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INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 03, March 2025, pp : 2234-2238

e-ISSN : 2583-1062
Impact Factor : 7.001

# THE USE OF WOOD ASH, OIL PALM ASH AND COCONUT HUSK ASH TO DETERMINE THE GROWTH CHARACTERISTICS OF ZEA MAYS L.

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## ABSTRACT

This research was carried out to determine the effect of palm bunch ash, coconut husk ash and wood ash on maize plant. 2kg of soil and 395g of each Ashes were applied to Four treatments (T1 control, T2 10% concentration (39.5g), T3 20% concentration (79g) and T4 30% concentration (118.5g) and were used to check the rate of growth of maize after seven weeks of planting. Standard procedures were adopted for the experiment, observation was made and result were collated. The results obtained from this research showed that these organic fertilizers (coconut husk ash, wood ash and palm bunch ash) had tremendous effect on maize plant. However, it was also observed that palm bunch ash performed higher than the other two ash materials studied. It is therefore concluded that these ash treatments (palm bunch ash, coconut husk ash and wood ash) could serve as a good organic fertilizer hence their performance in this research. Thus it is recommended.

**Key words:** Growth Characteristics, Wood Ash, Oil Palm Ash, Coconut Husk

## 1. INTRODUCTION

Plant growth and development largely depend on the combination and concentration of mineral nutrients available in the soil, but often face significant challenges in obtaining an adequate supply of these nutrients to meet the demands of basic cellular processes due to their relative immobility. The nutrients may not be available in certain soils, or may be present in forms that the plants cannot use. Soil properties like water content, pH, and compaction may worsen these problems. Plants are known to show different responses to different specific nutrient deficiencies and the responses can vary between species. The most common changes are inhibition of primary root growth (often associated with P deficiency), and increase in lateral root growth and density (often associated with N, P, Fe, and S deficiency). A deficiency of any one of them may result in decreased plant productivity and/or fertility. It can have a significant impact on agriculture, resulting in reduced crop yield or reduced plant quality. Nutrient deficiency can also lead to reduced overall biodiversity since plants serve as the producers that support most food webs (Ojeniyi et al., 2010).

With the high cost of inorganic fertilizers and the seemingly difficulty accessibility, there is the need to shift to organic fertilizers as soil amendment which are cheap and readily available as wastes. Application of organic fertilizers in the form of ash to young maize plants had significantly increased the yield of maize (Odiete et al., 2005).

Despite the great potential of this crop, it is highly underutilized in the country and it has not received much attention in terms of crop improvement thus this research seek to investigates the effect of palm bunch ash, wood ash and coconut husk on ash to growth characteristics of maize.

## 2. MATERIALS AND METHODS

**2.1 MATERIALS-** The materials used for the experiment are: coconut husk ash, palm bunch ash, wood ash, buckets, soil, maize (Oba 98), spoons, pen, book, hoe, measuring tape, ruler, weighing balance, sieves, trowel etc.

**2.2 Sources of Material-** The soil was obtained from the Faculty of Agricultural Science demonstration farm behind the water bottling plant, University of Port Harcourt. The maize seeds, palm bunch ash, coconut husk ash and wood ash were sourced from the Rivers State Agricultural Development Programme (ADP), Extension Services, Rumuodumaya, Port Harcourt

**2.3 Soil and Ash analysis-** The soils were collected randomly before application from each polybags. The soil samples were air-dried, sieved with 2.00 mm-sieve and analyzed in the laboratory. The coconut husk, wood and empty palm bunch were gathered in an open space and set to burn in full supply of oxygen. It was allowed to burn completely to ash. The ash were collected and allowed to cool for 24 hours. The ash collected were sieved after 24 hours to get a fine particle of the Ash. Samples were collected for analysis and the chemical composition were determined.

**2.4 Application of Treatments-** The various ash were properly mixed with the soil and applied two weeks before planting for proper mineralization and reduction in any present pathogen. The seeds were planted after two weeks, five seeds per bag. They were arranged in three replicates for the four treatments.

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**2.5 Growth Parameters-** The growth parameters assessed were: Plant height, Number of leaves, leave length, number of sprouts, and plant girth.

**2.6 Statistical Analysis-** To ascertain whether the results were significant or not, statistical analysis were performed on the values obtained from measuring the growth parameters

## 3. RESULTS

**table 3.1** indicates the minerals present in the soil analysis

| | |
|---|---|
| **Soil Properties** | Contents |
| % sand | 78.66 |
| NO | 200g |
| % Silt | 11.64 |
| C mol/kg Acidity | 6.20 |
| pH (1:1) $H_2O$ | 4.09 |
| Mol/kg Al | 0.90 |
| Ec (us/cm) | 13.3 |
| mol/kg EC EC | 8.86 |
| % N | 0.10 |
| mg/kg Mn | 20.71 |
| % O | 1.11 |
| Mg/kg Fe | 19.86 |
| Mg/kg P | 18.70 |
| Mg/kg Cu | 0.71 |
| mol/kg Ca | 1.41 |
| Mg/kg Zn | 1.62 |
| mol/kg Mg | 0.28 |
| % clay | 9.7 |
| Cmol/kg K | 0.05 |
| Cmol/kg Na | 0.29 |

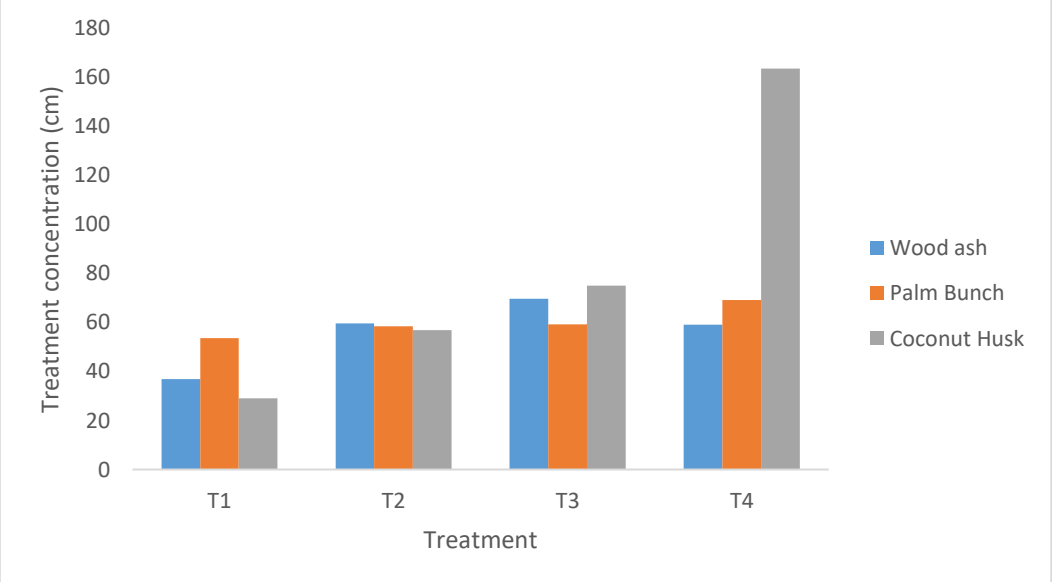


**Figure 3.1** Mean plant height at 8 weeks after planting

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Palm Bunch ash was seen to be high in T1, coconut husk ash in T3 and T4

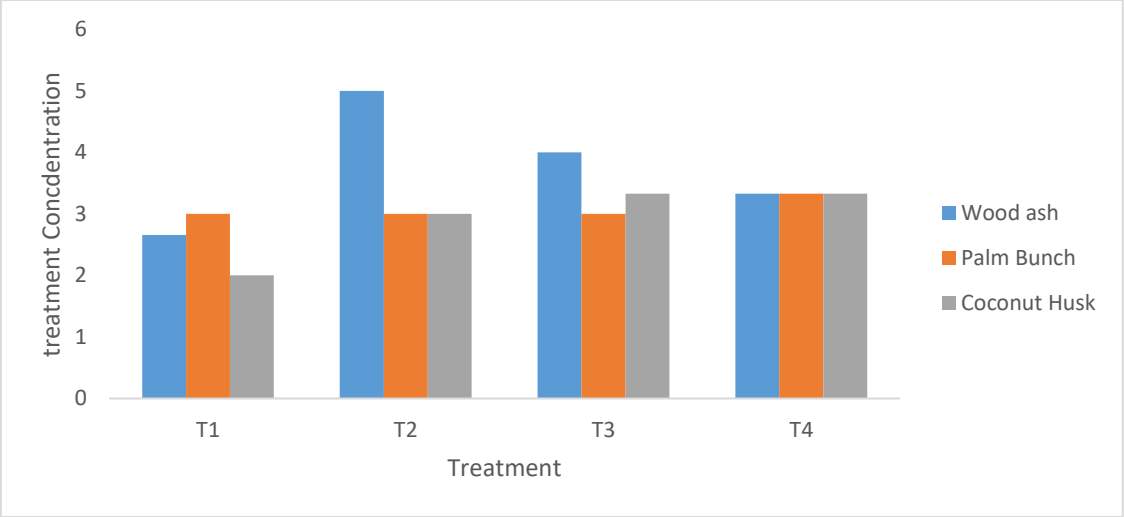


**Figure 3.2** Mean number of leaves at 8 weeks after planting

Palm Bunch ash was seen to be high in T1 wood ash in T2 and T3

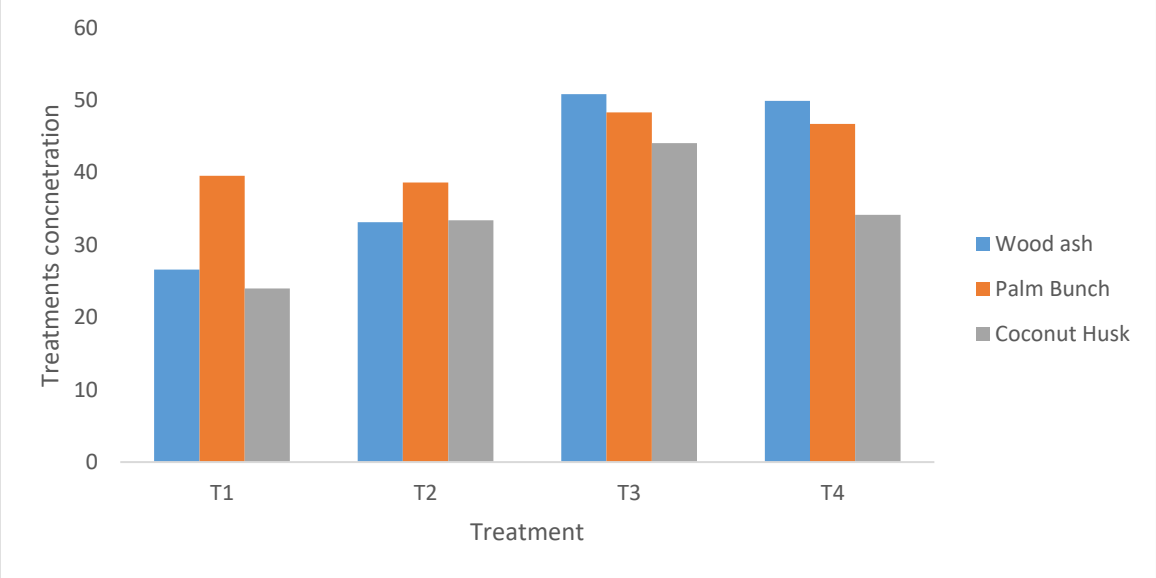


**Figure 3.3** Mean leaf length at 8 weeks after planting

Palm Bunch ash was seen to be high in T1 and T2, wood ash in T3 and T4

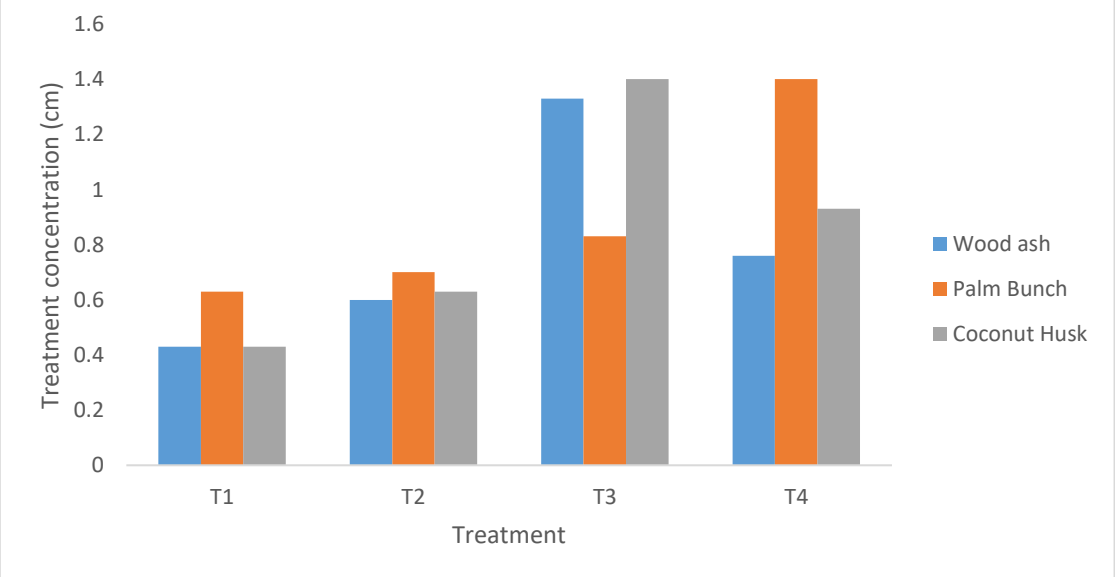

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**Figure 3.4** Mean plant girth at 8 weeks after planting

Palm Bunch ash was seen to be high in T1, T2 and T4, coconut husk ash in T3

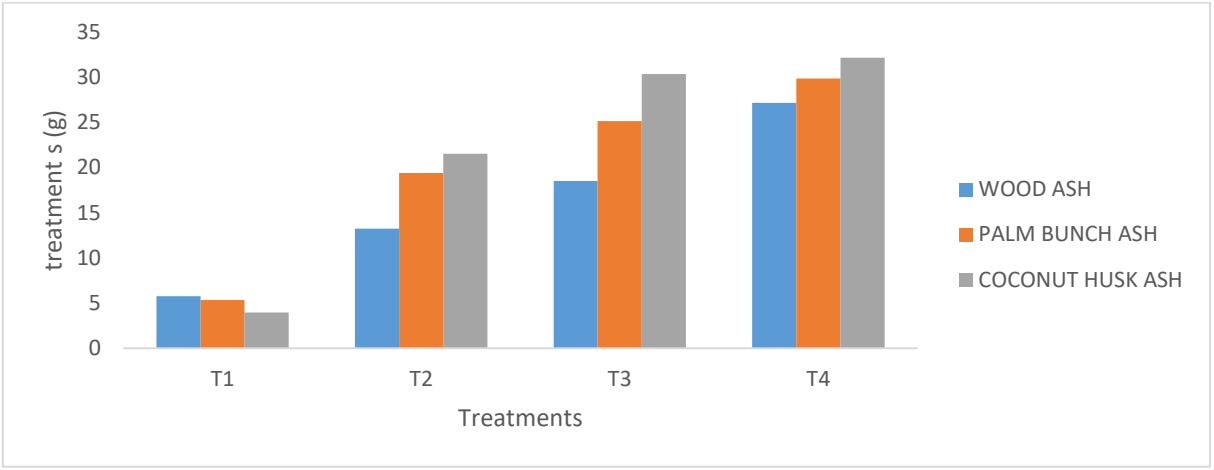


**Figure 3.5** Mean Fresh weight

Coconut husk ash was seen to be higher than other treatments in T2, T3 and T4, while Wood ash was high in T1.

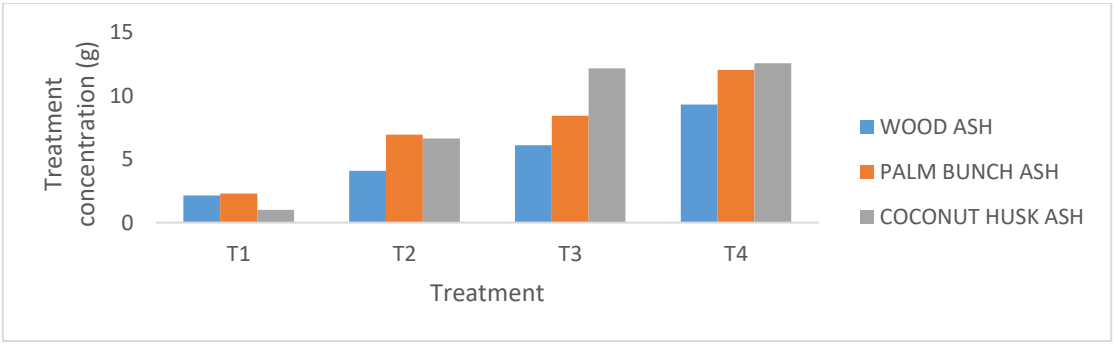


**Figure 3.6** Mean dry weight

Coconut husk ash was seen to be higher than other treatments in T3 and T4, while palm bunch ash was high in T1and T2

## 4. DISCUSSION

This research work investigated the effect of palm bunch ash, wood ash and coconut husk on growth characteristics of maize plant. About four treatments (T1 control, T2 10% concentration (39.5g), T3 20% concentration (79g) and T4 30% concentration (118.5g) were administered to check the rate of growth of maize after eight weeks of planting. The result obtained from this research showed that these organic fertilizers (coconut husk ash, wood ash and palm bunch ash) improves soil properties and enhance the existing soil nutrients, and thereby healthy growth is achieved with minimum nutrient densities. Hence the tremendous growth rate observed. It was also seen that treatment 4 for all ash treatments administered had higher rate of productivity over other treatments. This proves the point that productivity increases with increase concentration.

Further more, it was observed from the result that palm bunch ash performed higher than the coconut husk ash and wood ash. This observation buttresses the work of Onwugbuta et al., 2018; that stated that Palm Bunch Ash is well known for its commercial use in neutralizing acidic or peat soil naturally and effectively. It not only gives the basic nutrients, its high pH also neutralized the soils acidity, especially in peat areas and acidic soils with low potash. Palm Bunch Ash has long been known to be an excellent source of organic potash fertilizer.

Soil analysis is fundamental in agriculture to optimize crop production. It provides insights into nutrient levels, pH, organic matter content and soil texture allowing farmers to make informed decision about fertilization and soil amendments (Gloria et al., 2021). The soil analysis carried out shows that the soil has the required element hence it is suitable for planting.

## 5. CONCLUSION

From the result obtained in this research, it could be concluded that these ash contents (palm bunch ash, coconut husk ash and wood ash) could serve as a good organic fertilizer hence their performance in this research.

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