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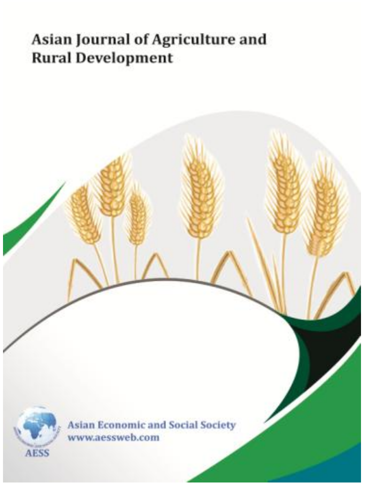


# Effects of Variety and Fertilizers on Number of Grains/Cob of Maize in Asaba Area of Delta State

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# Effects of Variety and Fertilizers on Number of Grains/Cob of Maize in Asaba Area of Delta State

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**Abstract**

This study carried out in the Teaching and Research Farm of Delta state University, Asaba Campus from March 2008 to June, 2010 to evaluate the effects of variety, organic manure and inorganic fertilizer on number of grain/cob of maize. The experiment was carried out in a Randomized Complete Block Design (RCBD) replicated three times in a factorial layout. Four different rates of poultry manure, cattle dung and NPK 20:10:10 fertilizer were applied to three different maize varieties sown at 75cm x 15 cm and evaluated for number of grains/cob. The result obtained indicated that hybrid variety, 9022-13, which had 5090, was superior. Also, plants that received inorganic fertilizer were outstanding in number of grains/cob with values of 441.5 in 2008 and 506.0 in 2009 followed by the plants received poultry manure (444.0 in 2008 and 468.0 in 2009). Based on the rates of application of manure/inorganic fertilizer, plants that received 450kgha$^{-1}$ of NPK 20:10:10 fertilizer were outstanding in numbers of grains/cob of maize with values of 532.8 in 2008 and 570.8 in 2009. The results of interaction showed that variety, manure type and rates of application were significantly ($p<0.05$) different. Based on the findings of this study, it is recommended that (i) Hybrid variety 9022-13 should be grown in Asaba area. (ii) NPK 20: 10:10 mineral fertilizers should be applied at the rate of 450kgha$^{-1}$ to enhance maize yield.

**Keywords:** Organic manure, Inorganic fertilizer, Number of grains/cob, Asaba, Delta State

## Introduction

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 (FAO, 2002). Maize crop is a key source of food and livelihood for millions of people in many countries of the world. It is produced extensively in Nigeria, where it is consumed roasted, baked, fried, pounded or fermented (Agbato, 2003). In advanced countries, it is an important source of many industrial products such as corn sugar, corn oil, corn flour, starch, syrup, brewer's grit and alcohol (Dutt, 2005). Corn oil is used for salad, soap-making and lubrication. Maize is a major component of livestock feed and it is palatable to poultry, cattle and pigs as it supplies them energy (Iken *et al.* 2001). The stalk, leaves, grain and immature ears are cherished by different species of livestock (Dutt, 2005).

In spite of the increasing relevance and high demand for maize in Nigeria, yield across the country continues to decrease with an average of about 1 t/ha which is the lowest African yield recorded (Fayenisin, 1993).

The steady decline in maize yield can be attributed to:

1. Rapid reduction in soil fertility caused by intensive use of land and reduction of fallow period as reported by Directorate of Information and

Publications of Agriculture (DIPA, 2006).

2. Failure to identify and plant high yielding varieties most suited or adapted to each agro-ecological zone (Kim, 1997; Olakojo *et al.,* 1998).
3. Use of inappropriate plant spacing which determines plant population and final yield (Zeidan *et al.,* 2006).
4. Negligence for soil amendment materials such as organic manure and inorganic fertilizers which improve soil condition and enhance crop yield.

Sonetra (2002) suggested that subsistence farmers should apply organic manure directly to the soil as a natural means of recycling nutrients in order to improve soil fertility and yield of crops. Manures and fertilizers are the life wire of improved technology contributing about 50 to 60% increase in productivity of food grains in many parts of the world, irrespective of soil and agro-ecological zone (DIPA, 2006). Reijnties *et al.* (1992) and Adepetu (1997) remarked that the downward trend in food production should prompt farmers to amend the soil with different materials in order to enhance growth and yield of crops. Several organic materials such as cattle dung, poultry dropping, pig dung and refuse compost have been recommended to subsistence farmers in West Africa as soil amendments for increasing crop yield (Sobulo and Babalola, 1992; Ismail *et al.,* 1990; Olayinka, 1996 and Olayinka *et al.,* 1998).

Municipal wastes were reported to have reduced soil temperature, increased soil water, nutrient status and the yield of maize in temperate soils (Movahedi *et al.,* 2000). Cattle dung has been reported to contain 0.3 – 0.4 % N, 0.1 – 0.2 % P and 0.1 – 0.3 % K (Subedi and Gurung, 1991). According to Adekunle *et al.* (2005) cattle dung applied at the rate of 10 t/ha to cowpea resulted to increased plant height, leaf area, pod number, pod weight as well as improved soil structure in a mixed farming system. Stefan (2003) indicated that fresh poultry dropping contain 70% water, 1.4% N, 1.1% $P_2O_5$ and 0.5% $K_2O$ while dried poultry manure contains 13% water, 3.6% N, 3.5% $P_2O_5$ and 1.6% $K_2O$. Ayodele (1993) reported that inorganic fertilizers are known to influence the quantity and yield of maize. Iken and Anusa (2004) recommended an optimum plant population of 53,333 plants/ha for maximum yield of maize. Their report indicated that this is obtainable 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 resulted in increased grain yield of maize while 75cm x 15cm gave maximum cob weight. Similar report by Allessi and Power (2004) revealed that maize cob weight decreased with increased plant population.

At present, there are no recommended standards taking into consideration the different combinations of such cultural practices as varietal selection, rates of appropriate organic manure and mineral fertilizer which interplay to influence yield and optimal performance of maize in Asaba area of Delta State. Against this background, the broad objective of this study, therefore, was to: identify variety of maize most suited or adapted to Asaba area and the appropriate fertilizer types and rates for the variety.

The specific objectives were to:

(i) identify the best variety for Asaba area.
(ii) determine the effects of NPK (20:10:10) mineral fertilizer, poultry manure, cow dung on number of grains/cobs maize.

## Materials and Methods

### Site Description

The study was carried out in the Teaching and Research Farm of Delta State University, Asaba Campus from March to December 2008 and repeated between March and December, 2009. Asaba is located at latitude 06°14’N and longitude 06°49’N of the equator. It lies in the tropical rainforest zone dominated by mangrove, fresh water, swamps, humid forests and secondary vegetation (NEST, 1991). Its climate is influenced by the movement of the Inter-Tropical Discontinuity (ITD). The IDT is made up of two wind systems namely the moisture-laden South-West monsoon from the Atlantic Ocean and the dry cold North-East trade wind from the Sahara desert. The South-West Trade wind most significantly determines the climate condition of Asaba area of Delta State. Asaba is characterized by raining season between April and October, with annual mean-rainfall of 1500mm and 2000mm maximum. The distribution is bimodal with peak in July and September, coupled with a period of low precipitation in August. Mean temperature is 23.8$^o$C with 37.3$^o$C as maximum. Relative humidity is 77.2%, the mean monthly soil temperature at 100m depth is 20.3 $^o$C, while sunshine stands at 4.8 bars (Meteorological Office, Asaba, 2003).

**Pre-planting Soil Analysis**
Representative surface soils (0-20cm) were sampled with a tubular sampling auger. These soil samples were air-dried at room temperature for 5 days and crushed to pass through a 2mm mesh sieve. Sub-samples from the bulked soil sample were further grounded to pieces to pass through 100mm-mesh sieve for the determination of organic matter. The rest samples were then analyzed to determine the physical and chemical properties of the soil. The analysis was done at Delta State University, Asaba campus.

## Analytical Procedure

**Physical Properties**

**Particle Size Distribution:** Particle size distribution was analyzed using the Bouyoucos hydrometer method in which 0.5 N Sodium hexameta-phosphate was used as dispersant (Landor, 1991).
**Bulk Density**: The bulk density (Bd) was determined by Core-method.
**Particle Density**: This was determined by pycometer or specific gravity bottle method as described by Bowles (1992).

## Chemical Properties

**Soil pH:** This was determined in soil: water suspension (1:1) using glass electrode pH-meter as described by Mclean (1982).
**Organic Carbon:** This was determined using the wet oxidation method of Walkley and Black (Walkley and Black, 1945).
**Total Nitrogen:** This was determined using the modified K. Jeldah distillation method as described by Landor (1991).
**Exchangeable Cations (EC) and Effective Cation Exchange Capacity (ECEC):** Exchangeable cations were determined by extracting the cations with IN ammonium acetate (IN, NHOAC) as displacing solution, buffered at $pH_7$ as described by Brady and Weils (1999). The extract was then determined electrochemically using atomic absorption spectrophometry. The effective cation exchange capacity (ECEC) was calculated as the sum of exchangeable bases (Ca, Mg, K and Na) and exchangeable A1 and H expressed in cmo1/kg$^{-1}$ of soil.
**Exchangeable Acidity:** This was determined by titration method as described by Juo (1981). The exchangeable $H^+$ and $A1^{++}$ were then expressed in cmo/kg$^{-1}$ of soil

**Aim of the Experiment**
The experiment was aimed at testing the response of three selected maize varieties to different rates of organic manure and inorganic fertilizer (NPK 20:10:10)

**Experimental Design**
The study was carried out in Randomized Complete Block Design (RCBD), replicated three times in a factorial layout. The factors were three sources of nutrients:- poultry manure (PM), cattle dung (CD), inorganic fertilizer (NPK 20:10:10). The different rates of PM were 0, 10, 20, 30t/ha, CD were 0, 10, 20, 30t/ha and NPK 20:10:10 were 0, 150, 300, 450kg/ha.

**Agronomic Practices**
Among the agronomic practices carried out were land preparation/plot layout, planting, application of treatments, weeding.

**Land Preparation and Plot Layouts**
The land was ploughed and harrowed using tractor. Three blocks (or replicates) consisting of 36 blocks each were layout, each block will measure 2.6m x 2.25m and was separated from one another with a space of 0.5m. Alley pathways of 1m separated one block from another, and the total number of plots laid out in the entire experiment was108.

**Planting**
Maize seeds were sown on the plots at the rate of 1 seed per hole at a depth of 2-3cm, using 75cm x 15cm spacing as indicated by the first experiment.

**Procurement and Application of Organic Manure and NPK 20:10:10 Fertilizer**

Well-decomposed cattle dung was collected from cattle pen area, while poultry droppings were obtained from the battery cage system of poultry management of Delta State University, Asaba Campus. This organic manure was analyzed to determine their nutrient contents. NPK 20:10:10 fertilizer was obtained from Delta Agricultural Procurement Agency (DAPA), Ibusa.These amendment materials were incorporated into the plots according to the treatment as suggested by Olanikan (2006).

**Weeding:** Weeding was done three times using hoe.

**Data Collection:** Fourteen middle stands were used as sample population for data collection. Data collected was number of grains/cob of maize. This was done by direct counting after harvesting and shelling at the end of the sixteenth week from sowing.

**Analysis of Soil Sample:** Soil samples were collected from each experimental plot and analyzed for their content of N P and K.

**Statistical Analysis:** Data collected were subjected to analysis of variance (ANOVA) and means were separated with Duncan Multiple Range Test (DMRT) according to Wahua (1999).

## Results

**Soil Physico-chemical Properties of the Experimental Site:**

The pre-physico-chemical properties of the experimental site are shown in Table 1. The result showed predominantly sand at the surface and this tends to decrease with depth of profile. Texturally, the soil of the experimental site is classified as sandy loam. The soil is acidic with pH of 6.2 in $H_2O$ and 5.6 in CaCl. The organic matter content and total nitrogen were low with values of 1.22 gkg$^{-1}$ and 0.113 gkg$^{-1}$. The available P was high with value of 26.5 mgkg$^{-1}$. The exchangeable cations (Ca, Mg, Na and K) were equally low in status with values of 2.6cmolkg$^{-1}$ for $Ca^{2+}$ and 0.9 cmolkg$^{-1}$ for $Mg^{2+}$. The value obtained for $Na^+$ was 0.57 cmolkg$^{-1}$, which was moderate while that for $K^+$ was 0.08cmolkg$^{-1}$, which was low. The CEC was 4.15, while ECEC was 5.6cmolkg$^{-1}$, which were generally low. The exchangeable acidity was only trace for $Al^{3+}$ and characteristically low for $H^+$ with a value of 1.4 cmolkg$^{-1}$.

**Nutrient Content (%) of Organic Manure Used in the study**

The nutrient content of organic manure (poultry manure and cattle dung) used in the study is shown in Table 31. The values of N, P and K in poultry manure were significantly ($P<0.05$) higher than their values in cattle dung. With respect to N, poultry manure had 1.6% against cattle dung which was 0.4%. Also, poultry manure had 0.6% P while cattle dung had 0.2% P. The values for K were 0.8% in poultry manure, while it was 0.3% in cattle dung.

**Table 1: Physico-chemical Properties of Experimental Site**

| Soil Property | | Value | Interpretation |
|---|---|---|---|
| Particle Size Distribution (%) | | | |
| Coarse sand | | 38 | |
| Fine sand | | 41 | |
| Silt | | 9 | |
| Clay | | 12 | |
| Texture | | | Sandy loam |
| Ph | $H_2O$ | 6.2 | Acidic |
| | CaCl | 5.6 | Acidic |
| Organic | Carbon gkg$^{-1}$ | 0.71 | |
| Organic | Matter gkg$^{-1}$ | 1.22 | Very low |
| Total | Nitrogen gkg$^{-1}$ | 0.113 | Low |
| Available | P (ppm) | 26.5 | |
| Exchangeable bases (cmol/kg$^{-1}$) | | | |
| | $Na^+$ | 0.57 | Moderate |

| | | | |
|---|---|---|---|
| | $K^{+}$ | 0.08 | Very low |
| | $Ca^{2+}$ | 2.60 | Low |
| | $Mg^{2+}$ | 0.90 | Low |
| Cation Exchange Capacity | | 4.15 | |
| Exchangeable acidity (cmol/kg$^{-1}$) | | | |
| | $Al^{3+}$ | Trace | |
| | $H^{+}$ | 1.4 | |
| Effective cation Exchangeable capacity (Cmol/kg$^{-1}$) | | 5.6 | |

**Table 2: Nutrient (%) of Organic Manure used ion the Study**

| | Nutrient Content (%) | | |
|---|---|---|---|
| Parameter | N | P | K |
| PM | $1.6_a$ | $0.6_a$ | $0.8_a$ |
| CD | $0.4_b$ | $0.2_b$ | $0.3_b$ |

*Legend:* *PM = Poultry Manure, CD = Cattle Dung, N = Nitrogen, P = Phosphorus*

**Effect of Variety, Organic Manure and Inorganic Fertilizer on Number of Grains/Cob of Maize**

The response of number of grains/cob of maize to variety, organic manure and inorganic fertilizer is shown in Table 3. There were significant differences in the number of grains/cob of maize. With respect to varietal performance in 2008, hybrid variety 9022-13 had the highest number of grains/cob (526.6), followed by open-pollinated variety BR9922-DMRSRF$_2$ (474.0) Agbor local variety had the lowest number of grains/cob (340.0). The order of highest number of grains/cob with respect to the varieties sown was 9022-13 > BR9922-DMRSRF$_2$ > Agbor local. This was also the trend in 2009. Plants that received inorganic fertilizer NPK 20:10:10 had the highest number of grains/cob (506.0) followed by plants that received poultry manure (468.0). Plants that received cattle dung had the lowest number of grains/cob. The order of superio0rity in the number of grains/cob based on source of nutrient was inorganic fertilizer NPK 20:10:10 > Poultry manure > cattle dung. Plants that received higher rates of fertilizer or manure had higher number of grains/cob than plants that received lower rates. The order of highest number of grains/cob based on rate of manure in tons/hectare was 30 > 20 > 10 > 0 while that of fertilizer in kg/ha was 450 > 300 > 150 > 0. Similar results were also obtained in 2009. The result of interaction (Table 4) showed that variety, manure type, rate, variety * rate were significantly ($P<0.05$) different and affected changes in number of grains/cob of maize in 2008 and 2009, while type * rate were not significantly ($P>0.05$) different and could not have affected changes in number of grains/cob of maize in both years of evaluation.

**Table 3: Effects of Variety, Organic Manure and Inorganic Fertilizer on Number of Grains per Cob of Maize in 2008 and 2009**

| | No. of grains/cob | | |
|---|---|---|---|
| | **2008** | **2009** | **Mean** |
| **Variety** | | | |
| 9022 – 13 | 509.0$_a$ | 526.6$_a$ | 517.8$_a$ |
| BR9922-DMRSF$_2$ | 410.0$_b$ | 474.0$_b$ | 242.0$_b$ |
| Agbor Local | 343.3$_c$ | 430.0$_c$ | 386.6$_c$ |
| **Nutrient Source** | | | |
| PM | 440.0$_a$ | 468.0$_b$ | 454.0$_a$ |
| CD | 380.7$_b$ | 458.0$_b$ | 419.3$_b$ |
| IF | 441.5$_a$ | 506.0$_a$ | 473.7$_a$ |
| **Rates of application (tons or kg/ha)** | | | |
| 0 | 332.6$_g$ | 394.0$_d$ | 363.3$_e$ |
| **manure** ($tha^{-1}$) 10 | 382.6$_f$ | 423.0$_c$ | 407.3$_d$ |
| 20 | 434.6$_d$ | 482.0$_b$ | 458.3$_c$ |
| 30 | 494.8$_b$ | 542.0$_a$ | 518.4$_b$ |
| **IF** ($kgha^{-1}$) 150 | 409.1$_e$ | 496.6$_b$ | 402.8$_d$ |
| 300 | 473.3$_c$ | 558.0$_a$ | 515.6$_b$ |
| 450 | 532.8$_a$ | 570.8$_a$ | 551.8$_a$ |

Means with the same letter(s) under the same column are not significantly different ($P \leq 0.05$) using Duncan Multiple Range test (DMRT).

**Table 4: Effects of Variety, Manure and Inorganic Fertilizer on Number of Grains per Cob of Maize in 2008 and 2009**

| **Variety** | **Nutrient Source** | **Rate** | **No. of Grain/cob** | **No. of Grain/cob** |
|---|---|---|---|---|
| 9022-13 | PM | 0 | 408.0 | 416.0 |
| | | 10 | 476.0 | 509.3 |
| | | 2 0 | 544.0 | 554.6 |
| | | 30 | 612.0 | 662.6 |
| | | **Mean** | | **535.6** |
| | CD | 0 | 384.0 | 396.0 |
| | | 10 | 448.0 | 466.0 |
| | | 20 | 512.0 | 528.0 |
| | | 30 | 569.3 | 588.0 |
| | | **Mean** | | **494.5** |
| | IF | 0 | 432.0 | 412.0 |
| | | 150 | 504.0 | 492.6 |
| | | 300 | 576.0 | 642.3 |
| | | 450 | 642.6 | 651.6 |
| | | **Mean** | | **549.6** |
| BR9922-DMRSRF$_2$ | PM | 0 | 336.0 | 400.0 |
| | | 10 | 392.0 | 416.0 |
| | | 20 | 448.0 | 484.0 |
| | | 30 | 504.0 | 528.0 |
| | | **Mean** | | **457.0** |
| | CD | 0 | 288.0 | 404.6 |
| | | 10 | 336.0 | 418.6 |
| | | 20 | 384.0 | 465.3 |

| | | | | |
|---|---|---|---|---|
| | | 30 | 432.0 | 526.0 |
| | | **Mean** | | **453.6** |
| | IF | 0 | 360.0 | 412.0 |
| | | 150 | 420.0 | 492.6 |
| | | 300 | 480.0 | 642.3 |
| | | 450 | 540.0 | 651.6 |
| | | **Mean** | | **549.6** |
| Agbor Local | PM | 0 | 312.0 | 356.6 |
| | | 10 | 364.0 | 375.3 |
| | | 20 | 416.0 | 428.0 |
| | | 30 | 468.0 | 476.6 |
| | | **Mean** | | **409.1** |
| | CD | 0 | 248.0 | 380.6 |
| | | 10 | 280.0 | 402.6 |
| | | 20 | 304.0 | 439.3 |
| | | 30 | 384.0 | 471.3 |
| | | **Mean** | | **423.5** |
| | IF | 0 | 260.0 | 376.0 |
| | | 150 | 303.0 | 474.6 |
| | | 300 | 364.0 | 480.0 |
| | | 450 | 116.0 | 500.0 |
| | | **Mean** | | **457.7** |
| Variety | | | * | * |
| Manure type | | | * | * |
| Rate | | | * | * |
| Variety x manure type | | | Ns | * |
| Variety x rate | | | * | * |
| Manure type x rate | | | Ns | Ns |
| Variety x manure type x rate | | | Ns | Ns |

**Legend:** * = significant at 0.05 level of probability, ns = not significant

## Discussion

**Soil Physico-chemical Properties of the Experimental Site**

The sandy loam texture of the experimental site may be attributed to the Parent Material (PM) from which the soil was formed and the climate of the area. The soil might be formed from sandstone and quartz parent materials. These impart sandy texture to the soils. The high sand content of the soil could be attributed to high content of quartz in the material (Brady and Weils, 1999). The weak acid nature of the soil of the area may be traced to the marked leaching of exchangeable bases resulting from the high rainfall associated with the environment and the dissociation of strong and functional group in the organic matter. This is in harmony with the findings of Omokri *et al*. (2007). The low organic matter status of the experimental site could be attributed to the rapid decomposition of organic matter due to high solar radiation and moisture,this favours optimum microbial activities in the soil, It could also be attributed to the annual seasonal bush burning which tend to deplete organic matter accumulation in the soil (Landor, 199l).

The low level of total nitrogen could be due to high temperature. It could also be attributed to leaching of' nitrate by torrential rainfall prevalent in the environment (Olatunji *et al.*, 2007). The high level of' Phosphorus may be attributed to either of these reasons: (i) history of land use and cultural practices associated with the land use (that is, cropping of crops that do not take much P nutrient from the soil and the application of P organic fertilizers (Nnaji *et al.*, 2002, Nnaji, 2008). (ii) The parent material from which the soil was formed may be rich in P minerals (Brady and Weils, 1999). (iii) The soil may not be highly acidic as to cause high level of fixation (Brady and Weils, 1999, Isirimah *et al.*, 2003 and Omokri *et al.*, 2007). The low values of exchangeable cations may be attributed to the leaching of bases from the solum due to high rainfall characteristics of the area. The low action exchange capacity could be attributed to the PM from which the soil was formed, and low organic matter (OM) content of the soil. The PM from which the soil was formed may be poor in basic nutrients. Nnaji *et al.* (2002) noted that soils of the study area were dominated by Fe oxide and Kaolinites. These clay minerals are low in basic cations (Brady and Weils, 1999). The exchangeable acidity was low possibly because of the cultural practices associated with the land use (that is, previous use of amendments to improve soil condition and enhance crop yield. The results, generally, are in harmony with the findings of Olatunji *et al*. (2007) and the results of soil fertility evaluation in the region. It is also consistent with the findings of Nnaji *et al.* (2002), Nnaji, 2008) which reported that the history of land use and cultural practices affect soil conditions and crop productivity.

**Nutrient Content (% dry matter) of Organic Manure used in the Study**

The values of N, P and K were higher in poultry manure than in cattle dung used in the study possibly because poultry manure, especially those produced in deep litter or battery cage house, have more concentrated nutrient content compared with other types of animal manure. This is similar to the findings of Sharpley and Smith (1995) and Brady and Weils (1999) who reported that among the different sources of organic manure which have been used in crop production, poultry manure was found to be the most concentrated in terms of nutrient content. It is also in harmony with the findings of Subedi and Gerung (1991) and D1PA (2006) who reported that poultry manure has higher levels of N. P and K than cattle dung. It is also consistent with the findings if Ibeawuchi *et al.* (2007) who reported higher levels of N. P and K in plots treated with poultry manure than in plots treated with other nutrient sources.

**Effect of Variety, Organic Manure and Inorganic Fertilizer on Number of Grains/cob of Maize**

Hybrid variety 9022-13 had higher number of grains/cob than open-pollinated variety BR9022-DMRSRF$_2$ and Agbor local possibly because hybrid maize varieties possess outstanding quality with respect of high grain yield. This is consistent with the findings of Odeleye and Odeleye (2001) and Sajjan *et al.* (2002) who reported that fruit production, grain yield and other yield components are usually influenced by genetic quality of individual variety. It is also in consonance with the findings of Olakojo *et al.* (1998) who reported that hybrid maize varieties have yield advantage of 25 to 50% over the best open-pollinated variety in Nigeria. Plants that received poultry manure had higher number of grains/cob than plants that received cattle dung probably because poultry manure must have increased the carbon content, water holding capacity, aggregation of soil, and decreased the bulk density of the soil. This is similar to the findings of Egerszegi (1990) who reported that poultry manure increased the carbon content, water holding capacity, aggregation of soil and decreased bulk density of soil where it was applied. Poultry manure could have also increased the water soluble and exchangeable potassium and magnesium, which enhanced yield as reported by Jackson *et al.* (1999). The superiority of plants that received inorganic fertilizer over other plants with respect to higher number of grain/cob could be attributed to better yield enhancement credited to inorganic fertilizers over other nutrient sources. This is similar to the findings of Ayodele (1993) and Giller (2003) who reported that inorganic fertilizers influenced crop quality and improved yield over 50% than their unfertilized counterparts. It is also consistent with the findings and report of Akintoye and Olufolaji (2005) on *Cayene* pepper. Higher rates of inorganic fertilizers or organic manure produced better response with respect to higher number of grains/cob possibly because higher rates satisfied the crop's requirement. This is similar to the findings of Olarewaju and Isma (1990) and Ayodele (1993) who suggested that accurate rate and type of fertilizer should be applied using the best method at the most appropriate time.

## Conclusion and Recommendations

This study was carried out to evaluate the effects of variety and fertilizers on number of grains/cob of maize in Asaba area of Delta State. It was a factorial experiment carried out in a Randomized Complete Block Design (RCBD) with three replicates. Four different rates of poultry manure, cattle dung and inorganic fertilizer NPK 20:10:10 were applied to three maize varieties sown at 75 cm x 15 cm plant spacing. The results obtained indicated that hybrid variety 9022-13 was superior in number of grains/cob of maize and that plants which received inorganic fertilizer application rate of 450 $kgha^{-1}$ had the highest number of grains/cob. Based on the findings of the study, it was recommended that (i) Hybrid maize variety 9022-13 be grown in the study area (ii) farmers who prefer mineral fertilizer should apply 450 $kgha^{-1}$ to enhance number of grains/cob of maize in Asaba area of Delta State.

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