



Received: 30 July, 2020
Accepted: 17 August, 2020
Published: 19 August, 2020

***Corresponding author:** Eleduma Ajayi Festus,
Department of Agricultural Technology, Rufus Giwa
Polytechnic, P. M. B. 1019, Owo, Ondo State, Nigeria,
E-mail: ajayifestus_eleduma@rugipo.edu.ng

Keywords: Cattle manure; Substitute; Vegetative
growth; Yield attributes

<https://www.peertechz.com>



Research Article

Effect of cattle manure on the performances of maize (*Zea mays L*) grown in forest-savannah transition zone Southwest Nigeria

Eleduma AF^{1*}, Aderibigbe ATB² and Obabire SO²

¹Department of Agricultural Technology, Rufus Giwa Polytechnic, P. M. B. 1019, Owo, Ondo State, Nigeria

²Department of Crop, Soil and Pest Management Technology, Rufus Giwa Polytechnic, P. M. B. 1019, Owo, Ondo State, Nigeria

Abstract

The contribution of inorganic fertilizer to enhance crop growth and yield cannot be ignored, but on the other hand their indiscriminate use is causing deterioration of the soil structure and soil acidity. A field experiment was conducted at the Teaching and Research Farm, Rufus Giwa Polytechnic, Owo, Ondo state, Nigeria to study the effect of variable rate of cattle manure on the growth and yield of maize (*Zea Mays L*). Five rates of cattle manure: control, 5, 10, 15, and 20 t/ha⁻¹ replicates three times laid out in a Randomized Complete Block Design (RCBD) was evaluated. Data were collected on vegetative traits and yield component and statistically analyzed. The growth and yield attributes increased significantly according to the rates of cattle manure due to continuous supply of nutrient. The control plot gives significantly lower means and maize that received 20 t ha⁻¹ recorded the highest mean in all growth and yield parameter evaluated in the study. Applications of 20 t ha⁻¹ cattle manure significantly improve vegetative growth and yield attributes of maize plant and therefore recommended for adoption by resource-poor farmer can adopt the use of cattle manure at 20 t ha⁻¹ as substitute for inorganic fertilizer, thus reduce environmental pollution posed by the disposal of the cattle waste and ultimately improve yield in the study area.

Introduction

Maize (*Zea Mays L*), sometimes referred to as corn is ranked with wheat and rice as one of the most produced and consumed cereal crops in Nigeria [1]. In spite of its nutritional and economic value its production has been hampered by low yield caused by several factors and chief among them is low soil fertility status. Nigeria soil has a high potential for crop production yield, levels obtained under farmer's condition are usually low due to poor soil management and conservation method. The type of problem is solved through the use of either inorganic or organic fertilizer. However, the use of inorganic fertilizer by resource-poor farmers is limited by its scarcity and cost [2] and untimely availability [3].

Under intensive agriculture, the use of inorganic fertilizer has not been helpful because it is associated with soil acidity, nutrient imbalance and reduction in crop yield [4,5]. The use of organic manure to meet the nutrient requirement of crop would be an inevitable practice since organic manures generally improve the soil physical, chemical and biological properties along with conserving capacity of the moisture holding capacity of soil and this, resulting in enhanced crop productivity along with maintaining the quality of crop produce [6]. Although organic manures contain plant nutrients in small quantities compared to inorganic fertilizers, the presence of growth-promoting principles like enzymes and hormones, besides plant nutrients make them essential for improvement of soil fertility and productivity [7]. Improvement in the public health and environmental conditions are also the strong

reason for advocating the use of organic material [8]. In the present chemical input farming system, natural (use of organic amendment viz. green mature, poultry manure, farmyard manure etc) can be considered to be a solution to many problems for different cropping system in different agro-ecological zones [9].

With the problem associated with inorganic fertilizers already being viewed, this project work was carried out to evaluate the effect of cattle manure on the growth and yield performances of maize in forest Savannah transition zone south western Nigeria.

Materials and methods

Experimental layout and land preparation

The field experimental was laid out in a Randomized Complete Block Design (RCBD) replicated three (3) times with five treatments on a 104m² area of land at the Teaching, Research and Commercial farm, Rufus Giwa Polytechnic, Owo, Ondo state, Nigeria, located on latitude 7° 12'N, longitude 5° 35'E within the forest savanna transition zone, south western Nigeria.

The land was occupied by *Sida acuta*, *Impereta cylindrica*, Siamweeds and some other common weeds, the land had been under continuous cultivation for the past four years without application of either inorganic and organic fertilizers. The land was cleared and stumps manually and thereafter ploughed and harrowed mechanically in order to obtain a clean fine tilth soil. The experimental land was divided into 3 blocks of 12m x 2m (24 m²) each with a distance of 0.50m between each plots and each plot size was 2m x 2m (4m²) which produced a total number 15 plot. The treatments are: T₁ – 0 t/ha⁻¹, T₂ – 5 t/ha⁻¹, T₃–10 t/ha⁻¹, T₄ – 15t/ha⁻¹ and T₅ – 20 t/ha⁻¹ cattle manure. The cattle manure was applied to the plot 2 week after planting (WAP) using ring method of application after being pulverized.

Crop establishment and management

Two seeds of improved maize seed downy middle resistance early streak resistance yellow (DMR-ESR-Y) obtained from National Center for Genetic Resource and Biotechnology (NACGRAB) Ibadan, Oyo State, Nigeria was planted per hole at a spacing of 50cm x 50cm at a depth of 3 to 5cm; which was later thinned to one healthy plant per stand. Immediately after planting Atrazine mixed with Paraquat was applied as pre-emergence weed control and when necessary rouging was carried out to eliminate emerging weeds.

Cow manure and soil analysis

Cattle manure was obtained from the livestock session of the Teaching, Research and Commercial Farm, Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria. The sample was air dried, crushed through a 2mm sieve and subjected to laboratory analysis following standard procedure in order to determine the chemical properties [10]. Prior to the commencement and at the end of the experiment, top soil samples of 20 cm– 30 cm deep were collected randomly from five spots using soil auger from the experimental plot and mixed together to

form a composite sample. It was air dried, sieved with a 2mm mesh-size sieve and taken to the laboratory to determine the soil's physicochemical properties using standard laboratory procedures [11–15].

Data collection and statistical analysis

Five plants were randomly tagged from two middle rows in each plot for sampling and data collection for vegetative growth and yields assessment. The following data on vegetative growth (number of leaves, leaf area, stem girth and plant height) and yield attributes (number of grains per cobs, cob circumference, grain weight and husk weight) were collected at crop maturity and harvest. Data collected from the experimental field were subjected to analysis of variance (ANOVA) using Statistical Package for Social Science [16]. Significant treatment means were compared using Duncan Multiple Range Test (DMRT) at 5% probability level.

Results

Physiochemical properties of soil and cattle manure

The physiochemical properties of the soil (0.30cm depth) at the experimental field before cropping showed that the soil textural classification was sandy loam, slightly acidic in nature with pH value of 5.49 and low in fertility as indicated by the low content of organic carbon, organic matter, total nitrogen, available phosphorus and exchangeable cations (Table 1). Soils with low levels of nutrients need to be boosted with soil amendments input in form of inorganic or organic fertilizer in order to improve them for crop production. The low soil fertility status and its acidic nature are expected to benefit from application of cattle manure (Table 2). Low soil nutrient of the experimental site was probably as a result of: (1) high proportion of sand content of the soil, which implies that basic cations would be leached more easily as texture determines the degree of retention or ease of leaching of basic cations [17]. (2) The low NPK levels observed in the soil can be attributed to continuous cropping and increased land use intensity.

Table 1: Soil physiochemical properties before planting and at crop maturity.

Constituents	pre-cropping	post-cropping			
		5t/ha ⁻¹	10t/ha ⁻¹	15t/ha ⁻¹	20t/ha ⁻¹
Chemical					
pH (H ₂ O)	5.49	5.64	5.58	5.76	5.87
Organic carbon (%)	0.54	0.82	1.43	2.09	3.11
Total Nitrogen (%)	0.08	0.12	0.22	0.28	0.26
Available P (mg/kg)	9.18	4.91	3.82	4.32	4.81
Na (cmol/kg ⁻¹)	0.93	0.38	0.7	0.77	0.73
Ca (cmol/kg ⁻¹)	0.42	1.1	1.53	1.81	1.83
K (cmol/kg ⁻¹)	0.96	0.24	0.18	0.23	0.27
Mg (cmol/kg ⁻¹)	0.2	0.5	1.04	2.64	2.97
Physical					
Sand %	47	64.8	70.5	72.4	71.9
Silt%	44	8	15.7	15	12.4
Clay %	9	27.2	13.8	12.6	15.7
Textural class	Sand loam	Sandy loam			



At crop maturity, application of different rate of cattle manure slightly increased the soil pH value and total nitrogen ranges from 5.58 to 5.87 and 0.12–0.28 respectively. Percentage organic carbon, Ca and Mg was significantly increased in soil amended with cattle manure compared with control plot and the highest recorded from plots supplied with 20t/ha⁻¹, while available P, Na and K was drastically and slightly decreased across the different level of application respectively (Table 1). The marginal increase observed in the soil pH level indicates the buffering capacity of the cattle manure in reducing soil acidity. This finding however did not agree with the findings of Adekiya and Agbede [18], Sanni [19], who observed that soil pH tended to reduce with a rise in the amount of poultry and cow manure application, suggesting that poultry and cow manure led to increased acidity in the soil.

The increases in soil organic carbon, Ca and Mg observed at crop maturity from plots incorporated with varying level of cattle manure might be as a result of the slow rate in which their nutrients are released into the soil [20] or might be due to the increased in the amount of nitrogen present in the various rates of manure applied which improved microbial activity that led to enhanced production and mineralization of organic matter from natural (native) source in soil [19]. The higher organic carbon content in the plot treated with cattle manure relative to other treatment plots agreed with findings of Esawy, et al. [20] on the increase in organic matter as a result of addition of rice straw compost. While the low P, K level and marginal increase of K observed at crop maturity might be as a result of NPP uptake for the growth and development of the plant.

Effect of Cattle Manure on mean Vegetative Growth parameters of Maize

The response of maize to the varying levels of cattle manure on the vegetative growth (plant height, number of leaves, leaves area and stem girth) is presented in Table 3. The response of plant in terms of vegetative growth followed the same trend whereby the lowest values were recorded for control plants and higher values for fertilized plants in line with the amount of manure applied i.e. the higher the amount of manure applied the greater the mean value of the vegetative growth parameters. This result suggests that nutrient availability, especially NPK, determines plant vegetative growth and development [22]. The consistent poor performance of control plots (non-fertilized) and those with low level of manure revealed that when nutrients are available in adequate amounts, plant tends to grow at their optimum potential. These improvements in growth parameters with increase in rates of cattle manure applied agree with the findings of Fawuzi [23]; Uzo [24] and Aminifard, et al. [25].

Leaf area index (LAI) is a crucial growth index determining the capacity of plant to trap solar energy for photosynthesis and has marked effect on growth and yield of plant. The influence of cattle manure on leaf area remained significant under different application levels; maximum leaf area index (403.04) was recorded at 20 t/ha⁻¹ which was statistically higher than 15 t/ha⁻¹ (381.13), 10 t/ha⁻¹ (379.91), 5 t/ha⁻¹ (378.07) and 0 t/ha⁻¹ (313.62). However, non-significant effect was observed among the treatments with plants amended with 10 t/ha⁻¹ (379.91)

Table 2: Chemical analysis of cattle manure used.

Cattle manure	value
pH (H ₂ O)	5.48
Organic carbon (%)	2.47
Organic matter (%)	4.26
Total N (mg/kg)	1.09
Available P (mg/kg)	23.04
K (mg/kg)	1.05
Na (mg/kg)	3.48
Ca (mg/kg)	1
Mg (mg/kg)	0.5

Table 3: Effect of Cattle Manure on mean Vegetative Growth parameters of Maize.

Treatments	Plant height (cm)	Number of leaves	Leaves area (cm ²)	Stem girth (cm)
Control	102.25 ^{cd}	13.07 ^d	313.62 ^d	22.13 ^b
5 tha ⁻¹	103.15 ^c	13.18 ^c	378.07 ^c	22.94 ^b
10 tha ⁻¹	114.69 ^b	13.42 ^b	379.91 ^c	22.94 ^b
15 tha ⁻¹	118.15 ^{ab}	13.93 ^{ab}	381.136 ^b	23.43 ^b
20 tha ⁻¹	119.03 ^a	14.27 ^a	403.04 ^a	24.35 ^a
LSD (0.05)	0.81	0.06	0.31	0.86

Mean followed by the same letter (s) in a column are not significantly different according to multiple comparison, LSD $p < 0.05$.

and 5 t/ha⁻¹ (378.07) cattle manure. Nitrogen (N) is one of the main plant nutrients affecting plant growth and yield [26] and leaf area increase with increase in N level [27]. Increased leaf area in soil amended with organic fertilizer could probably be attributed to N availability which promoted leaf area during vegetative development and also helped to maintain functional leaf area during the growth period [28].

Stem diameter was significantly ($p < 0.05$) influenced by varying level of cattle manure application. Application of 20 t/ha⁻¹ cattle manure gave the highest response in respect, which was followed by application of 20 t/ha⁻¹, while the control treatment gave the least plant diameter. Mean treatment value obtained from plant amended with 15, 10, 5 t/ha⁻¹ and controls were similar and in comparison were not significantly different. Organic manures have been said to improve soil fertility by activating soil microbial biomass, which in turn leads to development in crops [29] and this may have been responsible for the observed increase in stem diameter resulting from nutrient application. Plant diameter would have positive implication on lodging, particularly during fruiting; the thicker the stem, the less likely the plant would lodge as a result of fruit carriage or other lodge inducing factors, such as wind.

Plants provided with 20 t/ha⁻¹ cattle manure were significantly ($p < 0.05$) taller than the other levels of manure and control plants. The steady increase in height of maize plants with increase in rate of cattle manure suggests that quantity of manure applied affects nutrients availability for uptake by plants which promoted vigorous plant growth through efficient photosynthesis [30–32].



The highest number of plant leaves in the present study was recorded in plants amended with 20 t ha⁻¹ of organic fertilizer which was significantly ($p < 0.05$) higher than the control and other plants amended with other rates. The application of cattle manure to the soil at varying levels may have improved soil fertility and soil structure, increased soil organic matter and enhanced microbial activity [33] and the nutrients released from manure thus support and enhanced rapid root development [34], which might have enhanced leaf growth.

Effect of cattle manure application on mean yield attributes of maize

A non-significant treatment effect was revealed from mean value showed in Table 4 for number of harvested cob per plant, cob diameter and husk weight. However maize plants amended with 20 t ha⁻¹ had superior treatment mean numbers which decreased with each decrease in level of cattle manure applied. Meanwhile, the treatment mean obtained for number of grains per cobs, cob length and grain weight increased accordingly to the increase in the cattle manure application rates; with 20 t ha⁻¹ having the highest mean value which was significant different from mean value obtained from other application rates and control plots recorded the lowest mean treatment value. But cattle manure applied at the rates of 10 and 5 t ha⁻¹ did not differ significantly compared to control treatment. The highest number of grains, cob length, grain weight and husk weight obtained from 20 t ha⁻¹ was as a result of higher nutrient base supplied by the rate when compared with other rates where there was reduction with decrease in rate of cattle manure applied. The higher yield attributes obtained from the application of higher rates of cattle manure is in accordance with the studies of Devi, et al. [35]; Ogar and Asiegbu [36]; Aujla, et al. [37], Aminifard, et al. [25], where higher rates of nutrients increased the average crop weight and volume. This might be attributed to the stimulating effect of cattle manure 480 that supplies plant with nutrients required for better yield [38].

The application of increasing levels of cattle manure increased the maize growth, which might have been due to the balance availability of nutrients to the plants that resulted in a favourable soil environment. These favourable conditions increased the nutrient availability and water holding capacity of the soil resulting in enhanced growth and yield [39,40].

Table 4: Effect of cattle manure application on mean yield attributes of maize.

Treatments	No of Cobs	No of Grains/ Cob	Cob Length (cm)	Cob Diameter(cm)	Grain Weight (Kg)	Husk Weight (Kg)
Control	5.33 ^a	400.12 ^{de}	15.05 ^c	3.49 ^c	1.13 ^c	0.11 ^a
5 t ha ⁻¹	5.33 ^a	439.67 ^d	15.43 ^c	3.77 ^c	1.24 ^c	0.16 ^a
10 t ha ⁻¹	5.67 ^a	447.40 ^c	15.69 ^c	3.66 ^c	1.54 ^c	0.15 ^a
15 t ha ⁻¹	5.67 ^a	473.49 ^b	16.61 ^b	3.94 ^c	1.70 ^b	0.20 ^a
20 t ha ⁻¹	6.07 ^a	516.83 ^a	17.38 ^a	4.18 ^c	2.04 ^a	0.21 ^a
LSD (0.05)	0.89	0.41	0.41	0.63	0.39	0.81

Mean followed by the same letter (s) in a column are not significantly different according to multiple comparison, LSD $p < 0.05$.

Conclusion

The study clearly indicated that cattle manure significantly improved the performances of maize and soil fertility proportional with the increased in the rates with 20 t/ha⁻¹ rate giving the best performances. Therefore, it is recommended that resource-poor farmers in the study area should utilize cattle manure at the rate of 20 t ha⁻¹ for sustainable cultivation and optimum yield of maize in the study area as the manure contribute to the improvement of the low fertility status of the soil.

References

- Vadya K (1986) Amaranthus: The grain of the future. Indian Farmer Digest 7: 5-8.
- Akanbi NB, Adediran JA, Togun AU, Sobulo RA (2001) Effect of organic based fertilizer on growth yield and storage of Tomato. Biosci Res Communication 20: 10-16.
- Adedoyin SF (1995) An assessment of the linkage in delivery of technologies on rehabilitation and management of soil: A paper presented at 3rd All Africa soil science conference, university of Ibadan 19-26.
- Kang BT, Juo ASR (1980) Management of low activity clay soil in tropical Africa for crops production 129-133. In : Terry ER, KA Oduro and Scaveness(eds).
- Obi ME, Ebo PO (1995) The effects of organic and inorganic amendments on soil physical properties and maize production in a severely degraded sandy soil in southern Nigeria. Bioresource Technology 51: 117-123. [Link: https://bit.ly/3iNBK00](https://bit.ly/3iNBK00)
- Malieswarappa HP, Nansappa HV, Hedge MR, Balu SR (1999) Influence of planting material, plant population and organic manure on yield of East India Galangal and on soil physiochemical and biological properties.
- Bhuma M (2001) Studies on impact of humic acid on sustenance of soil fertility and productivity of green grain. Msc (ag) Thesis, TNAU, Cennatore. [Link: https://bit.ly/34e6uUE](https://bit.ly/34e6uUE)
- AbouelMadg MN, El-Bassiong M, Faziour ZF (2006) Effect of organic manure with or without chemical fertilizer on growth and quality of some variety of Bioccoli plant. Journal of Applied Science Research 2: 791-798. [Link: https://bit.ly/329Bm62](https://bit.ly/329Bm62)
- Sharma AR, Militra BN (1991) Effect of different rates of application of organic and nitrogen fertilizers in a rice-based cropping system. Journal of Agricultural Science (Cambridge) 117: 313-318. [Link: https://bit.ly/320sIXA](https://bit.ly/320sIXA)
- IITA (1989) International Institute of Tropical Agriculture. Automated and semi-automated methods for soil and plant analysis. Manual series 7.
- Olsen SR, Cole CV, Watanabe FS, Dean L (1954) Estimation of available phosphorus in soils by extraction with sodium bicarbonate, U. S. Dept Agron Cire 939. [Link: https://bit.ly/3g8NaKT](https://bit.ly/3g8NaKT)
- Jackson ML (1973) Soil Chemical Analysis. Second edition. Prentice Hall of India Pvt. Ltd., New Delhi, 498. [Link: https://bit.ly/3g8NaKT](https://bit.ly/3g8NaKT)
- Page AL, Miller RH, Kuny DR (1982) Methods of Soil Analysis. Part 2. 2nd ed., pp 403-430. American Soc. Agron., Inc., Soil Sci. Soc. American Inc. Madison, Wisconsin.
- Dirk AT, Hargarty M (eds.) (1984) Soil and plant analysis. Guide for Agricultural Laboratory Directors and Technologist in Tropical Region 147.
- Okalebo JR, Gathua KW, Woomer PL (2002) Laboratory Methods of Soil and Water Analysis: A Working Manual (2nd edn.) Nairobi, Kenya. SACRED Africa 128. [Link: https://bit.ly/2EcC7TI](https://bit.ly/2EcC7TI)



16. SPSS Inc (2011) SPSS Statistics 17.0, SPSS Inc., Chicago, IL, USA.
17. Wapa JM, Oyetola SO (2014) Combining Effects of Nitrogen and Different Organic Manures on Major Chemical Properties of Typic Ustipsament in North-East Nigeria. *American International Journal of Biology* 2: 27-45. [Link: https://bit.ly/3gceCHY](https://bit.ly/3gceCHY)
18. Adekiya AO, Agbede TM (2010) Growth and yield of tomato (*Lycopersicon esculentum* Mill) as influenced by poultry manure and NPK fertilizer. *Emirate Journal of Food and Agriculture* 21: 10-20. [Link: https://bit.ly/3kUwv00](https://bit.ly/3kUwv00)
19. Sanni KO (2016) Effect of compost, cow dung and NPK 15-15-15 fertilizer on growth and yield performance of Amaranth (*Amaranthus hybridus*). *International Journal of Advances in Scientific Research* 2: 076-082. [Link: https://bit.ly/3kUwqL0](https://bit.ly/3kUwqL0)
20. Olowoake AA, Adeoye GO (2013) Influence of differently composted organic residues on the yield of maize and its residual effects on the fertility of an Alfisol in Ibadan, Nigeria. *Intl J Agric Env Biotech* 6: 79 - 84. [Link: https://bit.ly/3gea2Z0](https://bit.ly/3gea2Z0)
21. Esawy M, Mahmoud I, Paul R, Nouraya A, Mohamme E (2009) Rice Straw Composting and its Effect on Soil Properties. [Link: https://bit.ly/327r3PY](https://bit.ly/327r3PY)
22. Adebayo AG, Akintoye HA, Aina OO, Olatunji MT, Shokalu OA (2009) Assessment of Organic amendments on growth and flower yield of Sunflower (*Helianthis annus*). In: *Prceedings of Horticultural Society of Nigeria* 11-16 October, 2009, Kano State, Nigeria 292-298. [Link: https://bit.ly/2EiGzjG](https://bit.ly/2EiGzjG)
23. Fawusi MOA (1977) Influence of plant density and time of fertilizer application, growth characteristics, nutritional uptake and yield of tomato. *Scientia Horticulture* 7: 329-337. [Link: https://bit.ly/34hf187](https://bit.ly/34hf187)
24. Uzo JO (1971) Effects of nitrogen, phosphorus and potassium on the yield of tomato (*Lycopersicon esculentum* Mill) in the humid tropics. *Horticulture Resources* 11: 65-72. [Link: https://bit.ly/34hfgRR](https://bit.ly/34hfgRR)
25. Aminifard MH, Aroiee HO, Fatemi H, Ameri AS, Karimpour S (2010) Responses of eggplant (*Solanum melongena* L.) to different rates of nitrogen under field conditions. *Journal of Central European agriculture* 11: 243-248. [Link: https://bit.ly/2Q5oPej](https://bit.ly/2Q5oPej)
26. Tafteh A, Sepaskhah AR (2012) Yield and Nitrogen Leaching in Maize Field under Different Nitrogen Rates and Partial Root Drying Irrigation. *International Journal of Plant Production* 6: 93-113. [Link: https://bit.ly/3h5AvzC](https://bit.ly/3h5AvzC)
27. Oscar RV, Tollennar M (2006) Effect of Genotype, Nitrogen, Plant Density and Row Spacing on the Area-Per-Leaf Profile in Maize. *Agronomy Journal* 98: 94-99. [Link: https://bit.ly/327TGfN](https://bit.ly/327TGfN)
28. Cox WJ, Kalonge S, Cherney DJR, Reid WS (1993) Growth Yield and Quality of Forage Maize under Different Nitrogen Management Practices. *Agronomy Journal* 85: 341-347. [Link: https://bit.ly/2Q30hmg](https://bit.ly/2Q30hmg)
29. Ayuso MA, Pascal JA, Garcia C, Hernandez B (1996) Evaluation of urban wastes for agricultural use. *Soil Plant Nutrition* 42: 105 - 111. [Link: https://bit.ly/3kYx9uQ](https://bit.ly/3kYx9uQ)
30. Ayoub M, GS Lussier, S. and Smith DL (1994) Timing and Level of Nitrogen Fertilizer Effects on Spring Wheat Yield in Eastern Canada. *Crop Science* 34: 748-756. [Link: https://bit.ly/2Y9hnDx](https://bit.ly/2Y9hnDx)
31. Islam MR (2002) Effects of Different Levels of Chemical and Organic Fertilizers on Growth, Yield and Protein Content of Wheat. *Journal of Biological Sciences* 2: 304-306. [Link: https://bit.ly/2Eg3L2g](https://bit.ly/2Eg3L2g)
32. Iqtidar H, Ayyaz KM, Ahmad KE (2006) Bread Wheat Varieties as Influenced by Different Nitrogen Levels. *J Zhejiang Univ Sci B* 7: 70-78. [Link: https://bit.ly/3l2dVEG](https://bit.ly/3l2dVEG)
33. Khalil RS, Muhammad SK, Rehman F, Khan A, Amanullah AZ, et al. (2010) Phenology, Leaf Area Index and Grain Yield of Rainfed Wheat Influenced by Organic and Inorganic Fertilizer. *Pakistan Journal of Botany* 42: 3671-3685. [Link: https://bit.ly/2Q6R5NW](https://bit.ly/2Q6R5NW)
34. Abou El-Magd MM, Hoda Mohammed A, Fawzy ZF (2005) Relationships, Growth, Yield of Broccoli with Increasing N, P or K Ratio in a Mixture of NPK Fertilizers. *Annals of Agricultural Science Moshtohor* 43: 791-805. [Link: https://bit.ly/3iRzJRI](https://bit.ly/3iRzJRI)
35. Devi HH, Maity TK, Paria NC, Thapa U (2002) Response of brinjal to different sources of nitrogen. *Journal of Vegetable Science* 29: 45-47.
36. Ogar EA, Asiegbu JE (2005) Effects of fertilizer rates and cutting frequency on the marketable vegetables and pod yields in fluted pumpkin in southeastern, Nigeria. *Agro-Science* 4: 66-69.
37. Aujla MS, Thind HS, Buttar GS (2007) Fruit yield and water use efficiency of eggplant (*Solanum melongena* L.) as influenced by different quantities of nitrogen and water applied through drip and furrow irrigation. *Journal of Science and Horticulture* 112: 142-148. [Link: https://bit.ly/319WdXV](https://bit.ly/319WdXV)
38. Abdelrazzag A (2002) Effect of chicken manure, sheep manure and inorganic fertilizer on yield and nutrients uptake by onion. *Pakistan Journal of Biological Sciences* 5: 266-268. [Link: https://bit.ly/3186xPR](https://bit.ly/3186xPR)
39. Rashid Z, Rashid M, Inamullah S, Rasool S, Bahar F (2013) Effect of different levels of farmyard manure and nitrogen on the yield and nitrogen uptake by stevia (*Stevia rebaudiana* Bertoni). *African Journal of Agricultural Research* 8: 3941-3945. [Link: https://bit.ly/3h9hFBS](https://bit.ly/3h9hFBS)
40. Asiegbu JE, Uzo FO (1984) Yield and yield components response of vegetable crops to farm yard manure rates in the presence of Inorganic fertilizer. *Journal of Agriculture Pueterico* 68: 243-252. [Link: https://bit.ly/2Q5mslz](https://bit.ly/2Q5mslz)

Discover a bigger Impact and Visibility of your article publication with Peertechz Publications

Highlights

- ❖ Signatory publisher of ORCID
- ❖ Signatory Publisher of DORA (San Francisco Declaration on Research Assessment)
- ❖ Articles archived in worlds' renowned service providers such as Portico, CNKI, AGRIS, TDNet, Base (Bielefeld University Library), CrossRef, Scilit, J-Gate etc.
- ❖ Journals indexed in ICMJE, SHERPA/ROMEO, Google Scholar etc.
- ❖ OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting)
- ❖ Dedicated Editorial Board for every journal
- ❖ Accurate and rapid peer-review process
- ❖ Increased citations of published articles through promotions
- ❖ Reduced timeline for article publication

Submit your articles and experience a new surge in publication services (<https://www.peertechz.com/submitmission>).

Peertechz journals wishes everlasting success in your every endeavours.

Copyright: © 2020 Eleduma AF, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Citation: Eleduma AF, Aderibigbe ATB, Obabire SO (2020) Effect of cattle manure on the performances of maize (*Zea mays* L) grown in forest-savannah transition zone Southwest Nigeria. *Int J Agric Sc Food Technol* 6(2): 110-114. DOI: <https://dx.doi.org/10.17352/2455-815X.000063>