Original Research Article

The Effects of Nitrogen and Potassium on the Growth and Yield of a Cassava (*Manihot esculenta Crantz*) Variety at Igbodo in Delta State, Nigeria

[1]*Umeri, C., [2]Omoregie, A.U. and [1]Moseri, H.

[1]Agricultural Education Department
College of Education, Agbor, Nigeria

[2]Department of Crop Science
Ambrose Alli University, Ekpoma, Nigeria

*Corresponding author: cliffordumeri@gmail.com; +2348033771837

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Abstract

This study was conducted to determine the effects of Nitrogen and Potassium fertilizer on the growth and yield of cassava (*Manihot esculenta* (L) Crantz), variety (01/1797) at Igbodo in Delta State, Nigeria. The design was a 4×4 factorial scheme fitted into a Randomized Complete Block design giving 16 treatment combinations with 3 replicates. The following treatment combinations of N and K were applied: N_0K_0 (no fertilizer), N_0K_{20}, N_0K_{40}, N_0K_{80}, $N_{40}K_0$, $N_{40}K_{20}$, $N_{40}K_{40}$, $N_{40}K_{80}$, $N_{80}K_0$, $N_{80}K_{20}$, $N_{80}K_{40}$, $N_{80}K_{80}$, $N_{120}K_0$, $N_{120}K_{20}$, $N_{120}K_{40}$, and $N_{120}K_{80}$ kg/ha. The plant parameters measured were: plant heights, stem girth and number of branches/plant. These were taken at 2, 4, 6, 8 and 10 months after planting (MAP). Fresh tuber weight, dry matter of tuber and dry matter percentage (%) of tubers were also determined. In the trials involving the application of N, K and their combinations, N application had no significant effect on the plant height, number of branches and dry matter percentage, but significantly ($p<0.05$) influenced fresh and dry tuber weights of cassava. However, application of 120kgN +80kgKha^{-1} gave the best yield compare to other treatments. It was concluded that 120kgN/ha in combination with 80kgK/ha be applied to soils in the study area for the cultivation of 01/1797 cassava variety for best tuber yields.

Keyword: cassava, treatment, fertilizer, growth characters, yield.

Introduction

Cassava (*Manihot esculenta* Crantz synonymous with *Manihot utilissima* Pohl) is one of the most important stable food crops grown in tropical Africa. Because of its efficient production of food energy, all year round availability, tolerance to extreme stress conditions, and suitability for peasant farming and food system in Africa, cassava is playing a major role in efforts to alleviate

the African food crisis (Purseglove, 1991). Ekanayeke *et al.* (1997) reported that over two thirds of the total production of cassava is consumed in various forms. Omoregie (2005) reported that cassava serves some useful economic purposes. These include: (i) *garri*, the traditional product which is consumed in granule form, (ii) *fufu/akpu* which has assumed a national spread in consumption, (iii) tapioca and *usi* (starch) which are delicacies among the Urhobos, Itsekiris, and Ijaws of the Niger Delta, materials for industrial and domestic uses, (iv) the leaves which are used as vegetable, and (v) chips which are used for livestock feed.

Responses of cassava to fertilizer application are very variable under different nutrient and climatic conditions (Leakey and Wills, 1977). Nair and Sadananadan (1985) reported that N and K applications increased the yield obtained by applying 90kgN, 18kg P and 75kgK/ha on Utisol testing low in N and K and medium in P. Highest rate of tuberization and yield response were obtained with a combination of several levels of NPK 15:15:15 at 60, 90 and120 days (CIAT, 1985). Nigerian soils are fragile and inherently infertile. This infertile nature of the soils has led to reduction in yields, and resource – poor farmers are unable to meet national food demands. All that is required is to sustain the fertility of the soils and modify or improve on them (Agboola and Unamma, 1991). To increase the yield potential of cassava, the crop had been reported to respond to good soil fertility and adequate fertilizer (Gomez *et al*., 1980). Farmers do not fertilize cassava because they are contented with the minimal yields obtained from it using limited inputs or even from their infertile soils. The indifference towards low productivity can be attributed to the low and unstable prices of cassava tubers.

However, fertilizer requirement for optimum yield in cassava is determined by soil fertility status of the farmland and cropping intensity which affects K levels in the soil. Potassium level in soil stimulates response to N fertilizers, but excess amount of both nutrients leads to luxuriant growth at the expense of tuber formation (Rao *et al*., 1986; Onwueme and Charles, 1994).

Some of the problems associated with the soil for the cultivation of cassava in the Niger Delta area of Nigeria are deficiencies in nutrients, leaching, continuous cropping, oil spillage and oil exploration (Corliss, 1991). In order for cassava to reach its full production capacity, there is need to address nutrient deficiency. Reports on the nutrient requirements and response of cassava to fertilizer in Delta State, Nigeria are limited. Consequently, there is need to provide information on the missing link for better production of cassava in Delta State.

The specific objectives of the study were assessment of the effects of Nitrogen and Potassium fertilizers on the growth and yield of cassava variety in the area of study.

Materials and Methods

Location

The study was carried out in Igbodo in Delta State, Nigeria. Delta State which lies in the geographical coordinates of 6° 18' N of the equator, and 6° 23' E of the Greenwich meridian. Rainfall occurs mainly from April to October. Annual rainfall is usually from 2000mm – 3000mm

with an intense sunlight, which lasts for a minimum of 8 hours daily. Temperatures are high for most parts of the year, especially in the months of November to April with a mean monthly temperature of 31^0C. The annual range of temperature is thus small, only varying between 3^0C and 5^0C. Relative humidity varies from 60% during dry season to about 90% in the rainy season (Iloeji, 2003). The experiment was done at Igbodo because N and K were found to be deficient, from soil analysis.

Land Preparation and Fertilizer Application

The land used for the experiment was manually cleared, and debris packed without burning.

Nitrogen and Potassium were applied at rates of 0, 40, 80 and 120 kgN/ha and 0, 20, 40 and 80 kgK/ha, respectively. The applications were made based on N and K contents of the soil resulting from soil analysis. Nitrogen was applied as urea while Potassium was applied as muriate of potash.

A proven variety of cassava (01/1797) obtained from the International Institute for Tropical Agriculture (IITA) Ibadan was used in this study. The design was a 4 x 4 factorial scheme fitted into a randomized complete block design giving sixteen treatment combinations with three replicates. The following treatment combinations were applied N_0K_0kg/ha, N_0K_{20}kg/ha, N_0K_{40}kg/ha, N_0K_{80}kg/ha, $N_{40}K_0$kg/ha, $N_{40}K_{20}$kg/ha, $N_{40}K_{40}$kg/ha, $N_{40}K_{80}$kg/ha, $N_{80}K_0$kg/ha, $N_{80}K_{20}$kg/ha, $N_{80}K_{40}$kg/ha, $N_{80}K_{80}$kg/ha, $N_{120}K_0$kg/ha, $N_{120}K_{20}$kg/ha, $N_{120}K_{40}$kg/ha and $N_{120}K_{80}$kg/ha. The soils were mixed with various levels of nutrients using urea to supply nitrogen and muriate of potash as source of potassium at 4 weeks after planting (WAP) by using the side placement method.

The size of each plot measured 5m x 4m ($20m^2$) with spacing of 1m between plots, and 1.5m between replicates, giving a plant population of 20 plants per plot (10,000 plants/ha). There were, thus, a total of 48 plots (16 x 3). The experimental area was $1701m^2$ (0.17 ha). Weeding was carried out manually by hoeing at 3 WAP and repeated at 8 WAP for the second operation. Subsequent weed control was by rouging at 14 and 20 weeks after planting (WAP).

Data collection was carried out at 2, 4, 6, 8 and 10 months after planting (MAP). Four plants from the centre were randomly selected per plot, tagged and sampled as necessary.

Assessments of the following parameters were done:

Plant Height and Stem Girth

A tape rule was used to measure the height of plants from the soil surface to the top on the main branch. The stem girth was determined by using a string around the plant at the first internode and later spread on a ruler. The measurements were expressed in cm.

Fresh Tuber Weight

Four mature tagged cassava plants at the centre rows (net plot) were selected from each plot for harvesting and weighing.

Dry Matter Yield of Peels

The peel dry weight of cassava was taken by drying to a constant weight (after 48hrs) in force air oven at 80^0C. All weights were taken with a top-loading balance. The DM contents (%) of the tubers and peels were estimated as

100(Dry weight)/Fresh weight

Data Analysis

All data of parameters were subjected to the appropriate analysis of variance (ANOVA) procedures as described by Steel and Torrie, 1980.

Results and Discussion

Soil Analysis Result

The results of the soil analysis at the experimental site at Igbodo, Nigeria after first cropping indicate that the texture of the soils varied from sand to loamy sand. Soil samples for N_0K_{20} were found to be sandy at the top soil while other soil samples were loamy sand (Table 1).

Table 1: Physical Properties of Soils (0 – 15cm) at Igbodo after 1st cropping

	Soil Physical Properties			
Treatment	**Sand g/kg**	**Silt g/kg**	**Clay g/kg**	**Textural Class**
N_0K_0	893.0	76.0	31.0	LS
N_0K_{20}	908.0	71.0	21.0	S
N_0K_{60}	898.0	71.0	31.0	LS
N_0K_{80}	893.0	76.0	31.0	LS
$N_{40}K_0$	888.0	81.0	31.0	LS
$N_{40}K_{20}$	888.0	91.0	21.0	LS
$N_{40}K_{60}$	898.0	71.0	31.0	LS
$N_{40}K_{80}$	888.0	76.0	36.0	LS
$N_{80}K_0$	893.0	76.0	31.0	LS
$N_{80}K_{20}$	887.0	81.0	32.0	LS
$N_{80}K_{60}$	889.0	80.0	31.0	LS
$N_{80}K_{80}$	877.0	91.0	31.0	LS
$N_{120}K_0$	883.0	86.0	31.0	LS
$N_{120}K_{20}$	887.0	81.0	32.0	LS
$N_{120}K_{60}$	888.0	80.0	32.0	LS
$N_{120}K_{80}$	888.0	81.0	31.0	LS

S = Sand; LS = Loamy Sand

Table 2: Chemical Properties of Soils (0 -15cm) in Igbodo in Delta State

					Exchangeable										Available			
Treatment	pH H_2O	EC	N	C	Av.P	Na	K	Mg	Ca^{2+}	Al^{3+}	H^+	ECEC	OM	Zn	Pb	Fe	Cu	Mn
		(%)			(mg/kg)	(cmo/kg)					(%)	(mg/kg)						
N_0K_0	5.8	22.9	0.12	2.59	2.37	0.26	0.15	7.68	1.24	T	0.3	9.63	22.7	261.0	1.18	82.61	4.48	0.31
N_0K_{20}	5.9	31.0	0.13	2.46	5.59	0.34	0.09	4.56	1.76	T	0.4	7.04	42.6	31.38	1.31	83.58	6.63	0.26
N_0K_{40}	5.9	40.8	0.11	1.89	6.63	0.26	0.11	6.80	1.76	T	0.4	7.04	42.6	31.38	1.31	83.58	6.63	0.26
N_0K_{80}	6.7	42.3	0.15	1.73	4.04	0.32	0.11	6.32	1.52	T	0.4	8.68	29.9	219.7	0.97	83.73	6.09	0.27
$N_{40}K_0$	5.8	43.3	0.11	1.44	4.13	0.36	0.12	5.44	2.24	T	0.4	8.77	24.9	141.2	1.58	83.73	6.29	0.2
$N_{40}K_{20}$	5.7	22.9	0.10	1.73	4.76	0.31	0.12	4.64	2.24	T	0.5	7.81	29.9	172.6	1.89	112.8	5.29	0.27
$N_{40}K_{40}$	5.6	36.7	0.13	1.54	4.18	0.29	0.10	5.20	2.24	T	0.5	8.33	26.6	115.6	1.21	96.96	4.62	0.21
$N_{40}K_{80}$	5.7	34.0	0.12	1.92	30.2	0.23	0.08	2.88	1.92	T	0.4	5.50	31.3	209.2	1.61	83.43	5.89	0.31
$N_{80}K_0$	6.5	33.1	0.11	2.14	26.6	0.24	0.19	8.40	1.44	T	0.2	10.5	37.1	287.7	1.91	127.9	9.84	0.29
$N_{80}K_{20}$	6.8	29.7	0.12	1.95	11.3	0.30	0.14	6.56	1.68	T	0.4	9.08	33.8	136.0	1.15	118.6	6.36	0.20
$N_{80}K_{40}$	6.8	25.2	0.13	1.57	14.5	0.25	0.09	3.92	2.16	T	0.2	6.62	27.1	193.5	2.09	117.3	9.84	0.33
$N_{80}K_{80}$	6.4	46.1	0.14	1.67	6.90	0.20	0.13	4.80	2.40	T	0.2	7.73	28.8	109.8	1.10	134.9	8.30	0.28
$N_{120}K_0$	5.8	30.9	0.12	2.82	14.2	0.21	0.11	5.76	2.08	T	0.4	8.56	48.7	167.4	0.93	126.1	8.57	0.29
$N_{120}K_{20}$	6.2	49.0	0.10	1.79	14.7	0.43	0.23	8.96	2.40	T	0.2	12.2	31.0	183.1	0.92	116.3	8.90	0.16
$N_{120}K_{40}$	5.8	36.2	0.13	2.50	10.0	0.27	0.15	5.52	1.92	T	0.4	8.25	43.2	172.6	1.46	136.2	7.56	0.19
$N_{120}K_{80}$	6.3	33.9	0.12	2.14	18.1	0.26	0.16	6.32	1.92	T	0.3	8.96	12.5	177.8	1.97	123.6	7.62	0.16

.P = Available phosphorus; EC = Electrical conductivity; ECEC = Effective cation exchange capacity; OM = Organic matter; T = Trace

Plant Height

The effect of N fertilizer application on plant height of cassava at Igbodo soils are shown in Table 3. The highest mean plant height of 189.8cm was obtain from the control (0kgN/ha) at 10MAP. This was not significantly different from the mean plant heights obtained from other treatments, while the effect of K fertilizer application on plant height of 188.0cm obtained from 80kgK/ha was highest and significantly different from those at 8 and 10 MAP. The application of 40kgN/ha and 80kgK/ha gave the highest mean plant height (204.2cm) when compared to other treatment combinations. N and K applications generally resulted in increased plant height even though this trend was not consistent during some of the months of planting. Nitrogen has been reported to favour plant height of cassava especially at the initial stage of growth in respect to vegetative character and tuber yield and this is in consonance with previous findings of Utomakili and Enobakhare (1995) and Agba *et al.* (2005).The vegetative characters considered include plant height, stem girth, leaf area, number of branches and cassava yield.

Stem Girth

The highest mean stem girth was 9.3cm from variety 01/1797 at an application level of 40kgN/ha (Table 4). This value was, however, not significantly different from the stem girth obtained at other levels of N application and the control. There was a general increase in stem girth from 2MAP to 10 MAP. The highest stem girth of 9.6cm was obtained in the 10th month by applying K at 40kg/ha. This value was significantly different from the stem girth obtained at other levels of K. Application of N and K, generally, had no significantly effect on the stem girth of cassava, though N had significant effects at 2 MAP and K at 10 MAP. However, the application of 0kgN/ha + 40kgK/ha gave the highest mean stem girth. The effects of nutrient application on stem girth of

Table 3: Effect of nitrogen and potassium fertilizer on mean plant height (cm) of cassava (01/1797) variety at Igbodo

Levels of Nitrogen (k/ha)	Levels of Potassium (kg/ha)				
2MAP	**0**	**20**	**40**	**80**	**Mean**
0	31.5	43.5	31.7	36.0	35.7ns
40	28.8	37.7	39.8	32.0	34.6
80	33.7	33.0	41.8	37.5	36.5
120	21.5	26.0	34.7	40.0	30.5
Mean	28.9ns	35.0	37.0	36.4	
4MAP					
0	72.8	82.7	82.0	109.3	86.7ns
40	88.8	73.5	87.0	88.2	84.4
80	70.2	69.8	80.3	81.5	75.5
120	58.2	85.8	81.0	90.5	78.9
Mean	72.5ns	77.9	82.6	92.4	
6MAP					
0	108.3	136.2	128.3	159.8	133.2ns
40	95.0	135.8	102.2	125.7	114.7
80	120.3	117.2	130.0	126.3	123.5
120	98.7	124.3	140.8	109.0	118.2
Mean	105.6ns	128.4	125.3	130.2	
8MAP					
0	108.3	136.2	128.3	159.2	133.0ns
40	107.0	135.8	102.2	125.7	117.7
80	96.2	117.2	130.0	126.3	117.4
120	98.7	124.3	140.8	109.0	118.2
Mean: LSD (K=24.0)	102.5b	128.4a	125.3ab	130.0a	
10MAP					
0	185.5	191.5	185.8	196.3	189.8ns
40	132.5	189.2	165.3	204.2	172.8
80	185.0	177.0	165.2	179.3	176.3
120	136.7	166.5	202.2	172.3	169.4
Mean: LSD (K=27.8)	159.9b	181.0ab	179.6ab	188.0a	

Figures in the column and rows followed by the same letter are not significantly different at 5% level of probability. ns = Not significant

cassava were, therefore, related to stage of growth. There was an increase in stem girth as the plants aged (Table 4). Sanchez and Ushara (1980) found that where N and K status of the soils are low, large amount of nutrient elements are needed to boost the stem girth and yield of cassava production since nitrogen has been reported to favour vegetative growth at the initial growth

Branches/plant

The highest mean number of branches/plant (5.67) was obtained from the application of 40kgN/ha and this was not significantly different from what was obtained for all the other levels of N. There was an increase in branches at the location as time progressed from 2 to the 10MAP (Table 5).

Table 4: Effects of nitrogen and potassium fertilizers on stem girth of cassava variety at Igbodo

Levels of Nitrogen (k/ha)	**Levels of Potassium (kg/ha)**				
2MAP	**0**	**20**	**40**	**80**	**Mean: LSD (N=0.91)**
0	3.3	3.5	3.9	3.3	3.5ab
40	2.8	3.3	3.3	2.6	3.0b
80	4.1	4.4	4.1	3.4	4.0a
120	2.5	2.2	3.5	3.2	2.9b
Mean	3.2ns	3.4	3.7	3.1	
4MAP					Mean
0	4.8	5.8	4.1	5.3	5.0ns
40	5.1	4.4	4.8	4.6	4.7
80	4.1	4.3	5.3	4.9	4.6
120	4.5	5.6	5.0	4.9	5.0
Mean	4.6ns	5.0	4.8	5.0	
6MAP					Mean
0	6.2	6.5	6.5	7.0	6.5ns
40	7.2	6.7	6.2	6.8	6.7
80	6.8	6.5	6.8	5.8	6.5
120	5.7	6.3	7.2	6.8	6.6
Mean	6.5ns	6.5	6.7	6.6	
8MAP					Mean
0	8.6	8.4	7.7	9.3	8.5ns
40	7.6	8.5	8.0	9.0	8.3
80	10.3	7.6	8.5	8.3	8.7
120	7.6	7.7	10.0	10.0	8.8
Mean	8.5ns	8.1	8.5	9.2	
10MAP					Mean
0	9.3	9.4	9.2	9.0	9.2ns
40	9.5	8.5	9.3	9.7	9.3
80	8.5	8.1	9.8	9.2	9.0
120	9.5	8.3	10.2	9.0	9.3
Mean: LSD (K=0.90)	9.2ab	8.6b	9.6a	9.2ab	

Figures in the column and rows followed by the same letter are not significantly different at 5% level of probability ns = Not significant

The combined effect of applied nitrogen and potassium fertilizers that gave the best mean number of branches per plant was evaluated. The application of 120kgN/ha and 80kgK/ha gave the best results in terms of yield at the location. Sanchez and Ushara (1980) found that where N and K status of soils are low, large amounts of the elements are needed for proper plant growth and yield. Judging from the results obtained from the present study, the application of 120kgN/ha plus 80kgK/ha effectively enhanced cassava growth. Nitrogen has been reported to favour vegetative growth especially at the initial stage of growth (Udoh *et al.*, 2005).

Cassava Yield

Table 5 presents the effects of N and K on the yield of cassava at the location studied. The application of N resulted in significant ($p<0.05$) differences in fresh tuber yield among the

Table 5: Effect of nitrogen and potassium fertilizer on number of branches of cassava 01/1797 variety at Igbodo.

Levels of Nitrogen (k/ha)	**Levels of Potassium (kg/ha)**				
4MAP	0	20	40	80	**Mean**
0	0.00	0.33	0.00	0.00	0.08ns
40	0.33	0.00	0.00	0.00	0.08
80	0.33	0.00	0.00	0.00	0.08
120	0.00	0.00	0.00	0.00	0.00
Mean	0.17ns	0.08	0.00	0.00	
6MAP					
0	0.67	0.00	0.00	0.00	. 0.17ns
40	1.00	0.33	0.67	0.00	0.50
80	1.33	0.67	0.50	1.00	0.88
120	0.00	1.17	1.00	1.70	0.83
Mean	0.75ns	0.54	0.54	0.54	
8MAP					
0	1.17	1.17	1.67	1.83	1.46ns
40	2.67	2.00	0.83	3.00	2.13
80	4.00	1.00	1.67	0.33	1.75
120	1.83	1.17	3.67	2.17	2.21
Mean	2.42ns	1.33	1.96	1.83	
10MAP					
0	3.00	4.00	4.00	3.00	3.50ns
40	5.67	4.17	3.00	4.83	4.42
80	5.00	1.76	4.83	2.33	3.46
120	4.33	3.67	4.50	4.50	4.26
Mean:	4.50ns	3.38	4.08	3.66	

Figures in the column and rows followed by the same letter are not significantly different at 5% level of probability; ns = Not significant

treatments, with the application of 40kg/N/ha giving the highest fresh tuber yield. The application of varying levels of K also resulted in significant differences among the treatments. A mean fresh tuber weight of 12.48t/ha was obtained from the application of 80kgK/ha. N and K generally improved yields. The interaction between N and K had significant effect on fresh tuber weight at the location, with the combined effects of 120kgN/ha plus 80kgK/ha giving the highest fresh tuber weights of 14.4t/ha.

Table 6: Effect of nitrogen and potassium fertilizer on cassava fresh tuber weight (t/ha)

Levels of Nitrogen (k/ha)	**Levels of Potassium (kg/ha)**				
Fresh Tuber Weight	**0**	**20**	**40**	**80**	**Mean**
0	8.4	9.8	8.9	10.8	9.48c
40	9.2	10.8	9.5	12.8	10.58ab
80	9.6	9.1	9.3	11.9	9.98bc
120	9.7	9.6	10.5	14.4	11.04a
Mean: LSD (N=1.02,K=1.02)	9.23b	9.82b	9.55b	12.48a	
Dry Tuber Weight					
0	2.63	3.43	2.57	3.97	3.15b
40	2.97	3.30	2.77	4.13	3.2ab
80	3.27	2.97	3.20	4.17	3.40b
120	2.97	3.13	4.00	5.13	3.81a
Mean: LSD (N=0.48,K=0.48)	2.96b	3.21b	3.13b	4.35a	
Dry Matter %					
0	30.8	35.2	29.5	36.8	33.1ns
40	32.0	30.5	29.2	32.9	31.2
80	33.6	32.8	34.2	35.0	33.8
120	30.7	32.5	37.9	34.0	33.8
Mean	31.8ns	32.7	32.8	35.2	

Figures in the column and rows followed by the same letter(s) are not significantly different at 5% level of probability. ns = Not Significant

Dry matter yield followed the same general trend obtained for fresh tuber yield. There were significant differences among the treatment means with varying levels of application of either N or K. The highest mean tuber dry matter yields were obtained at the highest levels of application of K (4.35t/ha), N (3.81t/ha) and N x K combination (5.13t/ha).

The highest mean dry matter of 37.9% were obtained from the application of 120kgN/ha + 40kgK/ha. From the relatively moderate mean dry matter contents, the variety could be said to be high in moisture value (over 65% moisture content).

Fresh cassava weight, dry matter and dry matter percentage (%) improved with fertilization in comparison with the control. Nitrogen fertilizer alone did not raise tuber weight, dry matter yield

and dry matter percentage (%) as much as with its combination with potassium fertilizer. The application of 120kgN/ha + 80kgK/ha, gave the best cassava growth, tuber weight, dry matter yield and dry matter percentage (%) at the location for the variety under study. This suggests that high levels of N with a corresponding relatively high level of K interacted effectively, to enhance cassava performance. According to Ayoola (2006), K in the soil is readily released for cassava plant. Odedina (2005) found out that 60kgK/ha and 120kgN/ha gave highest cassava yield among the rates he considered in his study. He also observed that N requirement of cassava can only reduce when P is applied in adequate amount. The influence of higher potassium fertilization in increasing cassava yield was earlier reported by Enwezor *et al*. (1989) and Odiete *et al.* (2006) in soils with medium or low K status.

Polton (1995) observed a significant increase at the rate of 300kg/ha urea fertilizer. Okoruwa (1997) suggested that in low organic matter soils, only high amounts of urea fertilizer can effectively or significantly increase dry matter yield and that in high organic matter soils; its excessive application could enhance vegetative growth at the expense of dry matter yield.

Conclusion

The determination of the effect of nitrogen and potassium fertilizers on the growth and yield of a cassava (*Manihot esculanta* Crantz) variety was the principal objective of this study. The study was conducted at Igbodo in Delta State. Soil analysis to determine the levels of plant nutrients in the soils was carried out. The determination of the effects of nitrogen and potassium on the growth and yield was determined. The application of 120kgN/ha + 80kgK/ha (14.4t/ha) gave the best yields.

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