GLOBAL JOURNAL OF AGRICULTURAL SCIENCES VOL. 4, NO. 2, 2005: 165 - 167
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RESPONSES OF CUCUMBER *(CUCUMIS SATIVA L)* TO NITROGEN IN OBUBRA, CROSS RIVER STATE.

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(Received 7 February, 2005; Revision accepted 1 November, 2005)

ABSTRACT

The responses of Cucumber (*Cucumis sativa L*) to nitrogen was studied in two filed experiments conducted in the teaching and Research farm of the Department of Crop Science, Obubra Campus, Cross River State University of Technology during the 2003 and 2004 cropping seasons. The experiments were laid out in a Randomized Complete Block Design (RCBD) with three replications. Treatments comprised eight levels of Nitrogen (Calcium Ammonium Nitrate 26% of Nitrogen) rates at: 0 kg/ha, 80 kg/ha, 100 kg/ha, 120 kg/ha, 140 kg/ha, 160 kg/ha, 180 kg/ha and 200 kg/ha. Application of nitrogen significantly increased the growth and yield of Cucumber. The successive increase in nitrogen rate increased in vegetative growth (vine length, leaves and number of braches per plant). Nitrogen rates of 180 and 200kg/ha produced significantly higher fruit yield than the lower rates. The use of 180kg/ha of nitrogen gave the highest marketable fruit yield in 2003 and 2004.

KEYWORDS: Cucumber, Nitrogen, growth and yield.

INTRODUCTION

Cucumber (*Cucumis sativa* L) belongs to the Cucumbitaceae family. The fruits are commonly eaten raw, used to prepare salad or prickled for stewed in some tropical countries (Grubben 1998). Cucumber fruit is soft, succulent with high content of vitamins and minerals.Organized research on the growth and yield of cucumber is scanty and literature on the nutritional requirement of the crop in Cross River State is lacking.

Fertilizer application to fruit vegetables is a major condition for high yield especially in south eastern Nigeria due to low fertilizer status of the soils (Ayodele 1993, Olarewaju and Isma 1990). The use of nitrogen fertilizer in the cultivation of Cucumber has been found to increase growth and fruit yield of the crop. Ogunremi (1990) reported increase in cucumber fruit yield due to nitrogen application.

However, the yield of the crop in Cross River State is very low. The reason for the low yield may be attributed to lack of information on the fertilizer requirements of the crop. Hence this study was aimed at determining the nitrogen requirement and to ascertain the adequate level of nitrogen applied as Calcium Ammonium Nitrate fertilizer for optimum yield of Cucumber in Obubra Agro-ecological zone.

MATERIALS AND METHODS

Two field experiments were conducted at the Teaching and Research farm of the Department of Crop Science, Cross River State University of Technology, Obubra Campus, during the 2003 and 2004 cropping seasons. Obubra is located at Latitude 05^0 59" N and Longitude 08° 16"E. The area has mean annual rainfall of 2250 – 2500 mm (CRADP, 1992).

2003 EXPERIMENT

The experiment comprised eight rates of Nitrogen fertilizer (Calcium Ammonium nitrate 26% N) at: 0.0, 80, 100, 120, 140, 160, 180 and 200kg/ha. The experimental design was a Randomized Complete Block Design (RCBD) with three replications. The above treatments were allocated at random to each plot using the Table of Random Numbers. Each plot measured 4 x 5 metres ($20M^2$) with 1.0 metre paths separating each plot from the adjourning plot.

Cucumber seeds were sown at the rate of 3 seeds per hole at a spacing of 0.8 x 1.0 metre within and between the row, respectively in April 2003 and 2004 respectively. Nitrogen was applied as Calcium Ammonium Nitrate 26% N fertilizer at two weeks after planting. The method of application was by localized placement.

Data were collected on the following parameters numbers of leaves, branches, length of the longest vine (cm) per plant, Days to first and 50% flowering, fruit weight per plot and per hectare, and fruit grade (cucumber fruits were graded as marketable when fruit diameter is between 3 and 6 cm, free of any blemish. The changed fruits were recorded as the unmarketable fruits.

2004 EXPERIMENT

The 2004 experiment was repeated as in the 2003 cropping season. The treatments and data collected were done as described in the 2003 Experiment.

STATISTICAL ANALYSIS

All data collected were subjected to statistical analysis using the Analysis of variance (ANOVA) procedure outlined in Steel and Torrie (1980) for randomized complete block design experiments. Separation of treatment means for statistical significance was by the least significant Difference (F – LSD) procedures (Obi 1986).

RESULTS AND DISCUSSION

The results of the study showed that nitrogen treatment significantly increased the growth of cucumber in the two cropping seasons of 2003 and 2004 (Table I). All cases of nitrogen treatment produced profusely higher vegetative growth in cucumber than where nitrogen fertilizer was not applied. Both the number of leaves, branches and vine length per plant increased progressively with increase in nitrogen rates. Throughout the two planting seasons (2003 and 2004), nitrogen rates of 180 and 200kg/ha did not show any significant difference in the number of branches produced per plant. The application of 200kg/ha produced the longest cucumber vine length of 177.5 and 184.2 cm that were better than the lower rates of nitrogen.

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TABLE I: EFFECT OF NITROGEN ON THE GROWTH OF CUCUMBER IN 2003 AND 2004 CROPPING SEASON

Treatment Calcium Ammonium Nitrate ($Ca(NH_4)_2NO_3$) (kg/ha)	2003 Growth Attribute at 40 DAP			2004 Growth Attribute at 40 DAP		
	No. of leaves per plant	No. of branches per plant	length of longest vine (cm)	No. of leaves per plant	No. of branches per plant	length of longest vine (cm)
0.0	37.1	4.3	93.3	40.2	4.2	91.2
80	45.2	5.3	114.5	47.3	6.1	117.6
100	48.3	7.1	122.4	51.1	8.4	126.5
120	55.1	8.3	135.3	58.2	8.4	143.6
140	59.4	8.3	143.2	63.3	9.5	148.4
160	61.2	9.1	158.7	66.2	10.3	154.3
180	65.3	10.1	172.4	69.3	11.1	171.3
200	69.3	10.1	177.5	78.2	11.3	184.2
LSD (0.05)	1.2	0.5	3.3	2.6	0.4	5.1

TABLE 2: EFFECT OF NITROGEN ON THE YIELD OF CUCUMBER IN 2003 AND 2004 CROPPING SEASONS

Treatment Calcium	2003 YIELD ATTRIBUTES						2004 YIELD ATTRIBUTES					
	FLOWERING			MARKETED FRUIT WEIGHT			FLOWERING			MARKETED FRUIT WEIGHT		
Ammonium Nitrate ($Ca(NH_4)_2$ kg/ha) (kg/ha	Days to flowering first	Days to 50% flowering	Fruit diameter (cm)	Weight per fruit (g)	Fruit weight per plot (kg)	Fruit weight per hectare (ton/ha)	Days to flowering first	Days to 50% flowering	Fruit diameter (cm	Weight per fruit (g)	Fruit weight per plot (kg)	Fruit weight per hectare (ton/ha)
0.0	39.3	45.2	10.6	83.8	4.47	1.24	40.2	47.3	10.5	81.7	4.13	1.07
80	37.1	40.3	13.2	153.4	6.38	3.19	38.3	43.1	12.5	147.8	7.11	3.56
100	35.2	39.1	15.3	171.5	7.63	3.82	36.1	40.2	16.1	181.3	8.32	4.16
120	35.1	37.3	15.8	231.7	9.34	4.67	34.2	38.1	16.3	243.6	10.45	5.23
140	34.2	36.2	16.2	252.8	10.57	5.29	33.1	35.2	18.5	311.2	11.34	5.56
160	32.3	36.3	17.3	301.5	11.14	5.57	33.2	35.1	18.7	324.5	12.15	6.08
180	38.3	41.2	19.2	343.4	13.21	6.61	39.1	42.1	20.4	367.4	13.53	6.77
200	40.2	46.3	19.1	395.2	12.53	6.27	41.2	47.3	21.3	408.3	12.42	6.21
LSD (P = 0.5)	0.8	1.5	0.5	35.6	1.0	1.0	0.6	1.2	0.4	47.3	0.7	0.4

Grubben (1998) obtained better vegetable growth in cucumber due to the application of nitrogen fertilizer in the northern Nigeria. Similarly Ibrahim *et al*, (1997) reported increase in vegetative growth in water melon plots treated with nitrogen.

Table 2 shows that the application of nitrogen significantly improved the yield of cucumber. Nitrogen rates of 80 – 160kg/ha enhanced earlier flowering than the higher rates of 180 – 200 kg/ha. The number of days to first and 50% flowering were significantly shorten with the application of 100 –160 kg/ha of nitrogen than the higher rates.

This result is in conformity with the findings of Snapp *et al.* (1998) and Ibrahim *et al* (1997) that observed improved flower production in melon with nitrogen application.

The Marketable fruit yield of cucumber increased with successive increase in nitrogen rate. The use of 180 – 200 kg/ha of nitrogen produced better fruit yield than the other rates.

The application of nitrogen at 180 kg/ha produced the highest marketable fruit yield per plot (13.21 kg /plot and 13.53 kg/plot) in 2003 and 2004 cropping seasons respectively. The same rate of nitrogen gave the best fruit yield per hectare (6.61 ton/ha and 6.77 tons/ha) in the two cropping seasons. The results collaborated with those of (Olageorite *et al* 2002, Alasiri et al. 1995, Olarewaju and Isma 1990) who recorded similar results.

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