

GROWTH AND YIELD RESPONSE OF CUCUMBER (*Cucumis sativus*) TO SPACING IN THE SOUTHERN RAINFOREST OF RIVERS STATE, NIGERIA

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Abstract: The study was conducted to determine the effects of spacing (plant population) of cucumber. The experiment was carried out at the teaching and research farm of the department of Agriculture, Ignatius Ajuru University of Education, Ndele Campus between July and November 2018. The experimental design used was the Completely Randomized Block Design (C.R.D). The different spacing used were 50cm x 50cm, 100cm x50cm and 100cm x100cm, the parameters measured were plant length, number of leaves, leaf area, number of fruits, fruit length and girth, and fruit weight. The result obtained showed that cucumber planted at the spacing of 100cm x 50cm recorded the longest length, highest number of leaves, highest leaf area, and highest total fruit length and weight therefore planting cucumber at the spacing of 100cm x 50cm is recommended for optimum performance and yield of cucumber for farmers in Rivers State.

Keywords: Spacing, Cucumber, Growth, Yield, Rainforest, Nigeria.

I. INTRODUCTION

Cucumber (*Cucumis sativus*) belongs to the family Cucurbitaceae; cucumber generally has large lobed leaves and long vines which can climb by attaching to surface with tendrils. The crop has prickly leaves and produces yellow or orange flowers. The long tap root begins to grow soon after germination and grows to about 2.5cm per day until it extends to 90cm or more into the soil. As the tap root grows, horizontal roots extend from the tap root into 20cm to 25cm down the soil. The numerous horizontal roots grow as long as 17.5cm (Adams et al; 1992).

Cucumber is an annual plant species and is found to be day neutral. Under greenhouse 3 generations/years can be grown. Basically, it is monoecious, trailing or climbing vine with angled, hirsute or rough stems. Leaves are triangular ovate some-what three lobed with mostly acute curves.

II. IMPORTANCE OF CUCUMBER

Cucumber (*Cucumis Sativus*) originated from India. It is a widely cultivated creeping vine which bears edible fruits. Cucumber is an important vegetable and one of the popular members of the Cucurbitaceae family (Lower and Edwards, 1986). It is one of the oldest vegetables cultivated dating 5,000 years ago (Wehner and Guner, 2004). The crop is the fourth most important vegetable after tomatoes, cabbage and onions in Asia (Tatlioglu, 1997). It is also the second most important vegetable crop after tomato in Western Europe (Phu 1997). It is a high nutrient demanding crop which

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performs poorly on nutrient deficient soils leading to low yield. Cucumber is a very good source of vitamins A, C, K and B6, minerals such as potassium, pantothenic acid, magnesium, phosphorus, copper and manganese (Vimala et al, 1999). Okonmah, (2011) reported that the ascorbic acid and caffeic acid contained in cucumber help to reduce skin irritation. The low calorie and high-water content in cucumber aids weight loss. Cucumber contains 95% water. Regular consumption of it assists in eliminating dehydration and removal of other waste products such as bladder or kidney stone through urination.

It contains vitamins such as vitamin B₁, B₂, B₃, B₅, folic acid, calcium, iron and zinc, beta carotene, molybdenum, biotin, silica. Cucumber is also a rich source of triterpene phytonutrients called cucurbitacins (Rios, 2010).

III. PURPOSE AND OBJECTIVES OF STUDY

The realization of the importance of fruits in our diets and the over whelming importance of cucumber and its's health benefits, resulted in an increase in demand for the product in Nigeria. The shortage in supply could be linked to the production problems. Apart from staking, appropriate planting distance is a major factor that can affect its production in the rainforest of Nigeria. This is because there is high rainfall amount and distribution in this agro- vegetative zone and therefore present a different cultural production environment that may support higher planting density or land intensification for production.

The objective of this study was there the investigate the effect of spacing on the growth and yield of cucumber in the tropical rainforest of Rivers State, Nigeria.

IV. MATERIALS AND METHODS

A. Experimental Site

The study was carried out at the Teaching and Research farm of the Department of Agricultural Science, Ignatius Ajuru University of Education, Ndele campus in Rivers State between July and November 2018. The soil texture of the experimental plot is sandy loam in a tropical rainforest area, which is exposed to adequate sunshine for optimum productivity.

B. Field Mapping and Land Preparation

A land area measuring 15 x 12m was mapped out at the research farm and was manually cleared using cutlass. The land was properly tilled using spade and hoe and mapped into nine plots measuring 4 x 3m.

C. Experimental Design and Data Collection

The treatment of the study was cucumber spacing of 50 cm by 50 cm; 100 com by 50 cm; and 100 cm by 100cm. The experimental design used was the Completely Randomized Block Design (CRD) with three treatments, each replicated three times giving a total of 9 replications.

D. Parameters Measured

The following vegetative and reproductive parameters were measured, and data collected.

Vine length, Number of leaves, Leaf Area, Weight of fruits, Fruit Length and Girth.

E. Data Analysis

The data was analyzed by Analysis of variance of the completely randomized design at 5% level of significance, using the SPSS Statistical software.

V. RESULTS AND DISCUSSION

A. Effect of spacing on cucumber growth rate.

The effect of spacing on growth rate (plant length) in table:1. The response to spacing show that closely spaced cucumber crop grew tallest. Analysis of variance of the complete randomized design showed that the variation in plant length observed was significant at P= 0.5. this indicate that the spacing treatment used was responsible for the different growth rate observed. This is in line with Ansa (2016) who obtained high growth rate in closely spaced groundnut. The fact that

cucumber crops spaced at 100cm x 50cm recorded the highest growth rate is supported by Ijaz *et al*, (2007) who reported highest vine length in cucumber spaced at 80cm by 40 cm. This indicating that wider interrow spacing has advantage over closer inter row crops with same intra row spacing.

B. Effect of spacing on vegetative characteristics of cucumber.

It was observed that number of leaves, leaf Area and total Leaf area increased with wider inter row spacing. Among plants with same inter row spacing, those with narrower intra row spacing had higher values in the above-mentioned parameter. Hence plants grown at 100 cm x 50 cm had the highest values of number of leaves, Leaf Area and Total Leaf Area. This was followed by those planted at 100 cm x 100 cm. the least was produced by cucumber crops planted at 50 cm x 50 cm. These findings are supported by Streck *et al*, (2014) who reported that final leaf size and lateral shoot growth of cassava increased as planting densities decreased (ie wider spacing). The Fcal * show that the spacing significantly produced the variations in the vegetative values observed.

Table 1: Effects of Spacing on Cucumber Plant Length (Cm)

SPACING (CM)	1 WAP	2 WAP	3 WAP	4 WAP	5 WAP
50 x 50 cm	3.75 ^a	11.0 ^a	75.18 ^b	85.28 ^b	114.25 ^a
100 x 50 cm	3.40 ^a	6.50 ^b	85.50 ^a	96.60 ^a	175.08 ^a
100 x 100 cm	2.50 ^b	5.50 ^b	75.33 ^b	86.31 ^b	97.50 ^b
S.E.	0.30	0.882	1.471	1.016	1.28

Means followed by same letter in each column are not significantly different at P < .05 by Duncan multiple range test.

Table 2: Effect of Spacing on Vegetative Characteristics of Cucumber

SPACING	Number of leaves	Leaf Area (cm ³)	Total Leaf Area (cm ³)
50 x 50 cm	36.00 ^a	212 ^a	7,632 ^a
100 x 50 cm	67.50 ^a	280.5 ^c	18,933.8 ^a
100 x 100 cm	72.17 ^b	2.55 ^b	18,4033 ^b
S.E.	6.172	19.78	19.90

Means followed by same letter in each column are not significantly different at P < .05 by Duncan multiple range test.

Table 3: Effect of Spacing on Reproductive Yield of Cucumber

SPACING (CM)	Number of fruits	Fruit length cm	Fruit girth cm	Fruit weight g
50 x 50 cm	30.0 ^c	16.50 ^b	21 ^a	700 ^c
100 x 50 cm	27.67 ^b	16.24 ^b	21 ^a	866.7 ^a
100 x 100 cm	20.00 ^a	14.00 ^a	20 ^a	800 ^b
S.E.	0.382	0.382	0.420	562

Means followed by same letter in each column are not significantly different at P < .05 by Duncan multiple range test.

C. Effect of spacing on cucumber yield.

The influence of spacing on yield of cucumber shown in table 3 indicate that spacing had significant effect on number of fruits, fruit length, fruit girth and fruit weight. Though the most closely spaced cucumber crops at 50 cm by 50 cm produced the highest number of fruits, the biggest sizes were significantly produced by the widest inter row crops, hence cucumber plant at 100cm x 50 cm recorded the highest values in fruit length, girth and fruit weight. This is supported by the report of (Ijaz et al 2007) that cucumber grown at wider inter row spacing produced bigger and weightier fruits.

VI. CONCLUSIONS

The effect of spacing on the performance of cucumber was investigated in the rainforest of Nigeria. Spacings evaluated were 50 cm x 50 cm; 100 cm x 100 cm and 100c cm x 100 cm. Though plants spaced at 100 cm x 100 cm produced the highest number of leaves and those spaced at 50 cm x 50 cm had the longest cucumber fruits, the cucumber plants planted at the spacing of 100 cm x 100 cm had best values in terms of plant length, leaf size, number of fruits, fruit girth and fruit weight. Planting cucumber at a spacing of 100 cm by 100 cm is hereby recommended for production in the rainforest of Rivers state, Nigeria.

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