

# CASSAVA GROWTH AND YIELD AS AFFECTED BY INTEGRATED USE OF ORGANIC AND MINERAL FERTILIZERS IN THE TRANSITION SAVANNAH ZONE OF GHANA

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## INTRODUCTION

- ❖ Cassava (*Manihot esculenta* Crantz) is generally grown by small-holder farmers in marginal areas (Otieno, 2012). Due to the ability of cassava to produce fair yields under poor soils, it is often believed that soil fertility is not important in cassava production. However, research results of Fening *et al.*, (2009) indicate that this is a misconception hence the need to improve the fertility of soils for cassava production.
- ❖ The combination of organic and inorganic fertilizers for crop production has been recommended (Eneji *et al.*, 1997) as a sustainable option to improve the productivity of crops while maintaining soil fertility over a long period of time.

## OBJECTIVES

- ❖ This study was therefore carried out to assess the effect of sole application of three types of organic fertilizers at a nitrogen rate of 100 kg/ha and the integration of their half rates with 50% recommendation rate of NPK fertilizer for cassava production.

## MATERIALS AND METHODS

### Study location

- ❖ The study was carried out at the experimental field of Nkoranza Technical Institute (N 07°33.086', W 001°42.767') in the Nkoranza Municipality of the Brong Ahafo region of Ghana in the minor season from September, 2017 to August, 2018.

### Sources of organic fertilizers

- ❖ Three types of organic fertilizers were used for the study namely; Cow dung, Biodeposit and Organova. The Cow dung was obtained from the kraal of the Kwadaso College of Agriculture animal farm.

### Land preparation

- ❖ The field was cleared of weeds by weeding following which ploughing and harrowing was carried out. The field was then laid out into plots measuring 6 x 6 m.

### Experimental design

- ❖ Eight treatments consisting of sole application of three organic fertilizers applied at 100 kg N/ha and the combination of their half rates with 50% recommended rates of NPK as well as untreated control and recommended NPK were used. The treatments used were;
  - Control
  - 100-40-40 NPK (100% Recommended rate)
  - Cow dung @ 100 kg N/ha
  - Biodeposit @ 100 kg N/ha
  - Organova @ 100 kg N/ha
  - Cow dung @ 50 kg N/ha + 50% NPK
  - Biodeposit @ 50 kg N/ha + 50% NPK
  - Organova @ 50 kg N/ha + 50% NPK
- The experiment was laid out in a Randomized Complete Block Design (RCBD) using 3 replications.

## MATERIALS AND METHODS

### Application of amendments and planting of cassava

- ❖ The organic fertilizers were applied at planting whereas the inorganic fertilizer applied at two weeks after planting. The ring method of fertilizer application was used to apply both the organic and inorganic fertilizers.
- ❖ Urea, Triple Super Phosphate and Muriate of Potash were the sources of N, P and K respectively. The P and K were applied once while the N was split applied; 50% at 2 weeks after planting and the remaining 50% at 16 weeks after planting. The improved cassava variety 'bankyehemaa' was planted at a distance of 1m x1m.

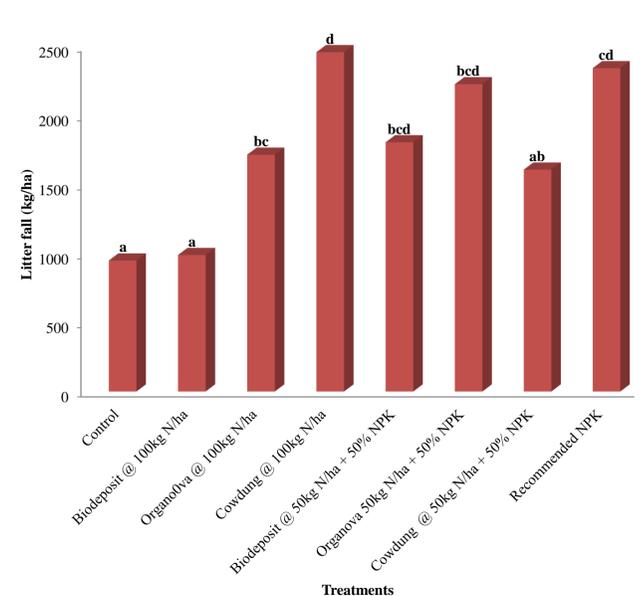
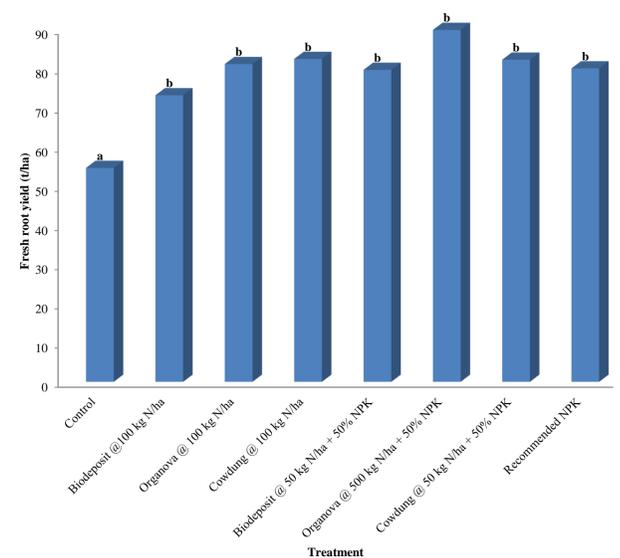
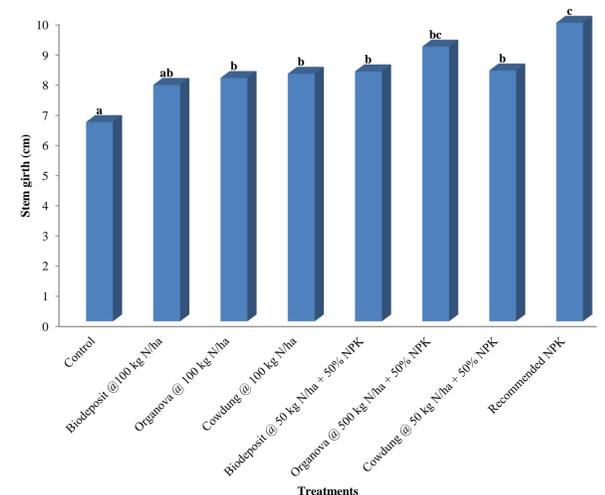
### Litter fall assessment

- ❖ In assessing the quantum of litter (leaf) fall from the cassava as result of the treatments, a 0.5 x 0.5 m quadrat was used to sample the leaf biomass. Three samplings were done from each treatment plot.
- ❖ The leaf biomass samples were then brought to the laboratory and oven-dried at a temperature of 60°C for a period of 48 hours. The dry weight of were then recorded and the litter fall converted to per hectare basis.

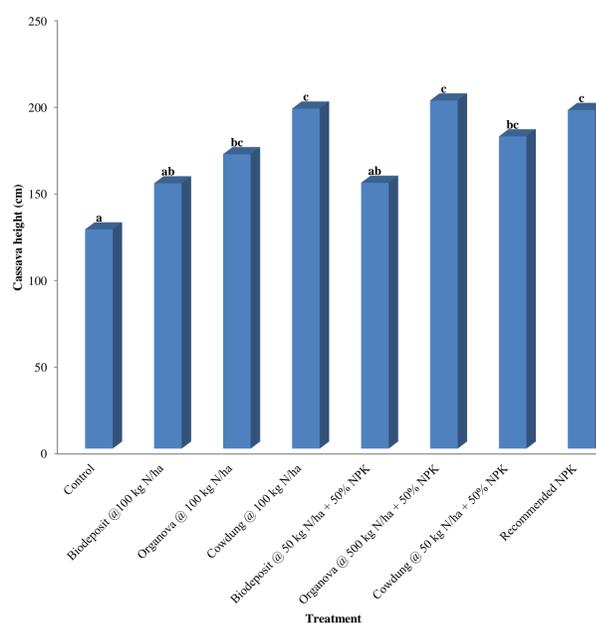
### Data collection and analysis

- ❖ Data collected includes height and stem girth of cassava as well as leaf, stem and root yield of cassava. The collected data were analysed using Genstat edition 12<sup>th</sup> for the ANOVA procedure (Payne *et al.*, 2006).
- ❖ Significant differences were assessed at 5% ( $p = 0.05$ ) level of significance and the means separated using Duncan's Multiple Range Test (DMRT).

## RESULTS



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## CONCLUSIONS AND RECOMMENDATION

- ❖ Cassava growth mostly responded well with the combined application of organic and inorganic fertilizer than the sole application of the organic fertilizers.
- ❖ In terms of yield, the cassava responded to both the sole organic fertilizer application as well as their combination with mineral fertilizers.
- ❖ We therefore recommend that for sustainable production of cassava, farmers should adopt the use of half doses of organic and inorganic fertilizers.