

Utilization of Rice Husk and Shallot Dregs as Planting Media for the Growth of Oil Palm (*Elaeis guineensis* Jacq) in Pre Nursery

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ABSTRACT

This research was carried out on Jl. Samanudi, Lk. VIII Kota Binjai, from January to April 2024. The study used a factorial Randomized Block Design (RBD) with 2 treatment factors. The first factor was rice husk consisting of 3 treatment levels, namely P0 = Without Rice Husk (Only Topsoil), P1 = 25% Rice Husk and 75% Topsoil, P2 = 50% Rice Husk and 50% Topsoil. The second factor was shallot waste with three treatment levels, namely A0 = 0 ml, A1 = 15 gr shallot waste, and A2 = 25 gr shallot waste. The parameters observed were stem diameter (mm), plant height (cm), leaf area (cm²) and Number of Leaves (strands). In this study, the rice husk treatment only significantly affected the growth of the number of leaves, and did not significantly affect the growth of stem diameter, plant height, and leaf area. The shallot waste treatment only significantly affected the growth of stem diameter, but did not significantly affect the growth of plant height, leaf area, and number of leaves. The interaction between the rice husk treatment and shallot waste treatment did not significantly affect the growth of stem diameter and plant height, but only significantly affected the growth of leaf area and number of leaves.

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1. INTRODUCTION

Oil palm (*Elaeis guineensis* Jacq) is a plantation crop that has high economic value in Indonesia. Oil palm produces vegetable oil that is widely used for various industrial purposes, such as food, cosmetics, pharmaceuticals, and biofuels. Indonesia is the largest producer of palm oil in the world with production reaching 51.2 million tons in 2020 (Statistics, 2021).

One of the problems faced in the use of oil palm planting media is the availability, quality, and cost of the organic materials used. Organic materials used as oil palm planting media must be of good quality, namely having a high nutrient content, appropriate pH, smooth texture, and not contaminated by hazardous materials such as heavy metals, pesticides, and pathogens. In addition, organic materials used as oil palm planting media must be available in sufficient quantities. This is a challenge for oil palm farmers, especially those in remote areas or far from sources of organic materials (Sefrila et al., 2019)

Rice husk is an agricultural waste produced from the rice milling process. Rice husk has a fairly high content of macro and micro nutrients, such as nitrogen 0.32%, phosphate 0.15%, potassium

0.31%, calcium 0.96%, iron 180 ppm, zinc 14.10 ppm, manganese 0.4 ppm and pH 8.5 - 9.0., (Nursanti et al., 2023). Rice husk also has good physical properties, such as porosity, cation exchange capacity, and water holding capacity. Rice husk can be used as a planting medium by composting it first or mixing it directly with other planting media (Augustien & Suhardjono, 2023).

Red onion dregs contain many macro and micro nutrients, such as 60 mg phosphorus, 37 mg potassium, 36 mg calcium, and 25 mg magnesium (Roudoh, 2022). Shallot dregs also have good physical characteristics, such as porosity, cation exchange capacity, and water holding capacity. Shallot dregs can be used as a planting medium by composting it first or mixing it directly with other planting media (Rahhutami et al., 2021).

The recommended dose of shallot pulp as fertilizer for oil palm plants in the pre-nursery is 15 g/polybag. Giving shallot pulp with this dose can increase the growth of oil palm plants in the pre-nursery, such as the number of leaves, leaf area, total wet weight, total dry weight, and the ratio of dry weight of roots and shoots. Giving shallot pulp with a dose lower or higher than 15 g/polybag can reduce the growth of oil palm plants in the pre-nursery (Pratomo, 2018).

2. METHOD

2.1 Time and Place of Research

This research was conducted in Binjai Selatan sub-district, Lk. VIII Binjai City, North Sumatra, from January 2024 to April 2024.

2.2 Tools and Materials

The tools used are meter, raffia rope, watering can, 2kg capacity polybag, caliper, paranet, scissors, scales, and hoe. While the materials used include PPKS oil palm sprouts, shallots, water, top soil, sand, rice husks, NPK and compost fertilizer.

2.3 Design Model

This study used a Factorial Randomized Block Design (RAK) with 2 treatment factors. The first factor is Rice Husk (P) consisting of 3 levels, namely: P0 = Without rice husk (only topsoil); P1 = 25% rice husk and 75% topsoil; P2 = 50% rice husk and 50% topsoil. The second factor is Shallot Dregs (A) consisting of 3 levels, namely: A0 = Without Shallot Dregs; A1 = 15 gr Shallot Dregs; A2 = 25 gr Shallot Dregs.

2.4 Data analysis

The observation data were analyzed using the F test. If the statistical test showed significant data, the test was continued with the 5% DMRT (Duncan's Multiple Range Test).

2.5 Research Implementation

2.5.1 Making Red Onion Dregs

Prepare 2 kg of shallots, then puree the shallots using a blender, after the shallots are pureed, squeeze them to separate the water and shallot pulp, then dry the shallot pulp in the sun, drying is done for 3 days.

2.5.2 Land Preparation

Determine an open place with good drainage near a water source, the location is first cleaned of all types of weeds and remnants of plant roots and then leveled. then making beds or plots with a distance between plots of 50 cm, a distance between repetitions of 100 cm and a distance between plants of 30 cm. And the plot size is 20 cm x 30 each plot consists of 5 plants.

The next step is the installation of the paranet. The paranet is installed with a height of 2 m from the ground surface, the paranet used with a light intensity of 55%. The shade is made in an east-west direction where in the east with a height of 2 m and in the west 1.5 m. The shade is made using paranet, arranged in such a way. The purpose of making the shade is to avoid rainwater and direct sunlight.

2.5.3 Preparation of Planting Media

Prepare loose top soil planting media, sand, rice husks and shallot dregs that have been dried for 3 days. Before the top soil is used, sift it first to remove dirt, after that mix the planting media, mix the top soil with manure and rice husks with a ratio of 1: 1, 1 soil, 1 rice husk and 1 manure.

After all the planting media is mixed flat, the next step is to put the planting medium into the polybag and mix the shallot dregs according to the recommended dose. The polybag used is 18 x 25 cm in size. After all the polybags are filled with planting medium, arrange the polybags on the plot that has been provided.

2.5.4 Planting

Oil palm sprouts are inserted as much as 1 seed per polybag with a depth of 1.5 - 2 cm. Planting must be done carefully, so that the sprouts are not planted upside down.

2.5.5 Maintenance

Maintenance carried out includes adequate watering, weeding and pest and disease control.

2.6 Observation

2.6.1 Bar Diameter (mm)

Stem diameter measurements were carried out after the plants were 30 HST, measurements were carried out every week. Measurements were carried out using a digital caliper, the plant was measured from the soil surface to the tip of the leaf that had not yet fully opened from the stem.

2.6.2 Plant Height (cm)

Plant height measurements were carried out after the plants were 30 HST, measurements were carried out every week. Measurements are made using a ruler, the plant is measured from the ground surface to the tip of the leaf that has not yet fully opened from the stem.

2.6.3 Leaf Area (cm²)

Measurement of plant leaf area is done after the plant is 30 HST old, measurements are done every week. Measurements are done using a ruler, by measuring the length and width of the leaves, then multiplying by a constant of 0.52.

2.6.4 Number of leaves (blades)

Observation of the number of leaves was carried out at the age of 30 HST. Counting the number of leaves was carried out to determine the number of leaves produced by the plant during the study.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Plant Height (cm)

Rice husk planting media did not significantly affect plant height parameters at all ages, while the treatment of shallot dregs fertilizer only significantly affected the ages of 10, 11, and 12 MST and the interaction of rice husk and shallot dregs planting media did not significantly affect the growth of oil palm plant height at all ages. The average plant height (cm²) of oil palm due to rice husk and shallot dregs can be seen in table 1 below:

Table 1. Average plant height (cm) of oil palm due to rice husk and shallot dregs treatment at the age of 4 to 12 MST

| Treatment | Plant Height (cm) | | | | | | | | |
|-----------------|-------------------|-------|-------|-------|-------|-------|--------|--------|--------|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Rice Husk | | | | | | | | | |
| P0 | 8.19 | 9.53 | 10.20 | 10.74 | 11.74 | 12.66 | 13.89 | 14.14 | 18.31 |
| P1 | 7.74 | 9.16 | 9.89 | 10.66 | 11.81 | 13.02 | 14.33 | 14.66 | 18.97 |
| P2 | 8.05 | 9.44 | 10.06 | 10.67 | 11.82 | 12.92 | 14.37 | 14.67 | 18.17 |
| Red Onion Dregs | | | | | | | | | |
| A0 | 7.75 | 9.20 | 9.89 | 10.45 | 11.36 | 12.31 | 13.50b | 13.77c | 17.54c |
| A1 | 7.84 | 9.22 | 9.97 | 10.71 | 11.90 | 12.93 | 14.20a | 14.51b | 18.49b |
| A2 | 8.38 | 9.70 | 10.29 | 10.91 | 12.10 | 13.35 | 14.89a | 15.19a | 19.43a |
| Interaction | | | | | | | | | |
| P0A0 | 7.48 | 8.89 | 9.72 | 10.22 | 11.12 | 11.73 | 12.63 | 12.81 | 17.21 |
| P1A0 | 7.84 | 9.38 | 9.98 | 10.63 | 11.52 | 12.86 | 14.40 | 14.69 | 18.04 |
| P2A0 | 7.93 | 9.34 | 9.96 | 10.49 | 11.43 | 12.36 | 13.46 | 13.81 | 17.37 |
| P0A1 | 8.42 | 9.66 | 10.31 | 10.81 | 11.86 | 12.81 | 14.06 | 14.37 | 17.96 |
| P1A1 | 6.82 | 8.31 | 9.32 | 10.33 | 11.84 | 12.97 | 14.19 | 14.48 | 19.53 |
| P2A1 | 8.28 | 9.70 | 10.29 | 11.00 | 12.01 | 13.02 | 14.36 | 14.68 | 17.98 |
| P0A2 | 8.67 | 10.04 | 10.58 | 11.18 | 12.24 | 13.42 | 14.98 | 15.23 | 19.78 |
| P1A2 | 8.54 | 9.79 | 10.38 | 11.02 | 12.06 | 13.24 | 14.40 | 14.82 | 19.34 |
| P2A2 | 7.93 | 9.28 | 9.92 | 10.52 | 12.01 | 13.38 | 15.29 | 15.52 | 19.18 |

Note: Numbers followed by different letters indicate different effects real level of 5% with DMRT test.

Table 1 explains that at the age of 4 to 12 MST, the treatment of rice husk planting media did not have a significant effect on the growth of oil palm plants at all ages. In the treatment of shallot dregs, there was only a significant effect at the ages of 10, 11, and 12 MST, where at week 12 with treatment A2 (19.43) it was significantly different from treatment A1 (18.49) and treatment A0 (17.54). Meanwhile, the interaction between the planting media of rice husks and shallot dregs did not have a significant effect on the growth of plant height at all ages of oil palm plants.

The relationship between plant height and shallot pulp can be seen in Figure 1, the relationship between plant height and 12 MST shallot pulp treatment.

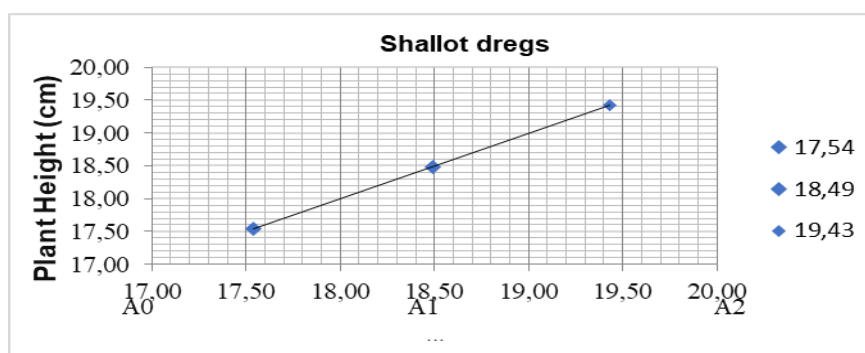


Figure 1. Relationship between Plant Height and Red Onion Dregs Treatment 12 MST

3.1.2 Bar Diameter (mm)

The planting media of rice husk, shallot dregs and the interaction between rice husk and shallot dregs did not significantly affect the growth of stem diameter of oil palm plants at all ages. The average stem diameter (mm) of oil palm plants due to rice husk and shallot dregs can be seen in table 2 below:

Table 2. Average stem diameter (mm) of oil palm plants due to rice husk and shallot pulp treatment at the age of 4 to 12 MST

| Treatment | Week to (MST) | | | | | | | | | |
|-----------------|---------------|------|------|------|------|------|------|------|------|--|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| Rice Husk | | | | | | | | | | |
| P0 | 1.97 | 2.37 | 3.44 | 4.10 | 5.10 | 5.89 | 6.29 | 6.69 | 7.38 | |
| P1 | 1.91 | 2.37 | 3.39 | 4.11 | 5.12 | 5.71 | 6.27 | 6.65 | 7.35 | |
| P2 | 1.84 | 2.22 | 3.41 | 3.94 | 4.96 | 5.60 | 6.11 | 6.87 | 7.45 | |
| Red Onion Dregs | | | | | | | | | | |
| A0 | 1.96 | 2.31 | 3.27 | 3.87 | 4.93 | 5.70 | 6.21 | 6.64 | 7.35 | |
| A1 | 1.90 | 2.34 | 3.56 | 4.19 | 5.23 | 5.86 | 6.29 | 6.67 | 7.46 | |
| A2 | 1.86 | 2.31 | 3.41 | 4.09 | 5.02 | 5.64 | 6.18 | 6.90 | 7.38 | |
| Interaction | | | | | | | | | | |
| P0A0 | 2.12 | 2.24 | 3.22 | 3.91 | 4.60 | 5.79 | 6.24 | 6.73 | 7.60 | |
| P1A0 | 1.92 | 2.46 | 3.36 | 3.92 | 4.97 | 5.66 | 6.36 | 6.58 | 7.36 | |
| P2A0 | 1.84 | 2.22 | 3.23 | 3.78 | 5.22 | 5.66 | 6.02 | 6.61 | 7.09 | |
| P0A1 | 2.00 | 2.41 | 3.59 | 4.18 | 5.26 | 5.89 | 6.31 | 6.64 | 7.42 | |
| P1A1 | 1.82 | 2.29 | 3.54 | 4.31 | 5.30 | 6.03 | 6.09 | 6.67 | 7.36 | |
| P2A1 | 1.87 | 2.31 | 3.54 | 4.08 | 5.13 | 5.67 | 6.48 | 6.71 | 7.59 | |
| P0A2 | 1.79 | 2.44 | 3.52 | 4.20 | 5.44 | 5.99 | 6.32 | 6.69 | 7.12 | |
| P1A2 | 1.98 | 2.37 | 3.26 | 4.10 | 5.10 | 5.46 | 6.37 | 6.71 | 7.34 | |
| P2A2 | 1.81 | 2.12 | 3.47 | 3.96 | 4.52 | 5.49 | 5.84 | 7.30 | 7.67 | |

Note: Numbers followed by different letters indicate different effects real level of 5% with DMRT test.

Table 2 explains that at the age of 4 to 12 MST, the treatment of rice husk planting media did not significantly affect the growth of the stem diameter of oil palm plants. The treatment of shallot dregs did not significantly affect all ages of oil palm plants. And the interaction between rice husks and shallot dregs did not significantly affect the growth of the stem diameter of oil palm plants at the age of 4 to 12 MST.

3.1.3 Leaf Area (cm)²

Rice husk planting media did not have a significant effect on leaf area parameters at all ages, while the treatment of shallot dregs fertilizer only had a significant effect at age 11 with the best treatment A2 (31.60), and at age 12 MST with the best treatment A2 (41.07) and the interaction of the influence of rice husk planting media and shallot dregs had a significant effect on the growth of oil palm leaf area at ages 11 and 12 MST in the best interaction treatment P0A1 (42.89 cm²) in week 12. The average leaf area (cm²) of oil palm plants due to rice husk and shallot dregs can be seen in table 3 below:

Table 3. Average leaf area (cm²) of oil palm plants due to rice husk and treatment shallot dregs at the age of 4 to 12 MST

| Treatment | Leaf Area (cm ²) | | | | | | | | | |
|-----------|------------------------------|------|------|------|-------|-------|-------|-------|-------|--|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| Rice Husk | | | | | | | | | | |
| P0 | 2.62 | 4.25 | 6.09 | 8.77 | 10.50 | 16.76 | 26.19 | 29.88 | 38.87 | |

| | | | | | | | | | |
|-----------------|------|------|------|-------|-------|-------|-------|---------|---------|
| P1 | 2.69 | 4.38 | 6.26 | 9.49 | 11.42 | 18.41 | 27.39 | 30.85 | 40.10 |
| P2 | 2.26 | 3.87 | 5.58 | 8.15 | 9.78 | 15.90 | 25.33 | 29.39 | 38.20 |
| Red Onion Dregs | | | | | | | | | |
| A0 | 2.25 | 3.93 | 5.62 | 8.34 | 10.01 | 16.06 | 24.72 | 27.22b | 35.42c |
| A1 | 2.55 | 4.17 | 5.97 | 8.69 | 10.43 | 17.00 | 26.51 | 31.29a | 40.67b |
| A2 | 2.77 | 4.39 | 6.34 | 9.39 | 11.26 | 18.01 | 27.68 | 31.60a | 41.07a |
| Interaction | | | | | | | | | |
| P0A0 | 2.34 | 4.05 | 5.83 | 8.16 | 9.68 | 15.61 | 23.61 | 25.70e | 33.51e |
| P1A0 | 2.49 | 4.36 | 6.18 | 9.53 | 11.53 | 18.48 | 28.23 | 31.76bc | 41.29bc |
| P2A0 | 1.91 | 3.38 | 4.85 | 7.33 | 8.81 | 14.08 | 22.33 | 24.22f | 31.48f |
| P0A1 | 2.55 | 4.17 | 5.98 | 9.12 | 10.95 | 17.66 | 28.24 | 33.00a | 42.89a |
| P1A1 | 3.02 | 4.46 | 6.37 | 8.66 | 10.39 | 16.73 | 24.95 | 29.03d | 37.73d |
| P2A1 | 2.10 | 3.89 | 5.58 | 8.28 | 9.94 | 16.61 | 26.35 | 31.84bc | 41.39bc |
| P0A2 | 2.98 | 4.52 | 6.47 | 9.05 | 10.85 | 17.01 | 26.73 | 30.94c | 40.22c |
| P1A2 | 2.57 | 4.32 | 6.24 | 10.28 | 12.34 | 20.02 | 28.99 | 31.75bc | 41.27bc |
| P2A2 | 2.76 | 4.33 | 6.31 | 8.83 | 10.60 | 17.01 | 27.32 | 32.10b | 41.73b |

Note: Numbers followed by different letters indicate different effects real level of 5% with DMRT test.

Table 3 explains that at the age of 4 to 12 MST, rice husk treatment did not have a significant effect on the growth of oil palm leaf area at all ages. The treatment of shallot dregs only had a significant effect at the age of 11 and 12 MST, where at the age of 12 MST with the A2 treatment (41.07) it was significantly different from the A1 treatment (40.67) and A0 (35.42) (Figure 4.2). Meanwhile, the interaction between the rice husk planting media and shallot dregs only had a significant effect on plant height growth at the age of 11 and 12 MST, where the combination of treatments at 12 MST P0A1 (42.89) was significantly different from the combination of treatments P2A2 (41.73), P2A1 (41.39), P1A2 (41.27), P0A2 (40.22), P1A1 (37.73), P0A0 (33.51), and P2A0 (31.48).

The relationship between plant height and shallot pulp can be seen in Figure 2, the relationship between leaf area and shallot pulp treatment 12 MST and in Figure 3, the interaction between leaf area and 12 MST.

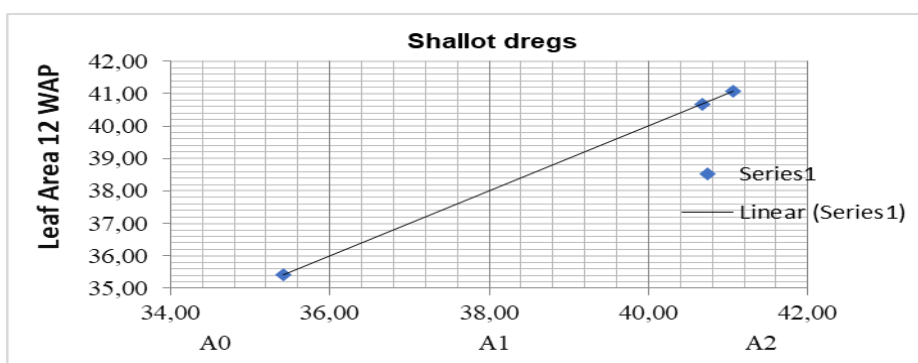


Figure 2. Relationship between Leaf Area and Shallot Pulp Treatment 12 MST

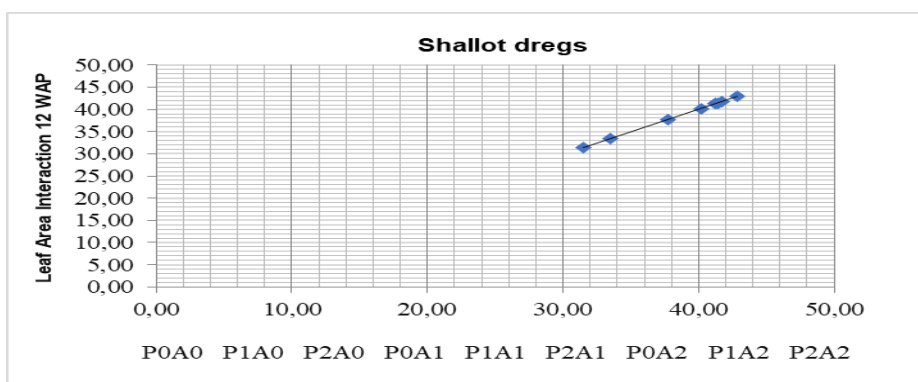


Figure 3. Interaction Relationship of Leaf Area 12 MST

3.1.4 Number of leaves (blades)

Rice husk planting media only had a significant effect at the age of 12 MST with the best treatment P2 (5.48), while the treatment of shallot dregs fertilizer was significantly different at the age

of 8 MST with the best treatment A2 (3.15), not significantly different at the age of 9 MST with the best treatment A2 (3.44), and not significantly different at 11 MST with the best treatment A1 (4.44) and the interaction of rice husk and shallot dregs planting media only had a significant effect on the growth of the number of oil palm leaves at the age of 10 MST with the best treatment P1A2 (3.56). The average number of leaves (strands) of oil palm plants due to rice husk and shallot dregs can be seen in Table 4 below:

Table 4. Average number of leaves (strands) of oil palm plants due to rice husk and shallot dregs treatment at the age of 4 to 12 MST

| Treatment | Number of leaves (blades) | | | | | | | | |
|------------------------|---------------------------|------|------|------|-------|-------|--------|-------|-------|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Rice Husk | | | | | | | | | |
| P0 | 1.59 | 2.04 | 2.44 | 2.52 | 3.00 | 3.37 | 3.48 | 4.26 | 5.15a |
| P1 | 1.56 | 2.00 | 2.52 | 2.70 | 2.89 | 3.22 | 3.41 | 4.30 | 5.30a |
| P2 | 1.81 | 2.04 | 2.63 | 2.78 | 3.11 | 3.30 | 3.44 | 4.41 | 5.48a |
| Red Onion Dregs | | | | | | | | | |
| A0 | 1.63 | 1.96 | 2.37 | 2.52 | 2.81b | 3.26a | 3.41 | 4.19a | 5.22 |
| A1 | 1.59 | 2.00 | 2.48 | 2.63 | 3.04a | 3.19a | 3.44 | 4.44a | 5.37 |
| A2 | 1.74 | 2.11 | 2.74 | 2.85 | 3.15a | 3.44a | 3.48 | 4.33a | 5.33 |
| Interaction | | | | | | | | | |
| P0A0 | 1.33 | 2.11 | 2.33 | 2.33 | 2.56 | 3.22 | 3.33d | 4.11 | 5.11 |
| P1A0 | 1.78 | 1.78 | 2.44 | 2.67 | 2.89 | 3.22 | 3.33cd | 4.11 | 5.22 |
| P2A0 | 1.78 | 2.00 | 2.33 | 2.56 | 3.00 | 3.33 | 3.56ab | 4.33 | 5.33 |
| P0A1 | 1.78 | 2.00 | 2.33 | 2.44 | 3.11 | 3.33 | 3.56ab | 4.44 | 5.22 |
| P1A1 | 1.33 | 2.00 | 2.44 | 2.67 | 2.89 | 3.00 | 3.33cd | 4.33 | 5.22 |
| P2A1 | 1.67 | 2.00 | 2.67 | 2.78 | 3.11 | 3.22 | 3.44b | 4.56 | 5.67 |
| P0A2 | 1.67 | 2.00 | 2.67 | 2.78 | 3.33 | 3.56 | 3.56ab | 4.22 | 5.11 |
| P1A2 | 1.56 | 2.22 | 2.67 | 2.78 | 2.89 | 3.44 | 3.56a | 4.44 | 5.44 |
| P2A2 | 2.00 | 2.11 | 2.89 | 3.00 | 3.22 | 3.33 | 3.33c | 4.33 | 5.44 |

Note: Numbers followed by different letters indicate different effects real level of 5% with DMRT test.

Table 4 explains that at the age of 12 MST, the rice husk planting media treatment had a significant effect on the growth of the number of leaves of oil palm plants, where the P2 treatment (5.48) was not significantly different from the P1 treatment (5.30), and the P0 treatment (5.15) (Figure 3).

In the treatment of shallot dregs, there was only a significant effect at the ages of 8, 9 and 11 MST, where at the age of 8 MST, the A2 treatment (3.15) was not significantly different from the A1 treatment (3.04) and significantly different from the A0 treatment (2.81) and at 11 MST, the A1 treatment (4.44) was not significantly different from the A2 treatment (4.33) and A0 (4.19) (Figure 4). Meanwhile, in the interaction between planting media.

Rice husks and shallot dregs only had a significant effect on plant height growth at the age of 10 MST, where the treatment combination P1A2 (3.56) was not significantly different from the treatment combination P0A2 (3.56), P1A2 (3.56), P0A1 (3.56), and P0A2 (3.56), and was significantly different from the treatments P2A1 (3.44), P2A2 (3.33), P1A1 (3.33), P1A0 (3.33), and P0A0 (3.33).

The relationship between the number of leaves and shallot pulp can be seen in Figure 4, the relationship between the number of leaves and the rice husk treatment at 12 MST, Figure 5, the relationship between the number of leaves and the shallot pulp treatment at 11 MST, and in Figure 6, the interaction between the number of leaves at the age of 10 MST.

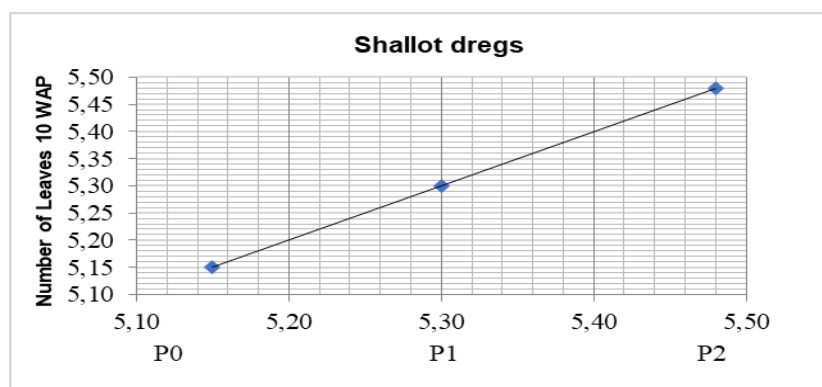


Figure 4. Relationship between Number of Leaves and Rice Husk Treatment 12 MST

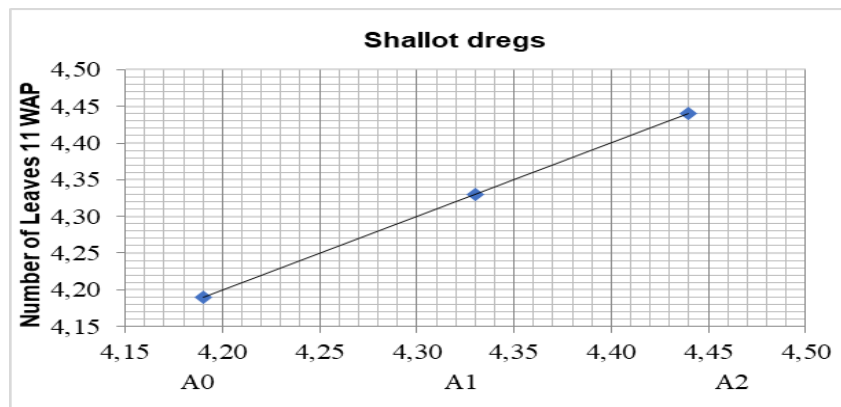


Figure 5. Relationship between Number of Leaves and Shallot Dregs Treatment 11 MST

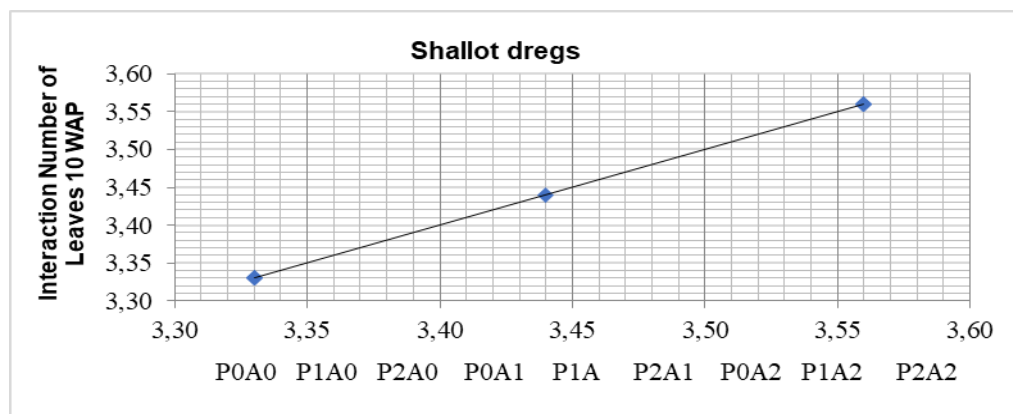


Figure 6. Interaction Relationship of Number of Leaves at Age 10 MST

3.2 Discussion

3.2.1 Utilization of rice husks as a planting medium for the growth of oil palm plants (*Elaeis guineensis*(Jack))

Plant height parameters are one of the observation variables that describe the addition of cells to plants. Based on the results of this study, it shows that plant height parameters do not have a significant effect on all ages of oil palm plants. Rice husks have a relatively low nutrient content compared to other planting media such as compost or top soil which are richer in nutrients. Therefore, although rice husks can provide a good physical structure for root growth, the lack of nutrients available from rice husks may not be enough to support significant plant height growth at the age of 4 to 12 MST (Radin, 2017).

The results of the study showed that rice husk planting media did not significantly affect the growth of oil palm stem diameter at the age of 4-12 MST because in this early growth phase, the plants were still focused on the development of roots and leaves, while the seedlings still had sufficient nutrient reserves from the seeds to support early growth. The characteristics of rice husks which are porous but poor in nutrients may not have a significant effect in the short term (Maulana et al., 2023).

According to Harun et al., 2021, stem diameter growth is more responsive to nutrients that are not significantly provided by rice husks. Rice husks contain several nutrients that contribute to responsive stem diameter growth of oil palm plants in pre-nursery. The main component is silica (15-20%), which strengthens cell walls and increases plant resistance. Organic carbon in rice husks improves soil structure and supports microorganism activity. Potassium plays a role in carbohydrate formation and stem growth, while phosphorus is important for root and stem development. Calcium and magnesium support cell wall and chlorophyll formation. Although in low concentrations, micronutrients such as zinc, iron, and manganese also play a role in plant metabolism. In addition to its nutritional content, rice husks also improve the physical properties of the growing medium by increasing aeration, drainage, and the ability to maintain moisture. The combination of improvements in physical properties and nutrient content is likely to contribute to the positive response of stem diameter growth in oil palm plants, although for optimal results, the use of rice husks should be combined with balanced fertilizers to meet the overall nutritional needs of plants. Finally, the effect of rice husk planting media on stem diameter growth may only be seen after a longer period, beyond the 12 MST range studied.

According to Hisham & Ramli, 2021 The chemical composition of rice husk does not provide sufficient nutrients or in a form that is easily absorbed by plants at that age. Rice husk is generally low in nitrogen and other macronutrients that are essential for plant growth.

In the leaf area parameter, rice husks did not have a significant effect on all ages of oil palm plants in the pre-nursery. The results of the study showed that the treatment of rice husk planting media did not have a significant effect on the growth of leaf area of oil palm plants at the age of 4 to 12 Weeks After Planting (MST). This is due to the physical characteristics of rough and hollow rice husks which may not be optimally utilized by plant roots that are still in the early stages of development (Pamungkas & Pamungkas, 2019).

According to Pode, 2016, young plant roots, which are still in the early developmental stage, may not have a root system that is extensive enough to explore and optimally utilize the pore space in rice husks. This is closely related to the limited leaf area of young plants, which limits the photosynthetic capacity and energy production required for aggressive root growth. Plants must balance energy allocation between shoot (including leaf) and root growth, known as the source-sink balance. The rough characteristics of rice husks may make it difficult for young roots to make direct contact with the media particles, reducing the efficiency of nutrient uptake, which in turn may slow root and leaf growth. Although rice husks improve aeration, the uneven distribution of moisture in the porous media can be a challenge for young roots. In addition, plants need time to adapt to the physical characteristics of rice husks, and during this adaptation period, leaf and root area growth may not be optimal. As a result, the rough and porous physical characteristics of rice husks, although potentially beneficial in the long term, may not be optimally utilized by young plants, which may lead to slower initial growth and be reflected in smaller leaf areas.

The relatively low nutrient content of rice husks has not provided a significant effect, considering that oil palm seedlings at this stage still depend heavily on nutrient reserves from seeds. The slow decomposition nature of rice husks results in the decomposition process not being optimal within a time span of 4-12 MST, so it has not provided a real effect on leaf area growth (Segara et al., 2015).

According to Situmeang et al., 2019 to get the optimal benefits from rice husk as a planting medium or nutrient source, it may take at least 3-6 months, or even longer. This explains why in the range of 4-12 MST, the effect has not been seen significantly on the growth of oil palm seedlings.

The number of leaves parameter has a significant effect at the age of 12 MST, where the highest treatment is in P2 (50% Rice Husk and 50% Topsoil) with the number of leaves as many as 5.48 and in the P0 treatment (Only topsoil) has the lowest number of leaves, namely 5.15. This is due to the improvement of soil structure and aeration resulting from the use of rice husks, which in turn supports the development of the root system and nutrient absorption. This occurs because the plants begin to enter a more active growth phase and require better planting media support to support the increase in the number of leaves (Maulana et al., 2023).

3.2.2 Utilization of shallot dregs for the growth of oil palm plants (*Elaeis guineensis*(Jack)

In terms of plant height parameters, the treatment of shallot pulp significantly affected plant height growth at the ages of 10, 11, and 12 Weeks After Planting (MST). This is because the nutrients contained in shallot pulp, such as nitrogen, fructooligosaccharides, and organosulfur compounds, play an important role in supporting plant physiological processes that contribute to the growth of oil palm plants (Setyawati et al., 2024).

Nitrogen is one of the main components of chlorophyll which is essential for photosynthesis and plant growth. Efficient photosynthesis will produce enough energy for the growth of plant cells, including vertical or tall plant growth. In addition, nitrogen is also part of amino acids and proteins needed for the formation of new cells (Leghari et al., 2016).

The results of the study showed that the treatment of shallot pulp did not have a significant effect on the growth of the diameter of oil palm plant stems at the age of 4 to 12 Weeks After Planting (MST). This is because shallot pulp does not have sufficient nutrient content to support the growth of stem diameter in the early stages of plant growth. Nutrients such as nitrogen, phosphorus, and potassium are essential for plant growth, and if shallot pulp does not provide enough of these nutrients, plant growth can be hampered (Simanjuntak, 2024).

According to Hawayanti & Andika, 2018, shallot pulp contains carbohydrates that contribute to the development of the stem diameter of oil palm plants. Its main contents include nitrogen, which is essential for vegetative growth including stems; phosphorus, which plays a role in cell division and the formation of new tissues; potassium, which helps strengthen stems and increases plant resistance to environmental stress; sulfur, which supports protein formation and cell growth; and organic fiber that can improve soil structure, increase water and nutrient retention. In addition, shallot pulp also contains phenolic compounds that have the potential to increase plant resistance to

disease. This combination of nutrients works synergistically to support optimal growth of oil palm stems, stimulate cell division and enlargement, strengthen stem tissue, and increase the plant's capacity to absorb and utilize nutrients from the soil. The result is a significant increase in stem diameter, which in turn supports a stronger plant structure and higher productivity. However, it is important to note that the effectiveness of using shallot pulp as an organic fertilizer is also influenced by factors such as soil conditions, climate, application methods, and overall plantation management.

The physical structure of onion pulp may not be ideal for healthy root growth and may affect gas exchange and water availability to the plant, which in turn affects stem diameter growth (Suryani, 2022). The leaf area parameter had a significant effect at the ages of 11 and 12 MST, where the highest treatment was at the age of 12 with A2 (25gr) having a leaf area value of 41.07 cm², while in treatment A1 (15gr) the leaf area was 40.67 cm² and the treatment with the smallest number of leaves was A0 (Without shallot dregs) as much as 35.42 cm². This is because shallot dregs as a source of organic nutrients are rich in nitrogen which plays a crucial role in the photosynthesis process of oil palm plants. This nitrogen is the main component of chlorophyll, a pigment that absorbs sunlight to convert water and carbon dioxide into glucose and oxygen. With sufficient nitrogen, plants can optimize their photosynthesis process, which in turn allows for the growth of larger and wider leaves. Wide leaves increase the plant's capacity to capture more sunlight, which is essential for overall plant growth and development (Pellejero et al., 2017).

According to Stoica et al., 2023 Fructooligosaccharides in onion pulp support the growth of healthy soil microflora. This microflora includes beneficial bacteria and fungi that interact with plant roots to enhance nutrient uptake. Nutrients that are well absorbed by the roots will be distributed to all parts of the plant, including the leaves. Optimal root health allows for more efficient and effective leaf growth, thereby increasing leaf area.

The number of leaves parameter had a significant effect at the ages of 8, 9, and 11 MST, where at the age of 8 MST in the A2 treatment it gave a number of leaves of 3.15, the A1 treatment had 3.04 leaves, and A0 as many as 2.81. In week 9 the A2 treatment had a number of leaves of 3.44, A1 as many as 3.19, and A0 as many as 3.26. In the 11th week the A2 treatment had a number of leaves of 4.33, A1 as many as 5.30 and the A0 treatment had a number of leaves of 5.15. This is because the shallot dregs provide essential nutrients such as amino acids and proteins needed for the formation of new leaf cells. Amino acids are the building blocks of proteins, which are the main components of cell structure and enzymes that regulate plant metabolism. With this supply of nutrients, oil palm plants can produce an optimal number of new leaves (Metwally et al., 2021).

According to Powerful, 2022 The nutrients from shallot pulp also contribute to the general health of oil palm plants. Healthy plants have a better immune system against pests and diseases and better adaptability to changing environmental conditions. Optimal plant health supports the growth of new leaves and the maintenance of old leaves to remain functional. Thus, shallot pulp contributes to increased leaf area and leaf number by providing essential nutrients and supporting the physiological processes of oil palm plants during this critical growth period.

3.2.3 The interaction between the use of rice husks as a planting medium and shallot dregs on the growth of oil palm plants (*Elaeis guineensis*(Jack)

Plant height parameters did not have a significant effect at the age of 4 to 10 MST. This is because plants at that age are still too young so that the planting medium has not given a significant effect on height growth. Other factors such as plant genetics, water and nutrient availability may have a greater role in determining plant height during this stage (Purba et al., 2019)

Based on the research results, the growth of stem diameter did not have a significant effect at all ages, this is because rice husks are known to have good physical properties for planting media because they can increase aeration and drainage in the soil. However, rice husks themselves are not rich in nutrients, so they are not enough to support significant growth in the diameter of oil palm stems (Fadhilah & Harahap, 2020).

Meanwhile, according to (Sacred, 2022), shallot pulp may also not provide enough additional nutrients or physical benefits to significantly affect stem diameter growth when used in conjunction with rice husks. These two materials may not complement each other in terms of providing optimal conditions for plant growth.

In addition, other factors such as environmental conditions (e.g. temperature and humidity), planting techniques, and plant care can also affect the growth of stem diameter. If these conditions are not optimal or if there are deficiencies in planting and care techniques, plant growth can be hampered even though the planting medium consists of a combination of rice husks and shallot dregs (Akpo et al., 2014).

The use of interactions between rice husks and shallot dregs in the growth of oil palm plants showed results that significantly affected the growth of leaf area at 11 and 12 weeks after planting

(MST), as well as the number of leaves at 10 MST. This shows that the combination of the two materials can provide real benefits at certain growth phases of oil palm plants. Rice husks are known to have high nutrient content and bioactive compositions that can provide various health benefits and may also contribute to plant growth. Meanwhile, shallot dregs may provide organic matter and nutrients such as nitrogen, phosphorus, and potassium which are important for plant growth (Munda et al., 2023). According to Sundari et al., (2022) the interaction between rice husks and shallot dregs may improve soil structure, water retention, and nutrient availability which in turn can increase leaf area and number of leaves in oil palm plants. This effect is likely to be more visible at certain stages in plant development, such as at 10 to 12 MST when the plant is actively growing leaves.

4. CONCLUSION

The treatment of rice husk planting media plays a role in improving the physical and chemical properties of the soil and only has a significant effect on the growth of the number of leaves at the age of 12 MST, where the best treatment is P2 (50% Rice Husk) producing 5.48 leaves. The treatment of shallot dregs has a significant effect on the growth of plant height, leaf area, and number of leaves. where the best treatment for plant height is A2 (25gr of Shallot Dregs) producing a plant height of 19.43 at 11 MST, a leaf area of 41.07 in the A2 treatment (25 gr of Shallot Dregs) at 12 MST, and a number of leaves of 4.44 in the A1 treatment (15gr of Shallot Dregs) at 11 MST. The interaction between the planting media of rice husk and shallot dregs significantly affected the growth of leaf area and number of leaves, where the best treatment POA1 (Without rice husk (only topsoil) and 15 grams of shallot dregs) with a leaf area of 42.89 at 12 MST and the number of leaves in the treatment P1A2 (25% rice husk (75% topsoil) and 25 grams of shallot dregs) with a number of leaves of 3.56 at 10 MST. Further research is needed on the dosage of the treatment to determine the extent to which shallot dregs and rice husks can have a positive impact on the growth of oil palm plants and other supporting factors to produce optimal growth.

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