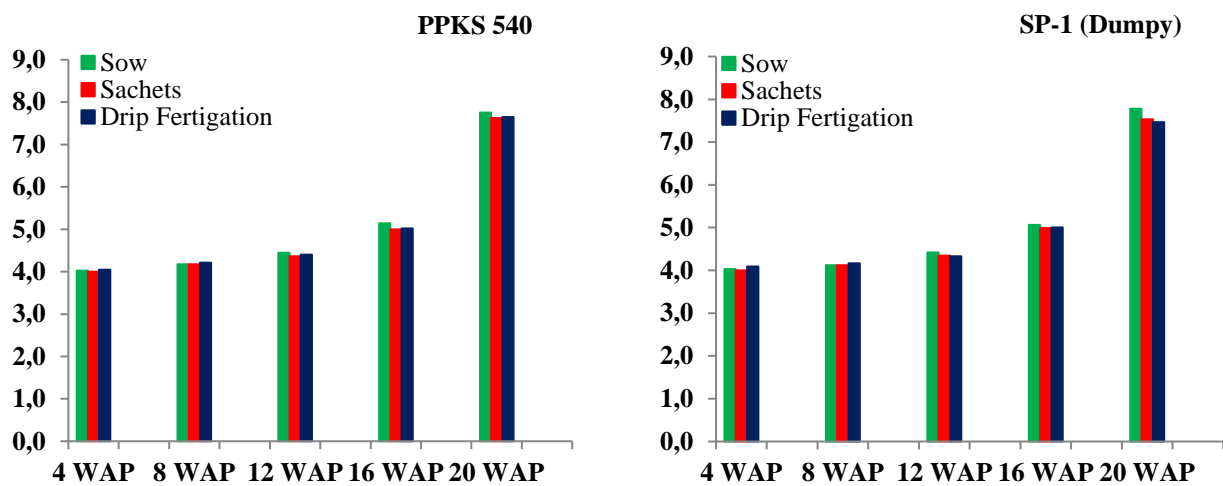


Figure 2. Graph of Mean Bar Circumference 20 WAP

It is stated that in the cycle of growth and development oil palm trunks must obtain sufficient, appropriate, and required nutrients in plants so that the plants will grow better. The factor of compound fertilizer with the spread or sowing technique makes the plants absorb nutrients more quickly when the planting medium is we so that it can allow nutrient absorption to be well absorbed to all parts of the roots. By knowing that there is a single effect of the fertilization technique, an effective and efficient result for the growth and development of plant stem circumference is the system of sowing fertilization technique.

According to Pahan. I. (2008) states that the stem is an area of accumulation of plant growth, especially in young plants, with the presence of nutrients it can encourage the rate of photosynthesis in producing photosynthates, thus helping in the formation of trunk circumferences of oil palm plants. Lubis et al. (2015) stated that the nutrient potassium (K) plays an active role in the process of photosynthesis and helps in the formation of proteins and carbohydrates. The smoothness of this process can be seen from the amount of carbohydrates in the new cells that cause good and fertile plant growth, such as plant height, stem diameter, and total leaf area.

### *Number of Leaf Sheaths*

The results of the measurement test from observing the number of leaf midribs of oil palm seedlings can be seen in Table 4 as follows:

Table 4. Average Number of Leaf Sheaths (sheet) 20 WAP

Variety	Fertilization Technique			Average Vn
	Sow	Sachets	Drip Fertigation	
PPKS 540	11,8 e	10,8 d	10,9 d	<b>11,1 b</b>
SP-1 (Dumpy)	10,2 bc	9,8 ab	9,7 a	<b>9,9 a</b>
<b>Total V x F</b>	<b>22,0</b>	<b>20,6</b>	<b>20,6</b>	
<b>Average Fn</b>	<b>11,0 b</b>	<b>10,3 a</b>	<b>10,3 a</b>	

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Description: Numbers followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ( $\alpha = 0.05$ )

In the growth and development of leaf sheaths in the D x P PPKS 540 variety, there were 11.8 strands, this was in the sow fertilization technique system, while in the Dy x P Sungai Pancur-1 (Dumpy) variety, the number of leaf sheaths in the sowing fertilization technique was 10.2 strands. and become the calculation of the highest number of leaf midribs.

This opinion is supported by Sinulingga et al. (2015), that nitrogen is very important and the main thing in plant growth, especially in the formation of leaves, stems, and roots. According to Lubis et al. (2015), explains that the main function of nitrogen is for growth and to nourish and increase leaves in leaf growth, the increase in the number of leaves is largely determined by the conditions of the season and the level of soil fertility, if nitrogen (N) is low, then growth is stunted and the number of leaves will not be much.

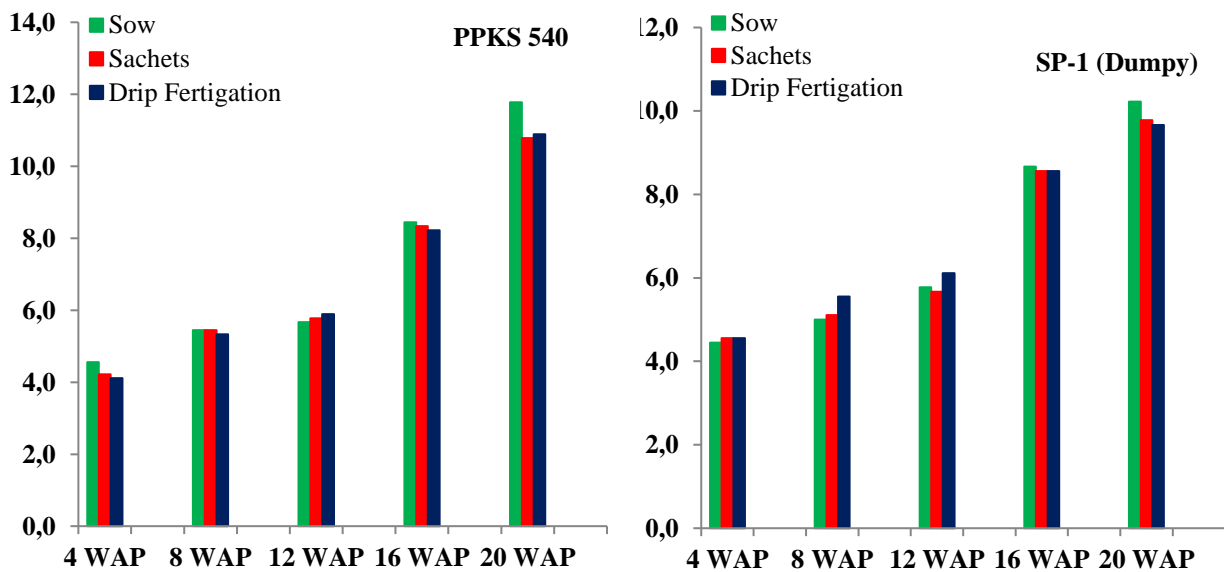


Figure 3. Graph of Average Number of Leaf Sheaths at 20 WAP

It is stated that the absorption of nutrients by plant roots is well absorbed due to increasing age which is adjusted to the application of nutrient fertilizers given in the form of compound fertilizers to the soil. In addition, the fertilization technique will also have an impact on the cycle of nutrients in the soil, the sow fertilization system becomes more effective in absorption by plant roots and can stimulate the growth of oil palm seedlings. In this case, it will be associated with the utilization of solar radiation which is used by plants effectively, because plants must be able to absorb most of the solar radiation for the process of growth, namely the process of photosynthesis of green leaves.

**Leaf Sheath Length**

The results of the measurement test from observing the length of the midrib of the leaves of the oil palm seedlings can be seen in Table 5 as follows:

Table 5. Average Leaf Sheath Length (cm) 20 WAP

Varietas	Fertilization Technique			Average Vn
	Sow	Sachets	Drip Fertigation	
PPKS 540	36,2 d	34,7 abcd	34,8 bcd	35,2 b
SP-1 (Dumpy)	34,0 abc	33,6 ab	33,2 a	33,6 a
<b>Total V x F</b>	<b>70,2</b>	<b>68,2</b>	<b>68,0</b>	
<b>Average Fn</b>	35,1	34,1	34,0	

Description: Numbers followed by the same index in the same row or column showed no the significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ( $\alpha = 0.05$ )

In the growth and development of the leaf sheath on the D x P PPKS 540 variety, it has an average length of 36.2 cm, this is in the sow fertilization technique system, while in the Dy x P Sungai Pancur-1 (Dumpy) variety, the leaf sheath length of the sowing fertilization technique is 34.0 cm and is the calculation of the length of the largest leaf midrib.

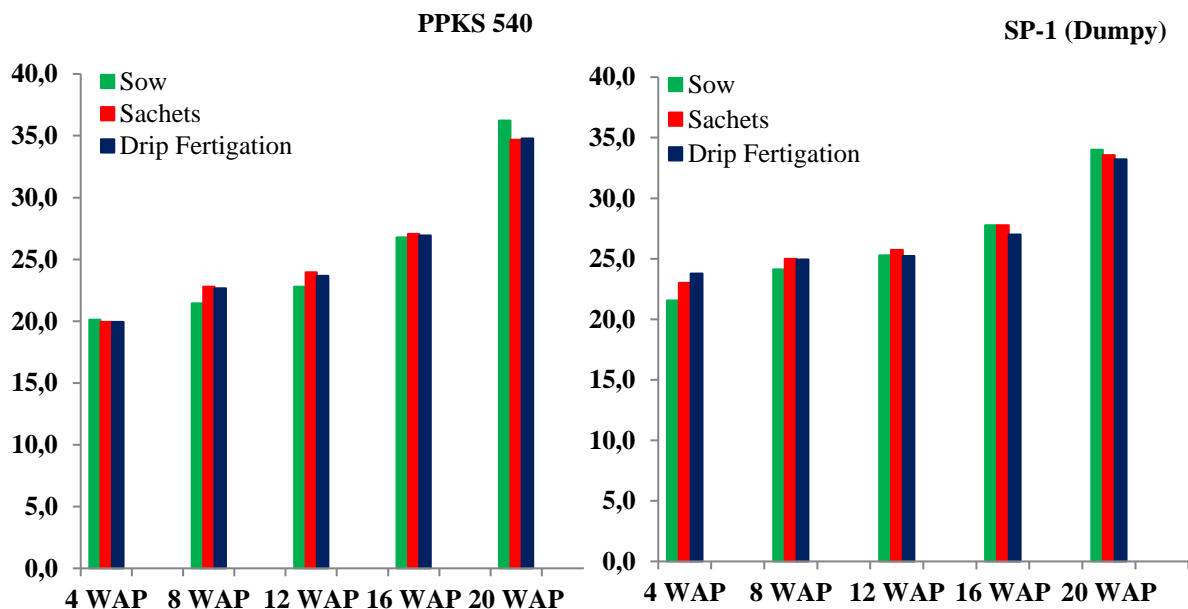


Figure 4. Graph of Mean Leaf Sheath Length at 20 WAP

The results of the final observations at 20 WAP on the observation of leaf midrib length of oil palm seedlings showed an average length of leaf midribs of oil palm seedlings, so it can be said that the best effective fertilization technique treatment is the sow fertilization technique system with an average of 36, 2cm. Based on Figure 4, the average frond length in the fertilization technique treatment showed that the average frond length was the highest in the sowing fertilization technique treatment, namely 36.2 cm in the D x P PPKS 540 variety and 34.0 cm in the Dy x P variety Pancur River-1 (Dumpy).

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Fertilization is adding nutrients to the soil so that plants can absorb them according to their needs, because a lack of unclean elements will result in inhibition of cell division and development, thereby inhibiting vegetative growth rates such as plant height, number of leaves, number of midribs, and diameter of plant stems (Pahan, 2012).

**Root Fresh Weight**

The results of the statistical analysis showed that the application of fertilization techniques to the two varieties of oil palm seedlings in the main nurseries and the interaction between the two treatments showed a very significant effect on the root fresh weight parameter.

The results of the measurement test from observing the fresh weight of the roots of the oil palm seedlings can be seen in Table 6 as follows:

Table 6. Mean Fresh Weight of Oil Palm Roots 20 WAP

Variety	Fertilization Technique			Average Vn
	Sow	Sachets	Drip Fertigation	
	..... g .....			
<b>PPKS 540</b>	49,7 e	32,3 a	35,8 abcd	<b>39,3 a</b>
<b>SP-1 (Dumpy)</b>	38,9 abcd	35,1 abc	34,9 ab	<b>36,3 a</b>
<b>Total V x F</b>	<b>88,6</b>	<b>67,4</b>	<b>70,7</b>	
<b>Average Fn</b>	<b>44,3 b</b>	<b>33,7 a</b>	<b>35,4 ab</b>	

Description: Numbers followed by the same index in the same row or column showed no significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ( $\alpha = 0.05$ )

Based on Table 6, the PPKS 540 variety produced the highest average root fresh weight of 49.7 g in the sprinkle fertilization technique and the lowest in the sachet fertilization technique of 32.3 g, while SP-1 (Dumpy) also produced the highest root fresh weight of 38.9 g in the sprinkle fertilization technique, while the lowest was in the drip fertigation fertilization technique of 34.9 g although in further tests the statistics were not significantly different.

This is because plants are still capable of absorbing nutrients in the soil and utilizing them for growth and development even though the topsoil nutrients contain very low nutrients in phosphorus (P) and potassium (K). By giving compound fertilizer NPK 15.15.6.4 which can stimulate root growth and increase root fresh weight. This is stated according to Arsyad et al., (2012) saying that, nutrients in the form of nitrogen (N) which are absorbed by plants really function as growth support, and element P (phosphor) plays a role in the formation of good roots and nutrient K (potassium) which is at the end The root tip functions as a stimulant in the process of root elongation.

**Header Fresh Weight**

The results of the statistical analysis showed that the application of fertilization techniques to the two varieties of oil palm seedlings in the main nurseries and the interaction between the two treatments showed a very significant effect on the canopy fresh weight parameter.

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The results of the measurement test from observing the fresh weight of the canopy of oil palm seedlings can be seen in Table 7 as follows:

Table 7. Average Fresh Weight of Canopy of Oil Palm Seeds 20 WAP

Variety	Fertilization Technique			Average Vn
	Sow	Sachets	Drip Fertigation	
	..... g .....			
<b>PPKS 540</b>	85,3 d	72,3 a	83,8 d	<b>80,4 b</b>
<b>SP-1 (Dumpy)</b>	83,6 d	74,2 ab	76,7 abc	<b>78,2 a</b>
<b>Total V x F</b>	<b>168,8</b>	<b>146,5</b>	<b>160,5</b>	
<b>Average Fn</b>	<b>84,4 b</b>	<b>73,2 a</b>	<b>80,3 b</b>	

Description: Numbers followed by the same index in the same row or column showed no significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ( $\alpha = 0.05$ )

Based on Table 7, the PPKS 540 variety produced the highest average crown fresh weight of 85.3 g in the sprinkle fertilization technique, and the lowest in the sachet fertilization technique which was 72.3 g, while SP-1 (Dumpy) produced an average crown fresh weight of 83.6 g in the sow fertilization technique, and the lowest was in the sachet fertilization technique which was 74.2 g even though the statistical test was not significantly different.

According to Yosephine et al. (2022) said that the nutrient N (nitrogen) needed by plants is sufficient, so plant metabolic processes increase, one of which is in the photosynthesis process, so photosynthates are translocated from photosynthetic results to the roots and shoots, as well as the availability of nutrients. Absorbed by plants is one of the factors that can affect plant growth, thereby increasing crown weight.

**Root Dry Weight**

The results of statistical analysis showed that the application of fertilization techniques to two varieties of oil palm seedlings in the main nurseries and the interaction between the two treatments showed a very significant effect on the root dry weight parameter.

The results of the measurement test from observing the dry weight of the roots of the oil palm seedlings can be seen in Table 8 as follows:

Table 8. Average Dry Weight of Oil Palm Roots at 20 WAP

Variety	Fertilization Technique			Average Vn
	Sow	Sachets	Drip Fertigation	
	..... g .....			
<b>PPKS 540</b>	15,6 cd	14,3 c	15,1 cd	<b>15,0 a</b>
<b>SP-1 (Dumpy)</b>	17,9 d	10,8 ab	10,7 a	<b>13,1 a</b>
<b>Total V x F</b>	<b>33,5</b>	<b>25,1</b>	<b>25,8</b>	
<b>Average Fn</b>	<b>16,8 c</b>	<b>12,6 a</b>	<b>12,9 ab</b>	

Description: Numbers followed by the same index in the same row or column showed no significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ( $\alpha = 0.05$ )

Based on Table 8, the PPKS 540 variety produced the highest average root dry weight, which was 15.6 g in the sprinkle fertilization technique, and the lowest in the sachet fertilization technique, which was 14.3 g, while SP-1 (Dumpy) produced an average root dry weight. of 17.9 g in the sprinkle fertilization technique, and the lowest was in the drip fertigation fertilization technique which was 10.7 g although the statistical test was not significantly different.

This allows plants to still have the ability to utilize the nutrients in the soil, even though the top soil nutrients contain very low nutrients in phosphorus and potassium, but with the addition of NPK compound fertilizer, phosphorus, and potassium nutrients have been fulfilled in the soil and can be absorbed well by plants. According to Arimbawa (2016) that, the availability of nutrients given to the soil will react to better growth and development, so that it will support the dry weight of the plant roots.

According to (Wahyuni, 2018) that, primary and secondary macro nutrients such as NPKMg which are absorbed by plants through the roots with the aim of better plant growth, but this will make limitations to the nutrients given not according to the dose at the age of the plant. plants, the plants will experience stunted growth and development.

### **Head Dry Weight**

The results of statistical analysis showed that the application of fertilization techniques to two varieties of oil palm seedlings in the main nursery and the interaction between the two treatments showed a very significant effect on the canopy dry weight parameter.

The results of the measurement test from observing the dry weight of the canopy of oil palm seedlings can be seen in Table 9 as follows:

Table 9. Average Canopy Dry Weight of Oil Palm Seeds at 20 WAP

Variety	Fertilization Technique			Average Vn
	Sow	Sachets	Drip Fertigation	
	..... g .....			
<b>PPKS 540</b>	44,6 d	39,4 a	41,2 abc	<b>41,7 a</b>
<b>SP-1 (Dumpy)</b>	43,9 c	39,8 ab	41,5 abc	<b>41,7 a</b>
<b>Total V x F</b>	<b>88,5</b>	<b>79,2</b>	<b>82,7</b>	
<b>Average Fn</b>	<b>44,3 c</b>	<b>39,6 a</b>	<b>41,3 ab</b>	

Description: Numbers followed by the same index in the same row or column showed no significant difference according to the DMRT test (Duncan's Multiple Range Test) 95% confidence level ( $\alpha = 0.05$ )

Based on Table 20, the PPKS 540 variety produced the highest average shoot dry weight of 44.6 g in the sprinkle fertilization technique, and the lowest in the sachet fertilization technique which was 39.4 g, while SP-1 (Dumpy) produced an average shoot dry weight amounted to 43.9 g in the sow fertilization technique, and the lowest was in the sachet fertilization technique which was equal to 39.8 g even though the statistical test was not significantly different.

This shows that the nutrient status of this canopy is closely related to other treated plants, one of which is sow which has a higher crown weight compared to sachets and drip fertigation. The nutrients absorbed in the canopy of the oil palm seedlings show the status of the dry weight of the canopy which is a determining indicator of whether or not the plant absorbs the nutrients that have been given, so in this case, the determinant is that the application of the sow fertilization technique has shown a large positive indication, and the technique remains Sachet fertilization and drip fertigation gave positive results in determining the dry weight of plant shoots.

In this case, the opinion (Siregar & Marzuki, 2011) stated that plant roots that are good at absorbing nutrients to all parts of the plant including leaves, as well as the application of compound fertilizer will be metabolized in the plant body so that it shows better results on dry weight of shoots. Spliced according to (Sinulingga et al., 2015) that the application of NPK compound fertilizer can increase growth and there is the highest main content, namely the availability of macronutrients needed by plants.

## CONCLUSION

In conclusion, this research establishes that the scatter fertilization technique has the most positive impact on the growth of two oil palm seedling varieties in the main nursery, resulting in superior plant weight yields compared to the sachet fertilization technique and drip fertigation. The scatter fertilization method, which involves evenly distributing fertilizer across a wide area, ensures a more balanced and uniform nutrient supply for the seedlings. This promotes optimal nutrient uptake by the roots, leading to healthier and more vigorous growth. In contrast, the sachet fertilization technique, with its localized application around individual seedlings, may cause uneven nutrient distribution, potentially hindering overall growth potential.

Similarly, the drip fertigation system, which delivers water and nutrients directly to the root zone, might not cover the entire area adequately, leading to some regions receiving insufficient nutrients and subsequently affecting seedling development. The notable advantage of the scatter fertilization technique is evident in the significantly higher plant weight yields achieved in comparison to the other two methods. Improved plant weight yields signify not only enhanced growth rates but also suggest the potential for greater productivity and successful establishment of oil palm plantations in the long term. To ensure practical application in real-world settings, further research on larger scales and under varying environmental conditions would be beneficial. Nonetheless, based on these findings, adopting the scatter fertilization technique in oil palm main nurseries can be recommended to maximize growth and yield outcomes for successful and thriving plantations.

## REFERENCES

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