GROWTH, YIELD ATTRIBUTES AND CONSUMERS PREFERENCE OF POINSETT VARIETY OF CUCUMBER (*Cucumis Sativus L.*) TO RATE OF COMMERCIAL ORGANIC FERTILIZER APPLICATION

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ABSTRACT
Appropriate rate of organic fertilizer is one of the major factors that affect growth and yield of cucumber in Nigeria. The experiment was conducted between April and July, 2018 at the Federal University of Agriculture, Abeokuta, Nigeria in the tropical rainforest-savannah transition zone of south-western Nigeria, to determine the optimum rate of a commercially produced organic fertilizer on growth, yield and sensory quality variables of poinsett cucumber fruits. There were four organic manure rate treatments comprising 0, 5, 10, and 15 tha^{-1} of Gateway Organic Fertilizer (GOF) brand. Treatments were arranged in a Randomized Complete Block Design (RCBD) with 4 replicates. Fertilizers were applied at two weeks before planting as a single dose of GOF containing composted city refuse, poultry manure and cow dung. Data collected on growth and yield parameters were subjected to analysis of variance using GENSTAT discovery. Fruit harvested from each treatment were assessed for the consumer preference of poinsett cucumber at different rates using structured questionnaire at the end of the experiment based on 5 point hedonic scale. Gateway Organic Fertilizer application had positive influence on growth, fruit yield and consumer preference of poinsett cucumber, irrespective of the rates of fertilizer applied, fertilized Poinsett cucumber variety had significant longer vines, larger leaves, wider leaf area and more fruit yield than unfertilized cucumber. Hence, Poinsett cucumber variety fertilized with 5tha^{-1} GOF was accepted than unfertilized poinsett.

Keywords: Poinsett cucumber, Gateway organic fertilizer, Fruit Yield and Consumer prefer

INTRODUCTION
Soil nutrient status is a major determinant factor in achieving higher productivity and quality of crops. Fertile soils are used for the production of cucumber as infertile soils results in lower quality of fruits which are often rejected by consumers, thereby reducing farmers' income (Ikenganyia *et al*., 2015). Health risks involved in food production and environmental pollution caused by use and misuse of chemical fertilizer necessitate the use of organic fertilizers for production of high quality, nutritious food that contributes to preventive health care and well-being of people.

Problems involving in disposing and handling of animal waste in Nigeria has necessitated various State Governments to other cost effective alternatives as commercial organic fertilizer for use in agriculture. With the afore-mentioned facts, 'Sunshine and Pace- setter organic fertilizer were produced in Ondo and Oyo State respectively. However, one of the most recent ones is the 'Gateway organic fertilizer' produced in Ogun State.

Appropriate rate of fertilizer application has significant effects on nutrient amounts supplied for optimum crop yield and quality. Cucumber (*Cucumis sativus* L.) used as the test crop in this study is one of the most important vegetable crops that offers numerous health benefits when consumed fresh, such as significant anti-inflammatory, antioxidant, and anti-cancer properties (Mukherjee *et al.*, 2013)). In Nigeria, cultivation of cucumber is gaining more popularity, presumably due to their high nutritional and financial worth. (Orluchukwu and Amadi.2022)

The quality of fruits can be described by four different attributes: physical appearance, taste, texture and nutritional value (Barret *et al*. 2010). These attributes are very crucial to determine fruit quality and overall consumer perception. It may be evaluated by either sensory or instrumental techniques. Consumer preferences focus on

consumer choices that results in different alternatives such as happiness, utility or satisfaction and this has a great influence in consumers purchasing decision.
The aim of this study was to determine the efficacy of the 'Gateway' organic fertilizer (GOF) on growth, yield attributes and consumer preference of Poinsett cucumber variety.

MATERIALS AND METHODS

The experiments was conducted between April and July 2018, at the Organic farm of the Federal University of Agriculture, Abeokuta. Based on good culinary trials, the Poinsett cultivars of cucumber was used for the experiment and is an open pollinated variety that is resistant to angular leaf spot, anthracnose, downy mildew and powdery mildew). The field was demarcated into 48 plots, and individual plots measured 3.0 x 2.0 m separated by 1.0 m walking path. Two seeds of cucumber were planted on the beds with a spacing of 1.0 m x 0.5 m. GOF containing composted poultry manure + cow dung at equal ratio by volume was applied in a single dose at 2 weeks before planting at the rate of 5, 10 and 15 tha^{-1}, while unfertilized plots served as control. The fertilizer rates were assigned following a randomized complete block design (RCBD) with four replicates. Data collection commenced at three weeks after planting till the end of the experiment. The data were collected on under listed parameters:

Growth parameters

Vine length (cm), number of leaves and leaf area (cm^2) were taken and recorded weekly**.**
(i)Vine length was determined by measuring the length of the main vine of the data plant in each treatment, with a measuring tape from soil mark to growing point.
(ii) Number of leaves was determined by counting the numbers of leaves on each plant.
(iii) Leaf area was determined non-destructively using equation:
$Y= 12.9 X - 54.31$ (r^2 =0.97) where Y = Leaf area ($cm^{2)}$ and X = lamina breadth (cm)

Yield attributes of cucumber

(i) Fruit yield (t/ha). This was estimated by weighing all the fruits harvested from each plot which was then estrapolated to tonnes per hectare.
(ii) Fruit length (cm): This was estimated by measuring the cucumber fruit from the apex to the base using measuring tape on five randomly sampled fruits and estimating the average.
(iii) Fruit circumference (cm): This was estimated by measuring the width of the fruit using measuring tape on five sample fruits selection with the average estimated.

Consumers' Preference Test

It was conducted at Sensory Evaluation Laboratory in the Department of Food Science and Technology, Federal University of Agriculture, Abeokuta. Cucumber fruits from four treatments at the end of the experiment were washed, sliced and arranged in four plates. To avoid bias panellist preference, the treatments were tagged with different codes representing the treatments. Thirty untrained panellists were used for this aforementioned test. Biscuits and water were provided for the panelist to rinse their mouth after each sample assessment. Panellists rated each sample using a 5 point Hedonic scale (5- Like extremely, 4- Like moderately, 3- Neutral, 2- Dislike moderately, 1- Dislike extremely). Questionnaires were designed to determine preference of the four sample based on the five sensory attributes.

(i) Physical appearance.
(ii) Texture (hand feel).
(iii) Taste.
(iv) Odour.
(v) Overall acceptability.

The data collected were subjected to analysis of variance (ANOVA) using GENSTAT discovery(12th edition) . Treatment means were separated by Least Significant Difference (LSD) 5% probability level.

RESULTS

The soil used for this study was sandy loam, with low organic matter, total N, available P as well as exchangeable bases (Table 1).

Table 1: **Gateway organic fertilizer, chemical composition, pre cropping physical and chemical properties of the soil at the experimental site.**

Parameter	Pre cropping soil analysis	GOF Analysis
Chemical Composition		
pH	7.20	6.50
O.M (%)	4.32	12.32
Total N (%)	0.15	2.14
Avail. P (mg kg $^{-1}$)	12.58	43.12
Exch. Bases		
Mg (cmol kg $^{-1}$)	0.37	2.86
K (cmol kg $^{-1}$)	0.61	1.50
Na (cmol kg $^{-1}$)	0.52	1.48
Ca (cmol kg $^{-1}$)	0.21	6.10
Zn (mg kg-^{1})	0.10	2.11
Fe (mg kg-^{1})	0.41	2.02
Physical		
Sand g kg-^{1}	526.70	
Slit g kg-^{1}	310.00	
Clay g kg-^{1}	160.00	
Soil Textural Class	**Sandy loam**	

Vegetative growth

Vine -length

Application of Gateway Organic Fertilizer (GOF) rates significantly increased vine length of poinsett cucumber variety from 3 to 8WAP. Vine length of poinsett cucumber variety from all the fertilizer rates were significantly longer than unfertilized plots. Application of 15 tha^{-1}gave the longest vines of 162cm which was similar with 153cm and 152cm obtained from 10 t.ha^{-1} and 5 t.ha^{-1} respectively (Fig 1).

Number of leaves

Application of GOF rates increased leaf production between 3 and 6 WAP followed by declination around the 8 WAP (Fig, 2). At 3 to 8 WAP, the number of leaves produced by cucumber under GOF rates were significantly higher than control (unfertilized). The highest number of leaves (35) was found in application of 15 t.ha^{-1} which was similar with 34 leaves obtained from 10 t.ha and 5 t.ha^{-1} respectively.

Leaf area

Gateway Organic Fertilizer (GOF) rates increased leaf area from 3 to 8 WAP, irrespective of the rates of fertilizer applied, leaf area from fertilized plants were significantly larger than unfertilized plants. The largest leaf area (248cm^2) was found in application of 15 t.ha^{-1} and did not significantly differ from 243 cm^2 and 240 cm^2 found in 10 t.ha or 5 t.ha^{-1} application respectively (Fig.3).

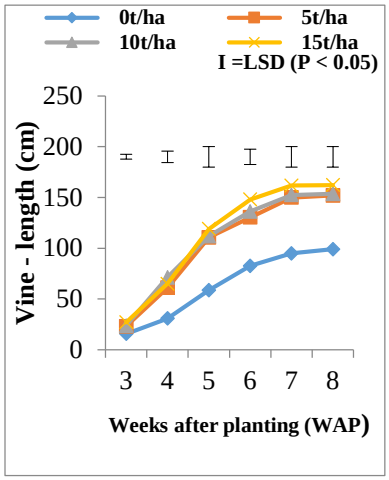

Fig 1: Effect of Gateway Organic Fertilizer on vine- length of Poinsett cucumber variety

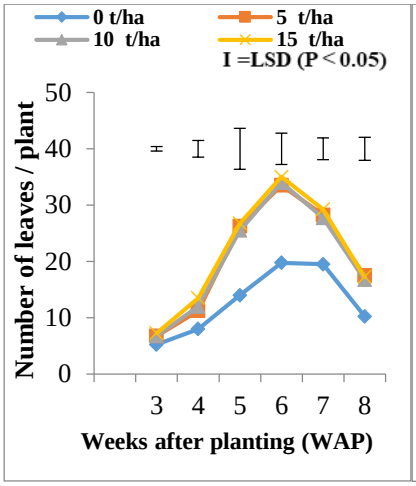

Fig 2: Effect of Gateway Organic Fertilizer on leaf production of Poinsett cucumber variety

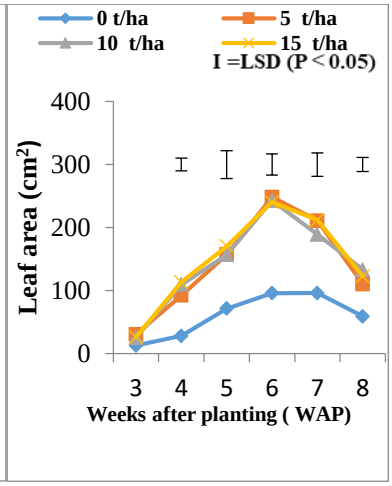

Fig 3: Effect of GOF on Leaf area of Poinsett cucumber variety.

YIELD ATTRIBUTES

Fruit Yield

Gateway Organic Fertilizer rates had significant effect on fruit yield. Fertilized poinsett cucumber variety produced significantly more fruits than unfertilized plants, but the effects of 5, 10 and 15 $t.ha^{-1}$ applications on fruit production did not significantly differ. ((Table2

Fruit Length and Circumference

Gateway Organic fertilizer rate significantly influenced fruit length and circumference of cucumber. Fertilized cucumber produced significantly longer and bigger fruits than control. Longest fruits of 20.5 cm was produced from 15 $t.ha^{-1}$ application which was similar to 19.3cm FL and18.7 cm FL produced from 10 and 5tha^{-1} application. (Table2)

Table 2: Effect of GOF on Fruit yield, Fruit Length and Fruit Circumferance

Rate of application (t/ha)	Fruit yield (t/ha)	Fruit Length (cm)	Fruit circumference (cm)
0	28.3	16.3	8.5
5	58.3	18.7	12.1
10	61.0	19.3	13.0
15	63.3	20.5	13.0
LSD (P < 0.05)	3.4	2.2	5.2

Gateway organic fertilizer significantly affected the rating of cucumber fruit for appearance, texture and acceptability. Preference for Poinsett was similar for all GOF rates ,irrespective of GOF application rate , consumer preffered fertilised plant than unfertilised plant in terms of appearance, texture and acceptability. However, there was no significant differences existed with both fertilised and unfertilized plant in terms of odour and taste.(Table 3)

Table 3: Consumers Preference Scores on Sensory Parameters of cucumber as influenced by rate of GOF application

GOF Rate (t/ha)	Appearance	Texture	Taste	Odour	Overall Acceptability
0	3.20b	3.23a	3.06b	3.24a	3.37b
5	3.69a	3.53a	3.54a	3.49a	3.83a
10	3.66a	3.18a	3.47a	3.24a	3.7ab
15	3.58a	3.41a	3.46a	3.27a	3.63ab

DISCUSSION

The results indicate that the Gateway' organic fertilizer (GOF) has potential for the cultivation of cucumber. The superiority of fertilizer -treated cucumber plants over the control in growth and yield indicated that the control plants were in short supply of nutrients.

The higher fruit yield of cucumber obtained from fertilized plots suggests that cucumber uses nutrients more efficiently when sourced from organic fertilizers and this was in agreement with Jao *et al.* (2018) , it might be due to the slow release properties of GOF that coincides with plant need for fruit formation. The absence of significant effects of GOF at all rates of 5, 10 and15t/ha indicates that for the soils used, the nutrient content of GOF at 5t/ha was optimal for cucumber production.

However, the short fruit length and circumference from the control plots might be due to low nutritional status of the soil used for the experiment. A similar trend was observed in the reports of Hamma (2012) that the higher the quantity of nutrients supplied, the higher the increase in fruit girth of cucumber. Since the effect of 5t, 10t and 15t GOF/ ha did not differ significantly from one another , it is recommended that 5t GOF could be used for the production of cucumber in south western Nigeria as this will reduce cost of production without impairing fruit yield.

This study also showed that appearance, taste and even overall consumer acceptance rating was highest for fertilized Poinsett, irrespective of the rate of GOF application, this corroborates the reports of Makinde *et al.* (2024) and Milosevic *et al.* (2022). This confirms the benefit of Gateway organic fertilizer in cucumber production and not just on vegetative growth and yield, also for consumer preference enhancement. This further strengthen the choice of Poinsett variety under 5 $t.ha^{-1}$ GOF application as the GOF rate recommended for cucumber cultivation in south western Nigeria.

CONCLUSIONS AND RECCOMENDATION

- ✓ This study has shown that Gateway Organic Fertilizer (GOF) application had positive influence on the growth, fruit yield and consumers preference of cucumber.
- ✓ Application of 5 $t.ha^{-1}$ GOF was optimum for growth and yield of cucumber in addition to acceptable quality parameters by consumers.
- ✓ To verify the potency of Gateway Organic Fertilizer using other locations, other varieties and other horticultural crops.

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