EVALUATION OF SOME MAIZE (Zea mays L) VARIETIES ON THE GROWTH AND YIELD PERFORMANCE IN DELTA STATE, NIGERIA.

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ABSTRACT
Growth and cob weight yield of five maize varieties in Delta State, Nigeria were evaluated. Maize varieties used for the study were: Oba 98, Oba super 2, Low nitrogen tolerant plant (LNTP), Open pollinated variety (OPV) and local variety were subjected to experimentation. The design was a randomized complete block with three replicates. The plant parameters measured were: plant height, number of leaves/plant, leave area and stem girth. These were taken at 2, 4, 6, 8 and 10 weeks after planting (WAP) Cob weight were also determined. The mean value across the varieties were subjected to Duncan multiple range test (DMRT) to test for the significant differences that existed among the varieties. The result showed that Plant height showed continuous increase across the varieties at 6, 8 and 10 WAP with significant differences across the varieties. At 10 WAP plant height was highest in OPV (264.3cm) and was least in LNTP (200.8cm). At 10 WAP Oba 98 (7.70cm) was the most significant in plant girth and was significantly different from other varieties. At 8 and 10WAP number of leaf was highest in OPV and was significantly different from other varieties. Mean cob weight was highest OPV (0.049t/ha) and was lowest in the local variety (3.8t/ha). It was concluded that OPV was the most outstanding variety having the highest cob weight of 4.8t/ha and therefore was recommended for farmers in the study area for cultivation without any form of fertilizer application.
Key word: Maize, evaluation, parameter, performance, growth character, yield

INTRODUCTION
Maize (*Zea mays* L) is a cereal crop, widely grown in many countries in the world and its production is very popular compared to other cereal crops. Recently, maize production has been given wide publicity among the farmers in Nigeria due to scarcity for food consumption and formulation of livestock feed due to high demand and other production input (F.A.O, 2003).

In Nigeria, maize is second most important cereal crops, ranking behind sorghum in the number of people who feed on it. The crop is important because it has several advantages over other cereals. These include the production of higher output per unit of labour input, easy to establish, cultivate, harvest, transport, store, process, the husks protect the grains against rain and birds attack in the field and time of harvest is not critical as it can be in the field for a long period in the field due to difference in cuiltivars (Rouanet, 1992, Osagie and Effiong, (1997).

Maize yield varies from variety to variety, location to location and also depends on the availability of essential factors such as native soil nutrients that will be available in sufficient quantity throughout the growing season with pH of 4.5-8.0 and soil temperatures of 26^0C- 30^0C with optimum temperatures of 21^0C- 30^0C at tesseling. A rainfall of 600-1200mm per annum (Jones, 1973; Onwueme, 1979).

Maize yield depends on the availability of essential factors such as soil nutrient, location to location also varies from variety to variety. Maize can be grown on a wide range of soils but performs better on a well deep loam and silt containing adequate organic matter and available nutrient (Gibbon and Pain, 1985).

In order for maize to reach its full production capacity, there is need to address the issues of its adaptation, growth performance and yield in Delta State. Consequently, there is need to provide information on the missing link for better production of maize in Delta State.

The broad aim of the study is the adoption of five varieties of maize yield in Delta State.

The specific objectives of the study were to:

1. Evaluation of five maize varieties in Delta State with a view to determining their adaptability and suitability for production;
2. Assessment of the yield performance of proven maize varieties in the area of study.

MATERIALS AND METHODS
Experimental location
The study was conducted in 2021 at the University of Delta's Teaching and Research Farm in Agbor, located at Ika south local government of Delta State. The rainfall regime has two peaks separated by a dry phase in August known as August break. The rainy season lasts at least seven months, or 220-250 days, with an average of 159 rain days per year. Temperature very from high during the day and cool at night (IIoeji, 2003).

Experimental material
Maize (Zea mays L) seeds were received from premier seed Nigeria, Agricultural development program (ADP) both in Benin City, Edo State and open pollinated seeds from ministry of agriculture

while the local variety were obtain from open market at Edike market in Agbor, Delta State.

Experimental design

The five varieties of maize (Oba 98, Oba super 2, Open Pollinated Variety (OPV), Low Nitrogen Tolerant variety (LNT) and Local variety were planted in a randomized complete block design (RCBD) subjected to treatment without fertilizer.

Land preparation

The location was carefully examined, prepared and plotted. Each plot measure $4m^2$ with 0.5m alleys between plots and replicates. The maize seed were planted at a spacing of 75cm within and 25cm between rows and in between plot. Each plot had 25 plants, giving a total population of 375 plants or 2.666 plants/ha.

Weed management was done manually with a hoe at 2 and 8 weeks (WAP) and subsequent weeding operation were done by slashing with cutlass.

Soil analysis

Before planting, soil augers were used to gather composite soil samples from 0 to 15cm deep from the experimental location. In laboratory, samples were bulked, air dried and sieved with a 2mm mesh sieve. The bulked samples were treated and tested for physicochemical parameter Okalebo *et al.* (2002)

Data collection:

Data were collected on growth and yield parameters. Growth parameters: Four plants were tagged in the net plot for data collection. The growth parameters collected included: plant height, number of leaves per plant, leave area stem girth cm at 2,4,6,8, and 10 weeks after planting (WAP) and fresh plant yield.

Statistical analysis

All data collected were analysed using analysis of variance (ANOVA) at 5% level of probability and the means separated using Duncan's Multiple Range Test (DMRT), when F- ratio proved significant (Steel and Torrie, 1987).

RESULTS

Soil analysis

The soil used for the experiment was sandy loam, slightly acdic, with moderate organic carbon, low in nitrogen, marginal in available phosphorus, and exchangeable bases.

Table1.Pre planting soil physical – chemical parameters of experimental site.

Parameters	Values
Sand (gkg^{-1})	820
Silt (gkg^{-1})	70
Clay(gkg^{-1})	110
Textutral class	sandy loamy
pH(H201:1)	5.75
Organic carbon (gkg^{-1})	8.30
Total nitrogen (gkg^{-1})	0.45
Available phosphorus ($mgkg^{-1}$)	10.00
Exchangeable calcium ($cmolkg^{-1}$)	1.03
Exchangeable magnesium ($cmolkg^{-1}$)	0.46
Exchangeable potassium ($cmolkg^{-1}$)	1.02
Exchangeable sodium ($cmolkg^{-1}$)	0.08
Total Exchangeable Bases ($cmolkg^{-1}$) $[ca^{2+} + mg^{2+} + k^{+} + Na^{+}]$	2.59
Total Exchangeable Acidity ($cmolkg^{-1}$) $[A1^{3+} + H^{+}]$	0.10
Effective cation exchange capacity ($cmolkg^{-1}$)	2.69
Base saturation %	96.28

Plant height (cm)

The plant height of the five maize varieties are presented in Table 2.The mean plant height of the maize varieties at 2 weeks after planting (WAP) ranged from 21.70 cm in Oba super 2 to 17.50cm in the local variety. However, significant differences existed in the plant height of the maize varieties with Oba super 2 (21.70cm) being the most significant variety. At 4WAP, plant height was highest in the open pollinated variety (OPV) with 48.8cm being the most outstanding variety and was lowest in Oba super 2 (39.9cm). Plant height showed continuous increase across the varieties at 6, 8 and 10 WAP with significant differences across the varieties. At 10 WAP plant height was highest in OPV (264.3cm) and was least in LNTP (200.8cm).

Table 2: Evaluation of some varieties on the growth parameters of maize

Varieties ←	WAP →				
	2	**4**	**6**	**8**	**10**
Plant height (cm)					
Oba 98	19.70^{b}	45.00^{a}	129.7^{a}	222.4^{b}	236.2^{b}
Oba super2	21.70^{a}	39.9^{b}	99.00^{b}	220.8^{b}	243.5^{b}
OPV	20.33^{b}	48.8^{a}	92.40^{b}	242.4^{a}	264.3^{a}
LNTP	18.61^{b}	42.8^{b}	81.11^{b}	194.2^{c}	200.8^{b}
Local	17.50^{c}	36.16^{b}	99.00^{b}	219.2^{b}	247^{b}
Mean	19.56	42.93	100.1	219.8^{b}	236.5^{b}
Stem girth (cm)					
Oba 98	2.77ns	5.37ns	7.65^{a}	6.70	7.70^{a}
Oba super 2	2.85	4.95	6.16^{b}	7.31	6.33^{b}
OPV	3.50	4.85	7.17^{b}	7.17	6.18^{b}
LNTP	3.50	5.08	6.80^{b}	6.70	6.53^{b}
Local	3.20	4.78	7.20	6.90	6.24^{b}
Mean	3.16	5.20	7.15	6.76	6.79
Leaf area/plant (cm^2)					
Oba 98	132.2^{a}	272.74^{a}	586.23^{a}	607.43^{b}	819.9^{a}
Obasuper2	63.74^{bc}	211.41^{b}	528.19^{b}	680.61^{b}	709.9^{a}
OPV	70.79^{b}	261.31^{a}	562.55^{b}	641.21^{b}	674.61^{b}
LNTP	57.29^{c}	223.32^{b}	583.02^{a}	693.55^{b}	737.02^{a}
Local	54.23^{c}	178.41^{c}	573.70^{a}	760.35^{a}	756.15^{a}
Mean	75.65	229.38	486.74	651.12	697.15
No of Leaves/plant					
Oba 98	4ns	7ns	11ns	11b	12a^{b}
Obasuper2	4	7	12	13a	13^{a}
OPV	4	8	11	14b	14^{a}
LNTP	3	7	11	13a	13^{a}
Local	4	7	11	13^{a}	13^{a}
Mean	3.5	7.2	11.4	12.6	13.2

Values with same letter(s) superscript indicated in columns are not significantly different using at 5% level of probability; ns; not significant

Stem girth (cm)

The plant girth of the maize varieties (Table 2) showed no significant difference across the varieties at 2 and 4 WAP. At 2WAP, plant girth was highest OPV and LNTP with 3.50cm respectively and was lowest in Oba super 2 (2.85). At 4WAP stem girth was highest Oba 98 (5.37cm) and was least in the local variety (4.78cm). Notwithstanding, there were significant differences in stem girth among the five varieties at 6 and 10 WAP with no significant difference at 8WAP. Stem girth showed no significant difference at 8WAP, but plant girth was highest in Oba super 2 (7.31cm) and least in Oba 98 and local variety with a mean of 6.70cm respectively. At 10 WAP Oba 98 (7.70cm) was the most significant in stem girth and was significantly different from other varieties.

Leave area/plant^{-1}

The leaf area of the maize varieties (Table 2) showed significant differences at 2, 4, 6, 8 and 10WAP. At 2 WAP leaf area was highest in Oba 98 (132.2cm^2) being significantly difference from other varieties and was lowest in the local variety (54.23cm^2). Mean leaf area maintained an increase at 4, 6, 8 and 10 WAP with significant differences across the varieties. At 4 and 6 WAP leaf area per plant was highest in Oba 98 (272.74cm^2, 586.23cm^2) and lowest in local (178.70Ocm^2) and Oba super 2 (528.19cm^2) in that other. Mean leaf area was highest at 8WAP in variety the Local variety (760.35cm^2) and lowest in Oba 98. However, at 10WAP leaf area was highest in Oba 98(819.9cm^2 and was least OPV variety (674.61cm^2). Notwithstanding, at 8 and 10WAP, there was no significant difference in the leaf area of Oba 98 and (819.9cm^2), Oba super 2.(709.9cm^2), LNTP (737.02cm^2) and the local variety (756.5cm^2) but statistically different from OPV (674.61).

Number of leaves/plant^{-1}

The mean leaf number per plant across the five varieties of maize showed no significant difference at 2, 4 and 6 WAP, but significant differences were observed in the mean leave number per plant at 8 and 10WAP. However, leaf number was highest in OPV variety (8) while the mean leaf number per plant across other varieties was 7. Similar trend was observed in 6WAP with Oba super 2 (12) having the highest number of leaf per plant. At 8 and 10WAP number of leaf was highest in OPV (14) and was significantly different from other varieties.

Cob weight yield

The mean cob weight yield per plant (Table 3) showed a significant difference in the varieties studied. However, mean cob weight was highest OPV (4.8t/ha) and was lowest in the local variety (3.8t/ha). Also, there was no significant difference in the mean cob weight of Oba super 2 (3.9t/ha) and local variety (3.8t/ha). Similar relationship was noticed in Oba 98 (4.5t/ha) and OPV (4.9t/ha) showing no significant difference among the mean cob weight of both varieties.

Table 3: Evaluation of Cob weight yield (t/ha) of maize

Varieties	Cob weight yield (t ha^{-1})
Oba 98	4.5a
Oba super 2	3.9c
OPV	4.8a
LNTP	4.2bc
Local	3.8c
Mean	4.2

Values with same letter(s) superscript indicated in columns are not significantly different using DMRT at 5% level of probability.

DISCUSSION

The adaptation of some selected maize varieties on the growth and yield of five maize varieties at Agbor without fertilizer application were carried out in order to determine their adaptation under native nutrient condition. The differential responses of maize varieties with respect to vegetative characters and cob weght yield in Agbor is in consonance with previous findings of Fluckiger *and Braun* (1998); Udoh *et al* (2005); Ghosh *et al* (2014); Katta (2016) and Begum *et al* (2016).

Consequently, the results from this study showed that the most outstanding variety among the five evaluated was OPV (4.8t/ha) and therefore could be cultivated at Agbor in Delta State. This observation is indicative of the effect of varieties on the growth and yield performance of maize Masuma *et al* (2017). The difference could be as a result of variation in soil native nutrient status and micro- climatic conditions.

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