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(RESEARCH ARTICLE)

Agronomic characterization of 'Ikom White' maize (*Zea mays* L.) as influenced by organo-mineral fertilizer in Calabar Agricultural Zone, Nigeria

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Abstract

A field experiment was conducted at the Teaching and Research Farm, University of Calabar in 2016 to evaluate the effect of organo-mineral fertilizer on agronomic parameters of a local maize variety popularly grown in the late season in Ikom Agricultural Zone, Cross River State. The treatments used were Jon Ker® organo-mineral fertilizer (OMF) at 0, 5, 10, 15 and 20 t/ha. The treatments were replicated three times and arranged in a randomized complete block design (RCBD). The results obtained showed that maize responded positively to fertilizer treatments in all agronomic parameters evaluated with the best values obtained at 20 t OMF/ha. Maize plants in this treatment were tallest (277.8 cm) with highest leaves (8.6/plant), highest LAI (85.5) and highest dry weight (1.7 t/a) as well as longest (14.4), largest (16.0 cm) and highest cob weight (520 g/plot) with the highest shelling percentage (15.6 %) and highest grain yield of 1733 kg/ha. This performance trend indicates that the best agronomic parameters could be obtained for this maize variety by applying 20 t OMF/ha or more in the study area.

Keywords: Agronomic characters; Humid forest; 'Ikom maize' variety; Organo-mineral fertility; Southeastern Nigeria

1. Introduction

Maize (*Zea mays* L.) is the third most important cereal grown throughout the tropical and sub-tropical areas of world in terms of the area of cultivation and volume of output [1- 3]. The United States is the world's largest producer of maize and together with China and Brazil constitute the top three world producers accounting for over 70 % of the global crop annually [4].

Maize is used mainly as a cheap source of food energy in developing countries with Lesoto, Malawi, Zambia and South Africa topping as the largest world consumers of the crop in various food forms. Per capita consumption of the crop in these countries range from 222 – 328 g/person/day whereas in industrialized countries as much as 60 – 80 % is used as an industrial crop for the manufacture of livestock feed, ethanol, glucose, starch and other products in industrialized nations like Brazil [5-6].

In Nigeria, maize is grown in all parts of the country but output is mainly from the forest areas and the derived savannah including the Guinea savannah [1]. Maize is consumed in all parts of the country either as flour or as green maize. It has dietary energy density of 365 kg cal/100 g [7]. It plays significant role in the national food security during the hunger period when yam and other root/tubers staples have not matured and are scarce and expensive.

The competitive use of maize as food staple and as an agro industrial raw material has escalated the demand for the crop and the increased production level achieved is still grossly insufficient. Low crop yields in intensive cropping systems without proper soil fertility management has been one of the major agricultural productivity challenges in sub-

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Sahara Africa [8]. Maize is a heavy feeder and its yield in organic production is usually low. Improvements in soil fertility with improved crop husbandry practices would stimulate the productivity of the crop for improved food security and increases in rural income.

Late season maize cultivation in Ikom Agricultural Zone of Cross River State between August and November is lucrative and has been in existence for a long time. However, the agronomic performance of the local variety adapted to this area has not been carried out. The objective of this work was therefore carried out to determine the best rate of organomineral fertilizer for optimum agronomic performance of 'Ikom white' maize.

2. Material and methods

The experiment was conducted in 2016 at the Crop Teaching and Research Farm of the University of Calabar (40 45' - 50 08'N; longitudes 80 11' - 80 27'E) at elevation of 32 m above sea level. The area enjoys average annual rainfall of 2000 - 3000 mm distributed over nine months from March/April to October/November. The mean maximum and minimum temperatures are 23 and 32 °C respectively, while the relative humidity ranges from 75 to 92% [9].

The land was cleared manually with machete, fine tilled and seedbeds of 2 m x 1.5 m (3.0 m^2) made with a spade. Contiguous plots were demarcated by 1.0 m wide pathways, while blocks each containing five unit plots spaced 1.5 m apart. Tie bunds were constructed at the ends of plots and at intervals between the plots to control runoff and erosion.

There were five organo-mineral fertilizer (OMF) rates viz; 0, 5, 10, 15 and 20 t/ha treatments each replicated three times and laid out in a randomized complete block design (RCBD).

Planting of maize was done in the late season on 14th September, 2016. Seeds were sown two/stand 2 – 3 cm deep and spaced 50 cm x 50 cm. Seedlings were thinned to one plant/stand corresponding to 40,000 plants/ha.

Weeding was done manually at three weeks after planting using a hand-held hoe. Soil was gathered at the base of plants to cover the roots and strengthen plant anchorage in the soil. Silted drainage pits were opened up and eroded cross bunds repaired and maintained during the period of the experiment.

Growth and yield data collected were subjected to analysis of variance (ANOVA) and significant means were compared using the Fisher LSD at 5% probability level.

3. Results and discussion

The maize variety tested responded to organomineral fertilizer in all agronomic parameters assessed (Table 1). Plant height differed significantly ($P \leq 0.05$) at each fertilizer rate and was highest in maize plants fertilized with the highest OMF rate while shortest plants were recorded in the control plots. Also leaf count and LAI were highest on plants treated with 20 t OMF/ha followed by 5 – 10 t OMF/ha, while lowest values were recorded for the control plants.

Table 1 Growth and yield parameters of 'Ikom white' maize as influenced by organomineral fertilizer rates in Calabar

Fertilizer rate (t/a)	Plant height (cm)	Leaves per plant	Leaf area index	Ear length (cm)	Ear girth (cm)	Ear weight (g/plot)	Shelling %	Plant dry weight (kg/ha)	Grain yield (t/ha)
0	166.3	5.0	0.3	10.3	14.3	140	22.7	350	1.45
5	190.3	6.7	0.7	9.7	14.7	210	22.6	670	1.72
10	232.7	7.4	0.8	9.0	15.2	240	22.9	770	2.64
15	249.0	8.6	1.7	11.5	17.3	326	24.2	1142	2.75
20	277.7	8.6	2.2	14.4	17.8	385	25.5	1168	2.97
LSD 0.05	23.7	0.7	0.2	1.8	1.2	56.8	0.7	88.4	0.4

Both ear length and ear weight were influenced by OMF application to maize. Longer and larger ears were observed in plants that received 15 – 20 t OMF/ha than those in other fertilizer rates and the control plants which had similar values. Ear weight however was highest in plants growing in plots that received 20 t OMF/a, followed by 15 t OMF/ha, while 5 and 10 t OMF/ha produced similar values whereas plants in zero OMF plots produced ears with lowest weight. The

shelling percentage followed a unique pattern and was higher at 15 – 20 t OMF/ha than in other fertilizer rates and the control which did not differ among them statistically. Plant dry weight varied among the different treatments and was highest in plants fertilized with 15 – 20 t OMF/ha. These plants were followed by those treated with 10 t OMF/ha, and then 5 t OMF/ha while the least plant dry weight value was obtained in control plants. Grain yield followed a trend similar to that of the plant dry weight with the highest yield produced at 20 t OMF/ha, followed by the yield in 10 t OMF/ha plots, followed by 5 t OMF/ha while the lowest yield figure was recorded in zero fertilizer plots.

4. Conclusion

Maize growth and grain yield indices were maximized at the highest fertilizer rate, indicating that further yield improvement could still be obtained at rates higher than 20 t OMF/ha. However, farmers could adopt this fertilizer rate to maximize maize yield while further trials using higher fertilizer rates are recommended to ascertain the best fertilizer rate for optimum performance of this crop in the study area.

Compliance with ethical standards

Disclosure of conflict of interest

There is no conflict of interest among authors.

References

[1] Oladejo JA and Adetunji MO. (2012). Economic analysis of maize (*Zea mays* l.) production in Oyo state of Nigeria. Agricultural Science Research Journal, 2(2), 77-87.

[2] Govind KC, Tika B, Karki-Jiban S and Buddhi BA. (2015). Status and prospects of maize research in Nepal. Journal of Maize Research and Development, 1(1), 1-9

[3] Hashim M, Dhar S, Vyas AK and Singh CB. (2017). Yield trends and changes in physico- chemical properties of soil in maize- wheat cropping system under integrated nutrient management. Journal of Environmental Biology, 38, 727 – 734.

[4] Ranum P, Pena-Rosas JP and Garcia-Casal M. (2014). Global maize production, utilization and consumption. Annals of the New York Academy of Science, 1312(1), 105 – 112.

[5] Cruz JC, Konzen EA, Pereira Filho IA, Marriel IE, Cruz I, Duarte JD, Oliveira MF and Alvarenga RC. (2006). Production of organic maize in family agriculture. Sete Lagoas: Embrapa Maize and Sorghum.

[6] Ahmad M, Ahmad R and Rehman A. (2007). Crowding stress tolerance in maize hybrids. Economic and Business Review, The Daily Dawn, Lahore, Pakistan. October 17-22.

[7] Dogan I, Mahmut D, Emine KA, Husrev M and Bernard HZ. (2017). Best timing for glyphosate treatments and possible combinations with pre and post- emergence weed control practices in no-till maize. Phytoparasitica, 45(4), 611 – 618.

[8] Wiggens S. (2015). Raising agricultural productivity in sub-Saharan Africa. https://assets.publishing.service.gov.uk/media/5c44c3d3ed915d3890c53f9f/Raising-agricultural-productivity-in-sub-Saharan-Africa.pdf

[9] Iloeje NP. (2001). A New geography of Nigeria, new revised edition. Ibadan, Nigeria: Longman Publishers.

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