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Palm Boiler Ash as a Growing Medium for Oil Palm Seedlings in Pre Nursery

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Abstract:- The growth of quality oil palm seedlings requires fertilization, because oil palm seedlings grow very quickly so they need sufficient nutrients. Boiler ash contains very useful nutrients and can be applied to oil palm seedlings as additional fertilizer or a substitute for inorganic fertilizer. This research aims to obtain a comparison of the best application of sub soil and boiler ash as a planting medium to increase the growth of oil palm seedlings by paying attention to seedling height and number of leaves. The research was carried out for 4 months, consisting of 3 levels with each level being repeated 10 times, so the total number of plants was 30 plants consisting of: PO = (control), P1 = 1 : 1 (sub soil: boiler ash), P2 = 1 : 2 (sub soil : boiler ash). The results of this research show that Treatment P2 is the best comparison by looking at the highest seed yield with the average height at the age of 30 Day after Fertilization, namely 24.91 cm and 60 Day after Fertilization, namely 37.20 cm and the average number of leaves at the age of 30 Day after Fertilization. namely 3.7 strands and 60 Day after Fertilization namely 4.7 strands.

Keywords:- *Boiler Ash; Oil Palm Seeds.*

I. INTRODUCTION

Seedling is the initial stage in oil palm cultivation to obtain good plants which are then placed in the field. Determining the success of the plant can be seen from the initial growth of the seedlings, so the nursery must be handled optimally (Sianggaran and Wawan, 2017). Good planting media is needed to support the growth of oil palm seedlings.

For the growth of quality oil palm seeds, fertilization is very necessary, this is due to the fact that oil palm seeds grow very quickly so they require sufficient nutrients (Gusniwati, Salim, and Mandasari, 2012). Fertilization needs to be done efficiently and effectively, if the oil palm plant has an excess dose of fertilizer then the oil palm plant will be poisoned, if there is a deficiency then the oil palm plant will experience a lack of nutrients which will cause stunted growth and decreased production (Hartono, Adwirman, and Manurung, 2014).

The availability of top soil is decreasing and the alternative to replace top soil is to use subsoil as a seeding medium, the availability of soil layers is greater (Andri and Saputra, 2016). The second soil layer (subsoil) is actually nutrient-poor soil with a low fertility level, pH ranging from 4.5-5.6, low Cation Exchange Capacity, low total N, low organic C and high Al (Hidayat, Simangunsong, Eka, and Iman, 2007). These problems can be overcome by adding organic materials.

Organic materials change the biological properties of soil in the growth of soil microbes (Sianggaran and Wawan, 2017). Organic materials have the benefit of being able to store water, have lots of pores and are rich in air, keeping the soil in a loose condition, helping good seedling growth (Augustien and Suhardjono, 2017). Boiler ash is an amliorant material, which is well known as a material that can improve the physical and chemical properties of soil. Boiler ash can be used to neutralize acidic soil and increase soil nutrient content. Boiler ash is solid waste from palm oil mills resulting from the combustion of shells and fibers in boiler machines. According to Amaru (2008) boiler ash contains very useful nutrients and can be applied to oil palm plants as additional fertilizer or a substitute for inorganic fertilizer. The nutrients contained in boiler ash are N0 74%, P205 0.84%, K20 2.07%, Mg 0.62%. According to Arianci, Elvia, Idwar (2013), boiler ash contains 30-40% K20, 7% P205, 9% CaO and 3% MgO. Ash tends to increase the amount of nutrients P, K, Ca and Mg and increases the nutrient N for plants.

Fertilization is very important to maintain the growth and productivity of oil palm plants. Palm oil that is often fertilized using inorganic fertilizer will damage the physical, biological and chemical properties of the soil. It is hoped that the abundant availability of boiler ash can replace the important role of KCl fertilizer, considering that there are quite a lot of elements contained in boiler ash. Therefore, this research is important to do.

Based on the above, research was carried out on subsoil improvement using oil palm boiler ash as a planting medium for oil palm seedlings.

The aim of this research is to obtain a comparison of the best application of sub soil and boiler ash as a planting medium to increase the growth of oil palm seedlings by paying attention to seedling height and number of leaves.

II. RESEARCH METHODS

A. Place and Time

This research was carried out for 4 months starting from June 2022 to October 2022. It was carried out on Sidomulyo village, Samarinda.

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B. Tools and Materials

The tools used are: hoe, analytical scales, watering tool, cloth meter, staples and writing tools.

The materials used are: 1 month old oil palm seeds of the London Sumatra type, the soil used for planting media is subsoil soil, boiler ash obtained from the PT palm oil mill. Tapian Nadenggan, Jak Luay Estate, the polybag used in this research measures 20 x 30 cm, the sack is used as a base for mixing media, labels, water.

C. Research Design

This research consisted of 3 levels with each level being repeated 10 times, the total number of plants was 30 plants consisting of:

- PO = (control)
- P1 = 1: 1 (sub soil: boiler ash)
- P2 = 1 : 2 (sub soil : boiler ash)

D. Research Procedures

➢ *Preparation of the Nursery Site*

Seeding is carried out in the pre-nursery by using paranet as a shade for the nursery to reduce the entry of sunlight and avoid direct rain falling on the plants which will have an impact on the growth process of palm seedlings.

➢ *Preparation of Planting Media*

The media used are subsoil and boiler ash. The soil from the bottom layer is first cleaned of plant root remains and other dirt, then mixed with boiler ash, the composition of the planting media in a ratio of 1:1 and 1:2. The ready media is put into a 20 x 30 cm polybag.

➢ *Seed Preparation*

The seeds used were 1 month old and came from PT. London Sumatra with the BAH LIAS 1 variety.

➢ *Planting*

- Planting is carried out after the polybags are filled according to the applicable measurements for each level
- Transfer 1 month old seedlings to polybags that have been prepared by tearing and discarding the initial polybag, then planting the seeds into polybags that have been prepared

➢ *Maintenance*

Maintenance activities include weeding, watering which is carried out twice a day/according to circumstances.

E. Data Collection Method

➢ *Data Collection*

The data taken are the growth parameters of oil palm seedlings including:

- *Seed Height (Cm)*

Observations of seedling height were carried out at the start of the study, at 30 Day after Fertilization and 60 Day after Fertilization, measured from the marked soil surface to the highest part of the plant.

- *Number of Leaves (Pieces)*

Observations on the number of leaves were carried out at the beginning of the study, at 30 Day after Fertilization and 60 Day after Fertilization, calculated starting from fully open leaves.

➢ *Data Processing*

Data processing uses the mean value of each treatment.

III. RESULTS AND DISCUSSION

A. Results

From this research, average seedling height (cm) and average number of leaves (strands) can be observed in table 1 and table 2.

Table 1 Average Seedling Height (cm)

Treatment	Day After Fertilizer	
	30	60
P0	20,03	27,05
P1	20,61	28,50
P2	24,91	37,20

Table 2 Average Number of Leaves (Strands)

Treatment	Day After Fertilizer	
	30	60
P0	3,0	3,5
P1	3,5	4,4
P2	3,7	4,7

B. Discussion

From the results of observations of the effect of oil palm boiler ash as a planting medium for oil palm seedlings on the growth of oil palm seedling height and number of leaves, it shows that in the P2 treatment the growth was better and faster than P1 and P0.

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➢ *Height of Oil Palm Seedlings*

Based on observations of the average height of oil palm seedlings in table 1, it shows that the P2 treatment produces taller plants than the P1 and P0 treatments. It is suspected that in the P2 treatment the nutrient content can accelerate the height growth of oil palm seedlings. Based on the results of observations of the average seed height of oil palm seedlings in table 2, it shows that the P2 treatment has more boiler ash than the P1 and P0 treatments. This is thought to be because more boiler ash is provided. Utilizing boiler ash can be an ideal ameliorant material because it has the properties of high base saturation, can increase soil pH, and has complete nutritional elements, so it also functions as fertilizer and is able to improve soil structure (Sitorus, Siagian, and Rahmawati, 2014). Ekawati (2006) stated that when the amount of nitrogen is sufficient, the work of auxin will be stimulated so that it will influence the growth of seedling height. The element nitrogen is widely used as the main constituent of chlorophyll and plant protein. The P0 treatment showed the lowest growth in seedling height, this is thought to be because there was no mixture of boiler ash and nutrients so that the available nutrients were very limited.

➢ *Number of Palm Oil Seed Leaves (Strands)*

Based on observations of the average number of leaves on oil palm seedlings in Table 2, it shows that treatment P2 has more boiler ash than treatment P1. This is thought to be because more boiler ash is provided. The tendency to increase the number of leaves is along with the average height of the seedlings in the previous parameters. The P0 treatment showed the lowest growth in the number of leaves, this is thought to be because there was no mixture of boiler ash and nutrients so that the available nutrients were very limited. Leaf growth and development is closely related to the availability of nitrogen elements for plants. In boiler ash fertilizer, the nitrogen element content reaches 0.74%. The N element is absorbed by plants in the form of ammonium and nitrate. The N element functions as a material for the synthesis of chlorophyll, protein and amino acids so that it directly influences increasing the number of leaves (Munawar, 2011).

Pangaribuan (2001) stated that apart from depending on the age of the plant, the increase in the number of leaves is a genetic characteristic of the oil palm plant itself. Apart from that, the development of oil palm seedlings is influenced by the rate of leaf production which depends on the local climate. In fertile soil, the leaves will quickly open, making them more effective in carrying out their function as a place for photosynthesis and a means of respiration, production per year on safe plants is genetically relatively the same, but if planted in different environments it turns out that the leaf production looks different.

IV. CONCLUSION

Based on the results of this research, it can be concluded that the P2 treatment 1 : 2 (sub soil : boiler ash) provides the best growth results in the parameters of height and number of leaves of 1 month old oil palm seedlings.

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