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Comparative study on the effect of N.P.K and poultry dropping on the yield of maize (*Zea Mays L.*) at Mokwa Southern Guinea Savanna of Nigeria

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Abstract

The trial was carried out at national cereals research institute, Mokwa. Training field in 2011 wet season to evaluate comparative study on the effect of N.P.K and poultry dropping on the yield of maize (*Zea mays* L.). Mokwa lie of latitude 09^0 18'N and longitude 05^0 04'E of the equator in the southern guinea savannah of Nigeria. The experiment was laid out in randomized complete block design (RCBD), It consist of three treatment replicated three times. The data collected include plant height a 3,6, and 9 WAP, Number of leaves per plant, maize vigor score, leaf area of maize, number of days to 50% probability. The result indicates that N.P.K fertilizer had significantly taller plant at 6 9WAP compared to poultry dropping and number of cob per plot indicate that N.P.K fertilized and poultry dropping were not significantly difference but differed significantly in control plot in the number of cob per plot. And also the result indicates that where N.P.K fertilizer was applied gave the optimum grain yield, finally the result had heavier in weight compared to all other treatment.

Keywords: Maize, N.P.K Fertilizer, Poultry.

Introduction

Maize (*Zea Mays* L.) is one of the cereal crops. The world cereal was derived from Cecelia which are member of grass panacea family are grow for their edible starch grain. The name maize was gotten from the south American India agewole name "Maniz" maize is also known by the name Indian corn and in American simple corn. It is a tall annual crop. Today maize is cultivated Nigeria because of its uses both human and animals (Kamara et al., 2020). Maize is a warm weather crop and cannot withstand loam soil. A well distributed rainfall, a frost free growing season of 110- 130 day and moderately high temperature in is best adapted to regions where both days and night temperature are over 21^0c during the growing period. And rainfall of 60cm/anum. The crop cannot tolerate frost (Fang, and Su, 2019). The nature of farming system adopted by farmers coupled with deforestation, erosion and construction activities have almost lift most of the arable land agricultural poor in yield. The continuous depletion of important nutrients in southern Guinea savanna soil like nitrogen, phosphorous and potassium etc. need to be augmented either naturally or artificially or targeted approach. Necessary documentation of information in this regard deserves prompt attention (Folberth et al., 2013).

In Nigeria, arbitrary use of poultry manures as soil additives in crop production is on the increase because of availability, nutritive value and inexpensiveness. Poultry manure, in contrast to chemical fertilizer, adds organic matter to soil which improves soil structures, nutrient

retention, aeration, soil moisture holding capacity and water infiltration (Boateng et al., 2006). Optimum use of poultry manure requires knowledge of their composition, not only in relation to enhanced crop yield but also for good crop quality (Ayeni and Adetunji, 2010), particularly in developing countries like Nigeria where maize is largely consumed when roasted, boiled or as supplement in many food diets. Dipeolu (2009) observed preference for organic vegetables due to their enhanced nutritional quality as against vegetables from inorganic fertilization.

In recent times, attention has been directed towards organic manure because of the rising cost of inorganic fertilizers coupled with their inability to give the soil the desired sound health. Poultry manure, sometimes called chicken manure, is an excellent soil amendment that provides nutrients for growing crops and also improves soil quality when applied wisely, because it has high organic matter content combined with available nutrients for plant growth (Moses et al., 2016). The chemical composition of poultry manure varies with factors such as source of manure, feed of the birds, age and condition of the birds, storage, handling of manure, and litter used (Mohammed et al., 2010). Poultry waste consists of droppings, wasted feed, broken eggs, feathers, and sometimes sawdust from poultry floor. It also includes the dead birds and hatchery waste, all of which are high in protein and contain substantial amount of calcium and phosphorus due to high level of mineral supplement in their diet. Poultry manure has been reported to contain more plant nutrients than all other organic manures (Glatz et al., 11). The aim of this work is to find out which among the NPK and poultry dropping is most appropriate for maize production.

Material and Methods

Description of the experimental site

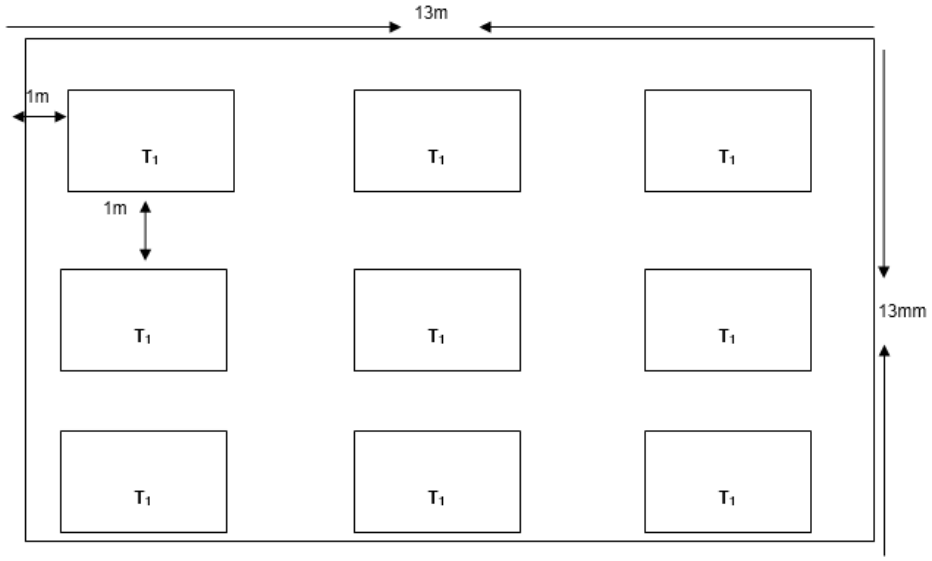
The trial was established at the national cereals research institute, Mokwa. Located at latitude 09^0 18^1 N and longitude 05^0 04^1E of the equator, the site for trials was used by farmers for the cultivation of maize for many years. The oil composition and rainfall data was shown in appendices 1-2 at the completion of work.

Experimental design, treatments and plot size

The trial was layout on a randomized complete block design (3) treatment replicated three (3) times. This treatment is T_1 NPK T_2 = Poultry dung and T_3 = control plot. Each plot was consisting of (4) ridge spaced 75cm wide and 3m long ($9m^2$) NPK 15:15:15 and poultry dung was applied at the rate of 1.2kg/plot and control plot was not applied with any fertilizers. One maize variety (ACR 9931 – DMR – SRY) was used in these experimental plot (Utobo et al., 2019).

Experimental Field Layout

Replication



KEY: T_1 = NPK 15:15 15/Plot, T_2 = Poultry dung /plot, T_3 = Control plot

Cultural Practices

Land Preparation

The site selected for the trial was cleared using hoe and cutlass to remove shrubs and grasses. The ridges constructed using hoe (Costa et al., 2016).

Sowing

Two seeds were planted per hole at 50cm intra and inter row spacing respectively.

Fertilizer Application

About100kg/ha, 50kg p_2O_5/ha and 50kg k_2/ha was applied half does of N and full dose of P_2 0_5 and k_2 0 was applied at 3WAP and half dose of N was applied at 6 WAP using Urea (Clain, 2014).

Weeding

weeding was done twice and at 3 and 6 WAP manually

Parameters to be Measured

Plant height at 3,6and WAP, number of leaves per plant at 3,6 and 9 WAP (kg/ha), leaf area (cm^2), number of 50% day to teaseling number of 50% days to cob formation, weigh of cobs (kg/ha) and maize grain yield (kg/ha) (Mario et al., 2018)

Data Analysis

The data to be collected were subjected to analysis of variance (ANOVA) and least significance difference (LSD) were used to partition the means at 5% probability

Results and Discussion

Plant Height

From table 1 it shows that separate application of N.P.K 15r:15:15 (1.2kg /$9m^2$) and poultry dropping did not significantly influence the maize plant height at 3 WAP although significant difference existed at 6 WAP with treatment N.P.K 15:15:15 (1.2kg / $gm^{2)}$ having the tallest plant height, followed by the treatment of the application of poultry dropping while the control had the lowest plant height.

Table 1: Plant height of maize as influenced by the application of N.P.K and poultry dropping

	Weeks after planting (WAP)		
Treatment	3	6	9
N.P.K 15:15:15	54.7	100.7	202.2
Poultry dropping	49.7	72.3	151.7
Control plat	41.7	43.7	111.7
L S D value at 5% DF	NS	10.7	13.4

N.S: Not significantly different at 5% probability, WAP: Weeks after planting

Number of leaves per plant

The result indicates that the number of leaves per plant of the N P K and poultry dropping were not significantly different throughout the crop growth period respectively (Table 2).

Table 2: Number of leaves per plant as influence by comparative study on the effect of N.P.K and poultry dropping on the yield of maize

	Weeks after planting (WAP)		
Treatment	3	6	9
N.P.K 15:15:15	5.7	6.7	14.3
Poultry dropping	5.3	6.7	15.0
Control plat	6.7	8.0	14.3
L S D value at 5% DF	6.0	5.5	2.8

N.S: Not significantly different at 5% probability, WAP: Weeks after planting

Maize vigour score

It was observed in the trial that NPK and poultry dung were not significant different significantly (Table 3).

Table 3: Maize vigour score as influence by comparative study on the effect of N.P.K and poultry dropping on the yield of maize

Treatment	Weeks after planting (WAP)		
	3	6	9
N.P.K 15:15:15	4.3	3.5	3.4
Poultry dropping	4.3	3.5	3.2
Control plat	3.9	3.2	2.4
L S D value at 5% DF	2.0	0.7	0.7

N.S: Not significantly different at 5% probability, WAP: Weeks after planting

Number of days to 50% tasseling

The result indicated that N.P.K poultry dropping control plot were not significantly different in days to 50% tasseling throughout the crop growth period respectively. (Table 4).

Number of days to 50% cob formation

It was observed in the trial that N.P.K poultry dropping and control plot were not significantly different in days to 50% cob formation throughout the crop growth cycle (table 4).

Number of cob per plot

The result indication that N.P.K and poultry dropping were not significantly different but differed significantly in control plot in number of cobs per plot (Table 4).

Table 4: number of days to 50% tasseling, number of days to 50% cobing and number of cobs per plot as influence by comparative study on the effect of N.P.K and poultry dropping on the yield of maize

Treatment	Weeks after planting (WAP)		
	3	6	9
N.P.K 15:15:15	57	57	55a
Poultry dropping	56	56	52a
Control plat	56	56	45b
L S D value at 5% DF	1.5	1.2	1.6

N.S: Not significantly different at 5% probability, WAP: Weeks after planting

Weight of cobs (kg/ha)

The result indicated that the plot where N.P.K fertilizer was applied had heavier maize weight compared to the plot where poultry dropping was applied at harvest (Table 5).

Leaf area of Maize

It was observed that plot treated with N.P.K have higher number of leaves than that of poultry dropping.

Maize grain yield

It was observed that plot treated with N.P.K fertilizer gave optimum grain yield at harvest (Table 5).

Table 5: Weight of cobs, leaf area of maize and maize grain yield as influence by comparative study on the effect of N.P.K and poultry dropping on the yield of maize

Treatment	**Weight of Cob (kg/ha)**	**Leaf area of Maize (kg/ha)**	**Maize grain Yield (kg/ha)**
N.P.K 15:15:15	3.8a	655.8a	2.9a
Poultry dropping	3.4a	546.3b	2.6a
Control plat	2.6a	339.5c	1.6a
L S D value at 5% DF	0.	71.8	0.6

N.S: Not significantly different at 5% probability, WAP: Weeks after planting

The result obtains from the trial indicated that ACR-9931 – DMR – SRY maize variety N.P.K fertilizer was applied had the ability to produce heavier maize weight compared to poultry dropping. In line with this N.P.K fertilizer

automatically has greater effects on the yield of maize than poultry dropping. This is also in line with the finding of Enujeke (2013) who stated that chemical fertilizer promotes plants growth than organic manure. There was significant different between the N.P.K fertilizer and poultry dropping as well as well as maize grain yield.

Conclusion

It is thus concluded from the result that poultry droppings can be used where NPK fertilizer is not available, since there were no significant differences in the field obtained. The experiment was laid out in a randomized complete block design (RCBD) with three treatment replicated three times. The treatment was NPK 15,15,15 poultry dropping and control plot. Thus, poultry droppings contain more various nutrients but in a little proportion while, NPK contains high proportion of nitrogen, phosphorus and potassium which is needed for maize yield, that is why NPK produces more yield than poultry dropping.

References

Ayeni L.S. and Adetunji M.T. (2010). Integrated application of poultry manure and mineral fertilizer on soil chemical properties, nutrient uptake, yield and growth components of maize. Nat. Sci. 8(1):60-67.

Boateng S., Zickermann A. J. and Kornaharens M. (2006). Effect of poultry manure on growth and yield of maize, West Afr. J. Appl. Ecol. 9:1-11.

Clain J. (2014). Fertilizer Rate Calculations Msu Soil Fertility Extension Agent Agronomy College. Government of Western Australia Dept. of Agriculture and Food

Costa A, Pôças I, Cunha M (2016). Estimating the leaf area of cut roses in different growth stages using image processing and allometrics. Horticulturae P 2.

Dipeolu AO, Phillip BB, Aiyelaagbe IOO, Akinbode SO, Adedokun TO (2009). Consumer awareness and willingness to pay for organic vegetables in S.W. Nigeria. Asian J. Food Agro-Industry. Special Issue S57-S65.

Enujeke E. C. (2013). Effects of Variety and Fertilizers on Number of Grains/Cob of Maize in Asaba Area of Delta State. *Asian Journal of Agriculture and Rural Development*, 3(4), 215-225.

Fang, J., & Su, Y. (2019). Effects of Soils and Irrigation Volume on Maize Yield, Irrigation Water Productivity, and Nitrogen Uptake. *Scientific reports*, *9*(1), 7740.

Folberth, C., Yang, H., Gaiser, T., Abbaspour, K. C. and Schulin, R. (2013). *Modeling maize yield responses to improvement in nutrient, water and cultivar inputs in sub-Saharan Africa. Agricultural Systems,* 119(12)*,* 22–34*.*

Glatz, P., Miao, Z. and Rodda, B. (2011). *Handling and Treatment of Poultry Hatchery Waste: A Review. Sustainability,* 3(12), 216–237*.*

Kamara, A.Y., Kamai, N., Omoigui, L.O., Togola, A. and Onyibe, J.E. (2020). Guide to Maize Production in Northern Nigeria: Ibadan, Nigeria. 18 pp.

Mario, C., Isabel, P. and Sosdito, E. M. (2018). *Maize leaf area estimation in different growth stages based on allometric descriptors. African Journal of Agricultural Research, 13(4), 1–* . doi:10.5897/AJAR2017.12916

Mohamed A. M., Sekar S. and Muthukrishnan, P. (2010). Prospects and Potential of Poultry Manure. *Asian Journal of Plant Sciences,* 9: 172-182*.*

Moses, B A., Olusegun, M O. and Aderonke, A O. (2016). *Comparative assessment of different poultry manures and inorganic fertilizer on soil properties and nutrient uptake of maize (Zea mays L.). African Journal of Biotechnology,* 15(22), 1–.21

Utobo E. B., Ogbodo E. N., Ekwu, L. G., Nwokwu, G. N. and Nwanchor, K. C. (2019). Adopting Additive Intercropping for the Production of Maize and Mungbean. “Building a Resilient and Sustainable Economy through Innovative Agriculture in Nigeria” 53th Annual Conference of Agricultural Society of Nigeria. 21st -25th October, 2019. NCRI, Badeggi, Nigeria.