# The effect of Moringa oleifera Leaf Extract on the growth and yield of White and Yellow Maize (Zea *mays*) in Nayinawa Village in Bali Town Bali Local Government Bali Taraba State Nigeria.

**[1]Abdulmumin Abdulkadir, [2]Abubakar Dauda Jugulde and [3]Danladi Samaila** [1]Federal Polytechnic Bali Taraba State Department of Agricultural Technology.
abdulmuminabdulkadir62@gmail.com
[2]Federal Polytechnic Bali Taraba State Department of Crop Production
[3]Federal Polytechnic Bali Taraba State Department of Agricultural Technology
Corresponding Email.sadiqhsadiq6@gmail.com
DOI: 10.56201/ijaes.vol.11.no4.2025.pg64.73

***Abstract***
*Maize (Zea mays L) is one of the major cereal crops grown in the humid tropics and Sub-Saharan Africa It is a versatile crop and ranks third following wheat and rice in world production as reported by Food and Agriculture Organization. Moringa is the sole genus in the flowering plant family Moringaceae made up of 13 species but the commonest one is Moringa oleifera. Moringa contains zeatin, a plant hormone derived from the purine adenine. It is a member of the plant growth hormone family known as cytokinins. These plant hormones help cell division, differentiation, and growth, protect against oxidation and help in nutrient assimilation The experiment was carried out in the data obtained were subjected to a soft wire called Statistical Package for Social Science (SPSS) for the analysis of variance (ANOVA). After the analysis, the following results were obtained. The result showed that moringa extract had a statistically significant effect on the growth of maize (P < 0.05). The result showed that growth of maize cultivars did not vary in their response to moringa extract (P > 0.05). The result showed that different concentration of moringa extract had a statistically significant effect on the growth of maize (P < 0.05). The result showed that moringa extract had a statistically significant effect on the growth of maize (P < 0.05).*

***Key words:*** *Moringa, Extract, Effect, Growth, Yield*

## INTRODUCTION

Maize (Zea mays L) is one of the most important cereal crops grown in many parts of the world including Africa and Nigeria as an explicit environment. It is a multipurpose crop and grades third following wheat and rice in world production as testified by Food and Agriculture Organization (FAO, 2002). Maize crop is a fundamental source of food and living for masses in many countries of the world. It is produced widely in Nigeria, consumed in raw forms, baked, fried, pounded or fermented and turned into flour for cooking and porridge (Agbato, 2003). Many industrial products in advance country such as alcohol, corn oil for salad, lubrication and soap making, maize serves as their source (Dutt, 2005). It is the main component of animal feed and it has a good palatability in poultry, pigs and cattle as it provides energy (Iken *et al.*, 2001). No part of maize is a waste to different species of livestock (Dutt, 2005). Even though there is there is a

significant demand of maize in Nigerian, but the only 1 t/ha was recorded in Nigeria as the lowest growth (Fayenisin, 2017). The fixed drop in maize growth can be indorsed to:

1. Speedy decline in soil fertility caused by cultivation and reduced fallow period as reported by Directorate of Information and Publications of Agriculture (DIPA, 2013).
2. Failure to select and plant fast growing varieties most suited or adapted to each agro-ecological zone (Kim, 2009).
3. Use of inappropriate plant spacing which determines plant population and growth (Zeidan et al., 2016). Tolera et al., (2018) proposed that plant breeders should select maizcultivars that associate fast growth and required Stover characteristics because of huge variances that exist between varieties. Odeleye and Odeleye (2001) reported that maize cultivars vary in their growth characteristics, and its component, for this reason, the selected cultivars should have these two qualities. Iken and Anusa (2004) suggested their recommendation for an optimum plant population of 53,333 plants/ha for maximum growth of maize. Their report showed that this can be obtained by using a spacing of 75cm x 25cm at 1 plant per stand or 75cm x 50cm at 2 plants per stand. Azam et al., (2007) reported that spacing of 75cm x 35cm increased the growth of maize grain while 75cm x 15 maximized cob weight. Related finding by Allessi and Power (2014) showed that increased plant population decreased maize cobs. Currently some farmers in Southern Nigeria plant any maize cultivar of their choice at such spacing as 90 cm x 30 cm, 90 x 20 cm or 75 cm x 50 cm which do not transform into anticipated high yield in the study area. Hence, there are no standard recommendation has been considered in cultural practices, cultivar selection, recommended plant spacing which affect both the growth and optimal performance of maize.The commercial and the subsistent farming of maize in Nigeria have been road blocked by low yield due to speedy decline in soil fertility and lack of fertility amending materials, availability and expensiveness (dip, 20o6: Enujeke, 2013).Even if the soil fertility amending materials are available and cheap, they are associated with soil degradation and environmental pollution ( Anyaegbu, 2015). In this modern and scientific years, awareness is being circulated on the important use of organic fertilizer in crop production. This organic fertilizer does not only supply the essential nutrients to plants but also increase the physical properties of the soil such as soil structure, water holding capacity and soil porosity and chemical property of the soil such as macro and microbial population which is very important in some nutrient's solubility such as P and Fe (Amujoyegbe, Opabode and Olayinka, 2007; Mishra, Singh, Singh, Das and Prasad, 2013). The application of moringa leave extract on maize was analyzed to an increase in crop production by 20% to more than 30% and also increased the crop life s pan, made heavier root and stem and this increased crop production and larger seeds (Foidl et al. 2001).

## MATERIALS AND METHODS

This research contains information on research deign, population, sample population, instrumentation, reliability, validity method the summary of the methodology respectively. Bali town, the headquarters of the Bali local government of Taraba state, Bali is situated on the bank of Taraba River, at some 150 km from Taraba state capital (Jalingo), by virtue of its location in the water shed area of the river Benue and its proximity of Taraba River. Bali town which is situated on the bank of the river Taraba, a major tributary of the river Benue at an altitude of about 450km above sea level. Bali town falls within the amassed leguminous woody land. It is characterized by heavily wooded vegetation along major water course. This support root crop farming and major food crops which include sorghum, rice and maize.

**Experimental Design**

The experimental design used was a randomized block design which consisted of 40 treatment and 40 controls. Treatments were 2g, 4g and 6g of fertilizer applied.

**Seed Procurement**

The seeds were procured from Gareji, one of the villages in Wukarin Local Government, Taraba State.

**Planting Operation**

The seeds were planted on 28th May, 2024, with the testing of seed viability by soaking the seeds in a bowl of water to identify viable and non- viable seeds. After soaking, those that were floating on the surface of water were considered not viable while those that settled at the bottom of the bowl were considered viable. The seed were drilled into the hole at the rate of 3 seeds per hole and planting space was 75cm×35cm within and between the rows.

**Germination Percentage**

The germination percentage was calculated by counting the number of plant emergence divided by the number of plants planted multiplied by hundred. As follow

$$GP = \frac{\text{Number of plant emergence} \ \ 100}{\text{Number of plant planted}}$$

**Measurements of the Plant height**

The plants heights were measured at 1, 2, 3, 4, 5,6,7,8 and 9 weeks. After the emergence and growth of the plants, the means and standard deviations of the compiled growth were calculated and presented on the results.

**Data Analysis**

The data collected were subjected to one way analysis of variance, mean separation was done using the (SPSS) Statistical Package for Social Science, multiple range test. Consequently, the error bar was presented to facilitate interpretation and comparison of results.

**RESULTS**

Four experiments were carried out in the Orchard of Bali Local Government Bali, and Agricultural farm. The first experiment was meant to see if moringa extract had an effect on the growth of rice. The second experiment was to find out if the growth of maize cultivars vary in their respond to moringa extract. The third experiment was to see if the growth of maize cultivars differ with the concentration of moringa extract. The fourth experiment was to see if moringa extract affect the yield of maize. Having conducted and completed the experiments, the results were displayed below.

On the effect of moringa extract on the two cultivars of maize, the result Showed that moringa extract had no statistically different effect on the growth of two maize cultivars (yellow and white) ($P > 0.05$), see figure 1 below.

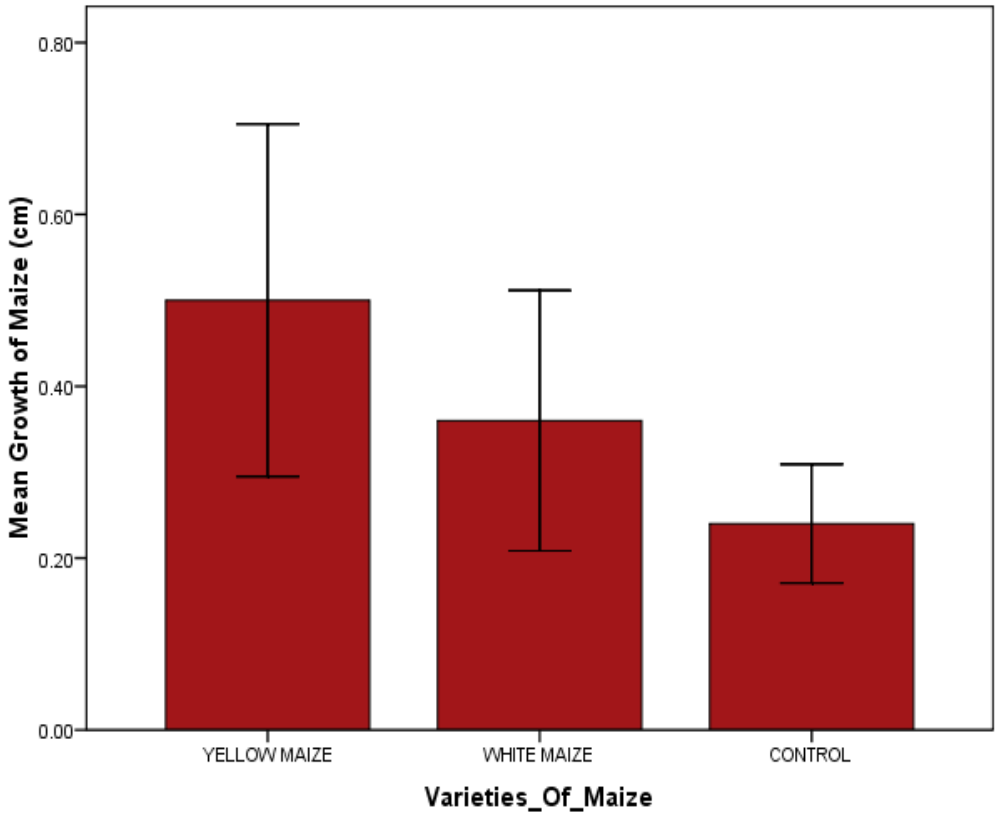


**Figure 1. Mean growth of maize and the standard deviation.**

The values 0.50 ± 0.26, 0.36 ± 0.21 and 0.24 ± 0.09 are means and standard deviations of treatments and control, respectively.

On the experiment to find out if the growth of maize cultivars vary in their response to moringa, the result showed that the growth of maize cultivars did not vary in their response to moringa extract ($P > 0.05$).see figure 2 below.

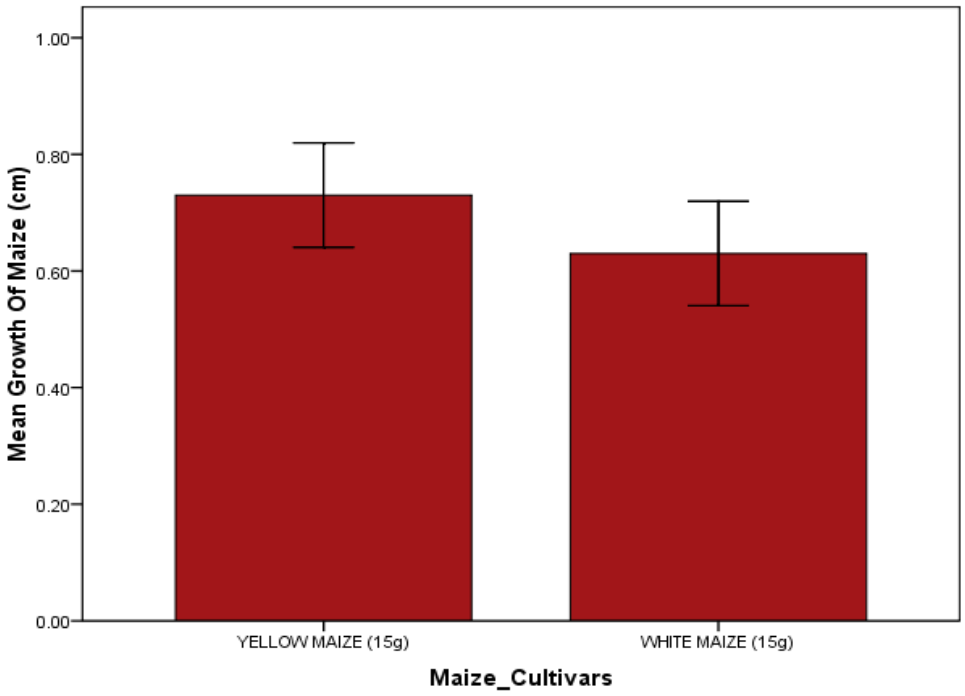


**Figure 2. Mean growth of maize and the standard deviation.**
The values 0.73 ± 0.12 and 0.63 ± 0.12 are means and standard deviations of treatments (Yellow and white maize) respectively.

On the experiment to find out if different concentration of moringa had a different effect on the growth of maize, the growth of maize, the result showed that different concentration of moringa extract had a statistically significant effect on the growth of maize ($P < 0.05$).See figure 3 and 5 below.


**Figure 3. Mean growth of maize and the standard deviation.**
The values 0.73 ± 0.12 and 0.40 ± 0.07 are means and standard deviations of treatments (Yellow maize) respectively.

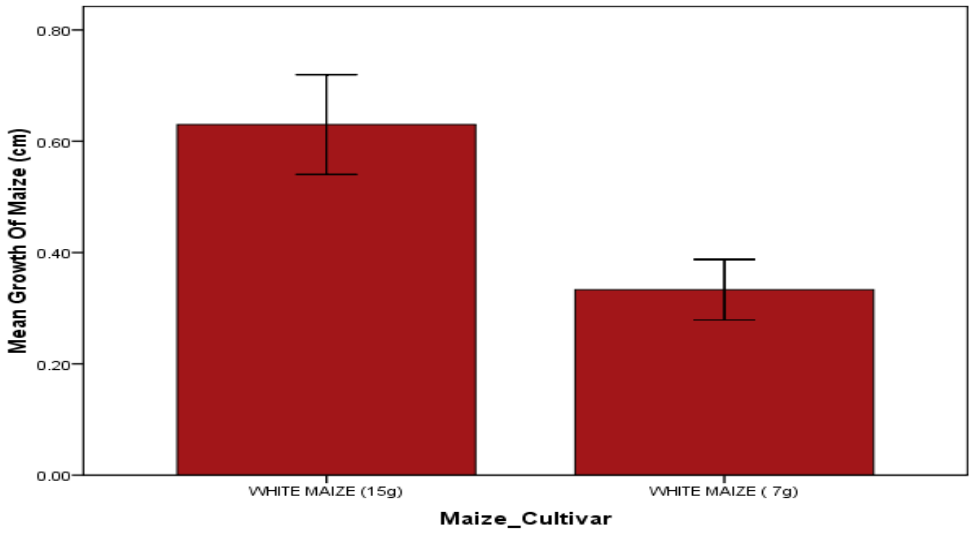


**Figure 4. Mean growth of maize and the standard deviation.**
The values 0.73 ± 0.13 and 0.33 ± 0.07 are means and standard deviations of treatments (white maize) respectively.

On the experiment to find out if moringa extract had an effect on the yield of maize, the result showed that moringa extract had a statistically significant effect on the growth of maize ($P < 0.05$).See figure 5 and 6 below.

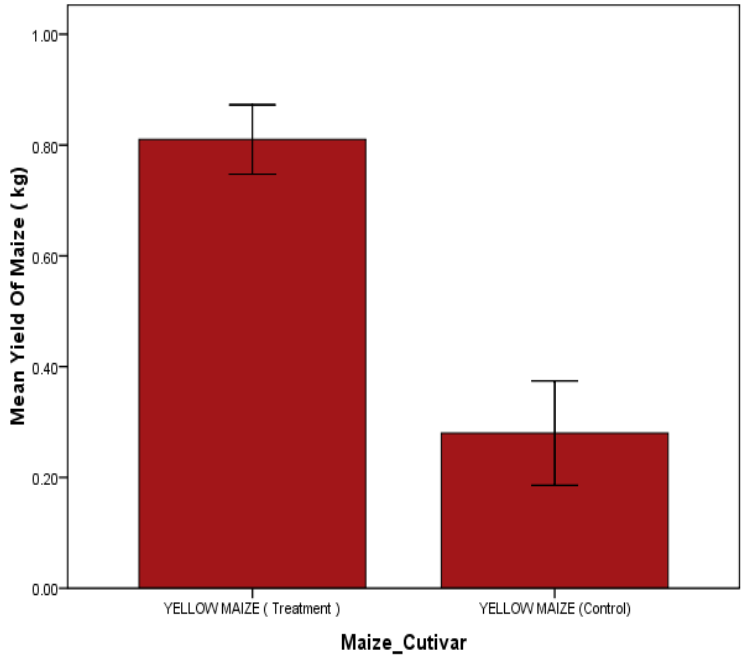


**Figure 5. Mean yield of maize and the standard deviation.**
The values 0.81 ± 0.09 and 0.28 ± 0.13 are means and standard deviations of treatments and control of the yellow maize) respectively.

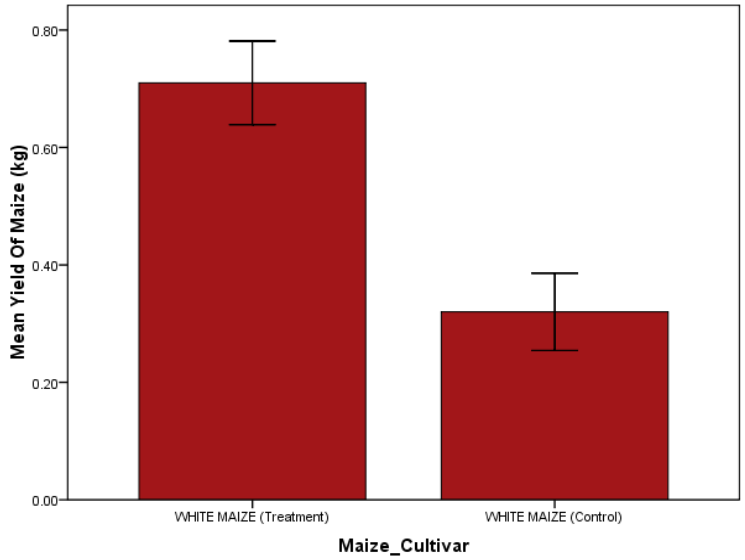


**Figure 6. Mean yield of maize and the standard deviation.**
The values 0.71± 0.10 and 0.32 ± 0.09 are means and standard deviations of treatments of the white maize) respectively.

## DISCUSSION

On the experiment to find out the effect of moringa extract on the growth of maize, the original hypothesis was moringa extract had no effect on the growth of maize. But this finding reported that moringa extract had a statistically significant effect on the growth of maize ($p < 0.05$) as shown in figure 1. This result is the same with the finding of (Hwang, 2012) where he conducted and experiment to see the effect of moringa extract on the growth of millet and found that it had a statistically significant effect. He said this can be applied to other crops if they are of the same family and maize and millet are of the same family, Graminae. But this result is contradicted by the result of (Fajemisin, 2017) where the same experiment was conducted and no statistically significant effect was seen. According to Odusanya 2018, this different result reported by (Hwang, 20 12) might be as a result of disease, striga and other factors, but definitely, the chemical content of moringa extract is capable of affecting maize if no above-mentioned factors.

On the experiment to see the respond of maize cultivars to moringa extract, the original hypothesis was maize cultivars do not differ in their respond to moringa extract. But this result showed that maize cultivars had a statistically different respond to moringa extract ($P < 0.05$) as displayed in figure 3 and 5. This result is supported by the research (Abera et,.al, 2005) where they carried out and experiment to investigate the effect of moringa extract on the different maize cultivar and reported that there was statistical and significant variation in the respond of maize cultivars to moringa extract. But beside the result of this researcher, another researcher called (Khaliq 2004) came out with the result debunking the result of (Abera et,.al, 2005). According to him, this variation that was seen might not be attributed the applied moring extract, but to the genetic makeup of the maize cultivars. To him, the different respond might be more attributed to genetic than the moringa extract.

On the experiment to see the effect of different concentration of moringa extract on the growth of maize, the original hypothesis was different concentration of moringa extract had no different effect on the growth of maize. But this finding showed that different moringa extract had a statistically significant different effect on the growth of maize. This result has a similar finding with the result of Opik et,.al,2005. The researchers reported this in the paper stipulating that the higher the concentration of moringa extract, the higher the effect on maize growth and vice versa. This result is also supported by IITA in 2012 and 2018 where the same experiment was conducted with moringa extract to see how its concentration would affect maize growth, and it was found to have that effect.

On the experiment to find out if moringa extract had an effect on the yield of maize, the original hypotheses were moringa extract had no statistically significant effect on the yield of maize. But according to this finding, moringa extract had a statistically significant effect on the yield of maize. In the year 2018, Makka and becker conducted an experiment to investigate the effect of moringa extract on the yield of maize. At the end of his finding, it was reported that moringa extract had a statistically significant effect on the yield of maize. A similar investigation conducted in 2008 by Fugile revealed that moringa extract had a statistically significant effect on the yield of maize. Other findings like that Omiscore and Abayomi, 2016 and that of Odusanya 2018, both conducted the same research on the effect of moringa extract on the yield of maize and reported that moringa extract had a statistically significant effect on the yield of maize. He said this might be attributed to the different growth hormones scientifically analysed and discovered to be present in moringa extract.

## CONCLUSION

The use of live moringa extract in maize production should be viewed as a sustainable production system that will bring about increase in growth and yield of maize and reduce the effect of fertilizer on soil fertility.

Soil amendment (moringa extract) has a great influence on the growth and yield of maize. The research was concluded with the followings

- Moringa extract had a statistically significant effect on the growth of maize.
- The effect of moringa extract on maize cultivars differed in their responseon the yield of maize
- Different concentration of moringa extract had differen effect on the growth of maize.
- Moringa extract had a statistically significant effect on the yield of maize.

The use of moringa extract is the most effective way of optimizing yield and profitability of maize.

## REFERENCES

Abera, T., Tanaand and L. M. Pant (2005).Grain Yield and LER of maize-climbing bean intercropping as affected by inorganic, organic fertilizer and population density in Western Oromiya, *Ethiopia. Asian Journal of Plant Science.* 4: 458-465

Agbato, S. O. (2003). Principles and Practices of crop production. Odumatt press publisher, Oyo, pp. 57-62.

Allessi, J. and Power, J. F. (2004). Effect of plant population, row spacing and relative maturity on dry land corn in the Northern plans. *Agronomy*

Anyaegbu, P.O ( 2014). Evaluation of Mixture Productivity and Economic Profit of Intercropped Garden Egg and Okra as Influenced by Application of *Moringa oleifera* Extract, Poultry Manure and NPK Fertilizers in Cropping Systems of Farming in North central Nigeria. *Journal of Educational Policy entrepreneur Research 1(2): 227-237*

DIPA (2013). Handbook of Agriculture: facts and figures for farmers, students and all interested in farming. Directorate of Information and Publications of Agriculture. *Indian Council of Agricultural Research*, New Delhi, p. 435.

Dudley, L.M., A. Ben-Gal and U. Shani. (2008). Influence of plant, soil and water on the leaching fraction. *Vadose Zone Journal* 7: 420–425.

Dutt, S. (2015). A Handbook of Agriculture. ABD Publishers, India. Pp 116-118

FAO (2016). Fertilizer and the future. *IFA/FAO Agriculture Conference on Global food security and the role of Sustainability Fertilization.* Rome,

Fayenisin, O. (2015). Search for Improved maize varieties for farmers in Nigeria. *3rd National Workshop of Maize Centre. NASPP, Ibadan December, 6th - 10th 1976*

Fiodl, N., Makkar, H. P,S., Becker, K (2001). The Potential of *Moringa oleifera* for Agricultural and Industrial uses. In: L.J Fuglie (Eds) The Miracle tree: The Multiple Attributes of Moringa. CTA Publication. Wageningen. The Nertherlands, Pp 45-76

Hwang, I., J. Sheen and B. Muller (2012). Cytokinin signaling networks. *Annual Review of Plant Biology*, 63, 353-380

Iken, J. E. and Anusa, A. (2004). Maize Research and Production in Nigeria. *African Journal of Biotechnology*, 3(6): 302-307.

IITA (2012) International Institute of Tropical Agriculture, *Maize Improvement Program Research Report,* Ibadan, Nigeria

IITA (2018). International Institute of Tropical Agriculture. Growing in Nigeria Commercial Crop Production Guide series. Information and Communication Support for Agricultural Growth in Nigeria. USAID Pp 1-8 www. Legit. Ng/>. Visited 16/ 11/18,

Khaliq, T., Mahmood, T., Kamal, J and Masood, A (2004). Effectiveness of Farm Yard Manure, Poultry Manure and Nitrogen for Corn Productivity. *International Journal of Agriculture and Biology* 6:260-263. 63, 353-380

Odeley, V.A. (2001).Maize production in Nigeria, Nigeria's Foods and Feeding Stuffs, their Chemistry and Nutrients Value, 3rd Ed. University Press, Ibadan. Saeed, I. M., R.

Odusanya, R. (2018). How to maximize yield of maize cultivation. *The Guardian.* Retrieved from: https://guardian.ng/features/how-tomaximize- yield-in-maize-cultivation/.

Öpik, Helgi; Rolfe, Stephen A.; Willis, Arthur John; Street, Herbert Edward (2005). The P h y s I o lo g y o f F l o w er i n g P l a n ts (4th ed.).Cambridge University Press. p. 191. ISBN 978-0-521-66251-2.

Zeidan, M. S., Amany, A. and Balor El-Kramany, M. F. (2006). Effect of N-Fertilizer and plant Density on Yield and Quality of maize in Sandy Soil. *Research Journal of Agriculture and Biological Sciences,* 2(4): 156-161.