

The Effects Of Dosages Oil Palm Husk Ash On The Yield Of Peanuts (*Arachis hypogaeae* L)

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Abstract: The oil palm husk ash is one of the Amelioren in the soil because it has complete micro and macro nutrient elements. The oil palm husk ash is made of the solid waste from the process of incinerator of the oil palm husk. The oil palm husk ash contains of 30-40% K_2O , 7%, 9% Cao, and 3% MgO. Besides, it contains 1.200 ppm Fe, 1,00 ppm Mn, 400ppm Zn and 100ppm Cu. The purpose of granting this oil palm husk ash is to know its optimum dosages for the ground and of yield peanuts. This study used the randomized group design, with treatment as follows; A_0 = without oli palm husk ash; A_1 = with oil palm husk ash 600kg/ha (120g/plot), A_2 = 900kg/ha (180g/plot), A_3 = 1200kg/ha (240g/plot), and A_4 = 1500kg/ha (300g/plot). The result of the analysis of variance shows that this treatment has real effects of various to the weight of peanut and the peanuts per plot. The highest result is shown in A_4 = dosages of 1500kg/ha (300g/plot) with total production of 56.00g. Peanuts are also produced from A_4 = dosis 1500kg/ha (300g/plot) with total of 23,15 g. Meanwhile, production of the weight of peanuts per plot from treatment A_3 dosages 1200kg/ha (240g/plot) with total of 635,75g. Itis different from the treatment A_0 with total of 360,75g. This because the nutrients elements contain in the palm husk ash gives optimum nutrients to the plant of ground peanuts. And the most contained element in oil palm husk ash is Kalium (30-40%). The results of this study shows that to obtain the optimum result in planting peanut, it is suggested to take dose of 1200kg/ha (240g/plot) oil palm husk ash to get maximum nutrient in the soil.

Index Terms: Oil palm, dosage, husk ash, Kalium, peanuts

1 INTRODUCTION

Peanut (*Arachis hypogaeae*.L) is an excellent plant for health benefits. Currently peanuts to be excellent because according to research can lower blood sugar levels and lower levels of cholesterol. And in Indonesia peanuts are one of the most popular types of beans. Processed peanuts we encountered many in the form of boiled or fried. Peanut is one that meets the best nutrition in the nuts group. Besides having high calorie peanut also contains meneral. A cup of peanuts contains 58% Magnesium, 44% Posfor, 43% Zinc, 37% Fe, 22% Potassium and 10% Calcium. Peanuts also help the process of metabolism and immune function and reduce the risk of certain cancers. Therefore, demand for peanuts in Indonesia is increasing, in line with the increase in population income (Sumarno, 1986). Currently the planting of peanuts is spread throughout the country where the total harvested area of 21 million ha and the average production of 1.10 tons / ha of dried pods. Indonesia ranks third largest in Asia by area (650,000 ha) after India (90 million ha) and China (2.2 million ha). While in the world of Indonesia is known as the seventh largest peanut producing countries after India, China, Nigeria, Seunegal, USA and Brazil (Adisarwanto, 2000). In terms of productivity Indonesia is still low, which is about 1.0 ton / ha. The results show the highest biological potential of peanut productivity level ever achieved in Indonesia is between 3.0-4.5 ton / ha (Adisarwanto, 2000). Suprpto (2002) in Elein (2013) said some technical obstacles that resulted in low peanut production are among others due to less optimal soil processing so that the drainage decreases and the soil structure is dense. And also caused less optimal plant maintenance and pest and disease attacks.

Besides fertilization is also an important thing in increasing peanut production. Suprpto (1993) said fertilization plays an important role in increasing peanut production because fertilizer contains nutrients with relatively high concentrations. Ranoprawiro, (1990) in Yulhamsir (2009) says peanuts need enough troops of Potassium. If not fulfilled then the seeds are not produced (pods to dry). According to Rosmarkan in Yulhamsir, (2009) said if peanuts lack of potassium, then many processes that do not work properly, such as decreasing levels of starch and accumulation of Nitrogen compounds in the soil. Since the function of Potassium is to form and transport Carbohydrates, as a catalyst in the formation of proteins, regulates the activities of various meinerall elements, determines the reaction in cells, especially in organic acids, increases the growth of meristem tissue, regulates stomata movement, strengthens stemata, enzymes, increases carbohydrates and sugars in fruit and seeds the plant will become filled and dense. New peanuts can bind Nitrogen from the air at the age of 15-20 days after planting, therefore Nitrogen fertilizer is still needed as much as 15-20 kg / ha and to encourage the growth of new roots. Meanwhile, to increase the nutrient absorption, more phosphate is needed, 45 kg P_2O_5 / ha, and for photosynthesis, transocption of photosynthesis, stomatal regulation, and activating plant enzymes 50-60kg K_2O kg / ha (Suprpto, 1993). For the addition of nutrients can be amelioren where its function is to improve the physical properties and soil chemical properties such as described into Figure 1.



Figure 1. Peanut plant *Arachis hypogaeae*

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Palm oil ash can be used as one of the ground ameliorants because it has complete nutrient content both macro and micro. Palm oil ash is derived from solid wastes of empty palm oil that has been burned inside the incinerator (a waste incinerator operated using combustion technology at certain temperatures, so that the garbage can burn out) in the palm oil mill and the combustion is done manually (Figure 2). Wastewater is a large volume of waste and fresh fruit bunch processing (FFB) processing at a palm oil mill reaching 21% of processed FFB. Palm oil long ash contains 30-40% K₂O; 7% P₂O₅; and 3% MgO. It also contains micro nutrients ie 1.200ppm Fe; 1.00 ppm Mn; 400ppm Zn and 100ppm Cu (Fauzi, et al 2012). According to Soverda's research, et al (2008) the best dose of palm oil ash for green beans is 4.5 tons/ha with 198.25 grams per plot and confirmed to 1.65 tons/ha-1.



Figure 2. Making palm oil ash on the incinerator

RESEARCH METHODS

This research was conducted in experimental field of Agricultural Faculty of Simalungun University Pematang Siantar City with altitude + 400m above sea level. The research was conducted for 4 months from November 2015 to February 2016. The materials used were peanut seed varieties Hypoma, Abu janjang palm oil, KCl fertilizer, Urea fertilizer and SP-36. Insecticide with active ingredient Lamada Sihalotin and Fungisida Antracol with Propineb active ingredient 70%. Tools used are hoes, ruler gauge, stationery, paint, nails, hammer, bamboo, plywood, hands sprayer. This research uses non factorial Randomized Block Design (RAK) with the formula $Y_{ij} = \mu + \alpha_i + \beta_j + E_{ij}$ and 5 treatments ie, A0 = without palm long ash; A1 = gray palm oil ash 600kg/ ha (120 g/plot); A2 = gray palm oil ash 900kg/ha (180g / plot); A3 = gray palm oil ash 1200kg/ha (24g/plot); A4 = gray palm oil 1500kg/ha (300g/plot). Each treatment was repeated four times so that there were 5 experimental plots. 200x100cm sample plot size, 40x20cm spacing and plant population per plot of 25 plants. The number of samples per plot is 5 plants. While to know the effect of treatment on plant parameters observed is done by calculation with mathematical model and analysis of variance.

If from variance there is a real influence (*) then continued with the test of the Smallest Real Difference (BNT) at 5% level. Implementation of research includes land preparation, gray palm ash (Figure 3), planting (Figure 4 and 5), fertilizing (Figure 6). While plant maintenance is done by watering, insertion, weeding weed, hoarding, pest control and harvesting. Parameters observed were plant height, weight of pod per plant, number of pods per plant, (fruit), pod production per plot (g), pod production per plot (g), seed production per plot (g) and dry weight per 100 seeds (g).



Figure 3. Gray palm ash



Figure 4. Age 21 days after planting



Figure 5. Age 40 days after planting



Figure 6. Age 80 days after planting

RESULTS AND DISCUSSION

Plant Height

From the results of plant height measurement at age 4 MST, 6MST, 8MST and the results of analysis of plant variety showed that the treatment of gray palm ash has no significant effect on plant height. The difference in average plant height can be seen in Table 1.

Table 1. High Mean Differences Test Results of Plants (cm) Due to the Influence of the Long Palm Ash Absorbing

| High Plant Age 4 WAP (Before Planting) | |
|--|--------|
| Treatment | Mean |
| A0 | 20,83 |
| A1 | 22,25 |
| A2 | 25,20 |
| A3 | 24,73 |
| A4 | 24,50 |
| Total | 117,51 |

High Plant Age 6 WAP

| Treatment | Mean |
|-----------|--------|
| A0 | 32,15 |
| A1 | 32,80 |
| A2 | 33,50 |
| A3 | 36,20 |
| A4 | 37,65 |
| Total | 172,30 |

High Plant Age 8WAP

| Treatment | Mean |
|-----------|--------|
| A0 | 39,88 |
| A1 | 40,80 |
| A2 | 44,08 |
| A3 | 43,83 |
| A4 | 46,05 |
| Total | 214,64 |

From the above data treatment of ash bare palm oil has no significant effect on peanut plant height. This is due to more Kaium element required for carbohydrate formation and little use in vegetative growth. This is supported by Sumadi, (1997) in Meryati (2012) who said that the element of potassium required for the formation of carbohydrates in seeds, for strength and thickness and enlargement but its effect on vegetative growth has no significant effect.

Weight Pods Per Plant (g).

The result of the analysis of variance shows that the treatment of palm oil ash has a significant effect on the weight of pods per plant. The average difference of planting pods was tested by BNT which results can be seen in Table 2.

Table 2. Average Weight Mean Test Results of Crops (g) Due to Influence of Long Palm Ash Absorbing

| Treatments | Mean |
|------------|---------|
| A0 | 29,75c |
| A1 | 46,25b |
| A2 | 47,00b |
| A3 | 49,75ab |
| A4 | 56,00a |
| Total | 228,75 |

Noted: The numbers followed by unequal letters on the same row and column are significantly different on the 5% BNT Test. BNT is the smallest real difference.

Figure 1 described of the highest gray palm ash treatment for the weight of planted pods produced by A4 with doses of 1500 kg/ha (300g/ha) of crude palm oil ash (56.00 g) was also significantly different with A0 (without ash) by the amount (29.75 g). A1 doses of oil palm ash 600 kg/ha, (180g/plot) with amount (46.25g) and A2 doses of 900kg/ha (180g/ha) oil palm dust ash (47.00g), but not significantly different with A3 dose ash palm oil 1200kg/ha, (240g/ha) with amount (49.75g).

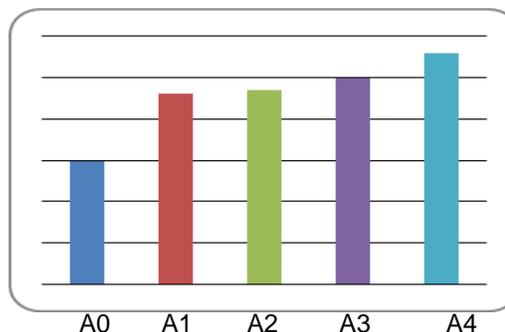


Figure 1. Histogram Effect of Extension of Oil Palm Long Ash Against Heavy Pod Planting (g)

Number of pods per plant (fruit).

The result of the analysis of variance to the number of plant pods shows that the gray palm ash have a significant effect on the number of pods per plant. To express the difference in average number of plant pods tested by BNT Test whose results can be seen in Table 3.

Table 3. Average Differences Test Result of Number of Planted Pods (fruit) Due to the Influence of the Long Palm Ashing

| Treatments | Mean |
|------------|---------|
| A0 | 13,55de |
| A1 | 16,45cd |
| A2 | 17,20bc |
| A3 | 19,53b |
| A4 | 23,15a |
| Total | 89,88 |

Noted: The numbers followed by unequal letters on the same row and column are significantly different on the 5% BNT Test.

According to Suprpto (2002) in Elain (2013) the number of pods formed per plant depends verietas, soil fertility and plant spacing. Oil palm long ash is a supply of potassium that much for the formation of pods that can affect the production of pods produced. This is in accordance with the opinion of Hanafiah (2005) in Eleni (2013) which states that the element of Potassium can play an important role in increasing the resistance of plants to disease so as to encourage the production of plants and will increase the number of fruit produced. Wididian (1996) in Indria (2005) argues that the provision of organic matter in providing the soluble element of Potassium is needed enough peanut plants for the development of pods. This is in accordance with the nature of the palm oil ash which the nutrients it contains is easily soluble. The highest yield of palm-ash asphalt yield on weight production of pods per plot was obtained by treatment of A3 dose 1200kg/ha (240g/plot) with amount (835 g) significantly different with A0 (without ash) with amount (453,75g), A1 dose of 600kg/ha (120g/plot) with amount (471,15g), A2 dose 900kg/ha (180gplot) with amount (564.50g) and A4 dose 1500kg/ha (300g/plot) with result (612,59g). For more clearly see the difference of each treatment of palm oil ash to palm weight production per plot (g). From the described above, it can be seen that palm oil ash has an effect on weight of pod

per plot, it is presumably because nutrient contained in palm oil ash is needed to increase peanut production. From research result of treatment dosage to A0 (without palm long ash) got the lowest yield, as well as the A4 treatment dose of 1500kg/ha (300g/plot) that received the lowest yield. But on treatment A3 of dose 1200kg/ha (240g/plot) get the highest results. This is allegedly due to excessive gray palm ash is also not good for peanut production. This is in accordance with the statements of Black (1973), Buckman and Brody (1982) in Oentari (2008) that the greater the amount of potassium available, the greater the amount of potassium absorbed by plants. This trend is called the consumption consumption of excess (luxury consumption) which is large in plants is not followed by increased production, resulting in late seed maturation and the seeds of the fruit become wrinkled, so the condition makes the resulting wet pod weight becomes low (Noviza, 2001 in Indira, 2005). In treatment A0 (without palm oil ash) the plant has a deficiency of potassium, because the dose of potassium given in treatment A0 is only 50kg / ha (10g/plot), ie half of the recommended dose of peanut fertilizer, so that the resulting production is the most low of all treatments. This is consistent with the opinion of Leiwakabessy and Sutandi (2004) in Oentari (2008) that in the Legumarose plant, potassium-deficient plants are more susceptible to disease and exhibit poor production quality due to the many seeds produced by the wrinkles. Potassium is needed to increase the production of tubers or seeds because Potassium is a constituent element of Nucleic acid protein, Potassium plays a role in the enlargement of tubers and help the activity of photosynthesis.

Production of Dry Seed Weight Per Plot (g)

The result of the analysis of the production variety of dry seed weight per plot indicates that gray palm ash has significant effect on the production of dry seed weight per plot. To know the difference of average yield of dry seed weight per plot with BNT test result can be seen in Table 4.

Table 4. Results of Average Differential Test of Weight Production of Dry Seed Perplot (g) Due to the Influence of the Long Palm Ash Absorbing

| Treatment | Mean | g/ha (ton) |
|-----------|---------|------------|
| A0 | 360,75b | 1,80 |
| A1 | 368,50b | 1,84 |
| A2 | 405,00b | 2,03 |
| A3 | 634,75a | 3,17 |
| A4 | 457,75b | 2,29 |
| Total | 2226,75 | |

Note The numbers followed by unequal letters on the same row and column are significantly different on the 5% BNT Test.

In the highest grain palm ash treatment yield the weight of seed per plot was obtained at A3 treatment of 1200kg / ha (240g/plot) with the number (634.75g) significantly different from A0 (without palm long ash) in amount (360.75g), A1 dose of 600kg/plot (120g/plot) with amount (368,50g), A2 dose 900kg/ha (180g/plot) with amount (405,00g) and A4 dose 1500kg/ha (300g/plot) (457.75g). To see more of the differences in the treatment of palm oil ash on the production of dry seed weight per plot. From the picture above can be

seen that the difference that occurs in the production of dry seed weight per plot due to gray ash palm oil is due to nutrients contained in palm oil ash can provide optimal results in peanuts. Along with the opinion Lingga (2013) in Eleni (2003) who stated that the element of Potassium can increase the weight of the seeds and reduce the shrinkage in the seeds. This is in accordance with the opinion of Cahyono (1996) in Saragih (2015), giving potassium to tubers and grains affect the formation of carbohydrate substances in seeds, besides potassium can also increase water absorption to the plants, thus preventing leaf lumber and can increase seed saving capacity and increase bulbs and seeds.

Dry Weight of 100 Seeds (g)

Result of analysis of variance to 100 seed dry weight indicate that treatment of ash of palm oil ash has no significant effect on dry weight of 100 seeds. To know the difference of average dry weight of 100 seeds can be seen in Table 5.

Table 5. Average Weight Mean Differential Test Results 100 Seeds (g) Influence of Long Palm Ash Absorbing

| Treatment | Mean |
|-----------|--------|
| A0 | 31,75 |
| A1 | 32,25 |
| A2 | 31,50 |
| A3 | 32,75 |
| A4 | 31,50 |
| Total | 159,75 |

The granting of oil palm ash has an effect on the weight of plant pods as compared to those not grayed with oil palm ash. This is because the ash of palm oil contains a lot of nutrients Potassium and Posfor needed for generative development in peanut plants. According to Ispandi (2004) in Oentari (2008) nutrients Potassium is very important in the formation of pods and seed filling and is very instrumental in the process of plant metabolism. Situmeang, (2013) said Posfor nutrients also function in the formation of flowers, fruits, seeds, and speed up fruit ripening and strengthen the stem and improve the quality of the plant. Differences in each treatment of palm oil ash can be seen in Figure 2 below.



Figure 2. Comparison of seeds and pods

Treatment of longitudinal ash of oil palm did not increase or decrease the weight of 100 seeds in peanuts. This is

presumably due to the role of the treatment given. According to Sitompul and Guritno (1995) in Indria (2015) stated that the weight of 100 seeds is one of the observation parameters that the more the results obtained. But they are also influenced by genotypes and crop varieties themselves

CONCLUSION

From this research, it can be concluded two things. First, the provision of oil palm ash has a significant effect on the weight of pods per plant, the number of pods per plant, the production of pods per plot and the production of dry beans per plot. Second, gray palm oil ash dose 1200kg/ha (240g/ plot) is the best dose and can increase the yield of peanuts (*Arachis Hypogaea*, L). For that, from the results of this study the authors propose that to obtain optimal yields in planting peanuts advised to use dose 1200kg / ha (240g / plot) ash bare palm oil for maximum nutrient element.

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