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Comparative Effects of Organic Manure on the Growth of Three Varieties of *Cucumis sativus L.*

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ABSTRACT

The growth of three varieties of Cucumber in response to the effects of organic manure was compared at the Biology Demonstration Garden of Alvan Ikoku Federal University of Education, Owerri, Imo State, Nigeria. Three bags of organic manure weighing 25kg were applied to the three-farm bed, each prepared before planting the seeds. The organic manure was reapplied three weeks before the growth. A comparative study of seed germination was conducted; the experiment was conducted for eight weeks. The growth characters increased by the organic manure are the vine length, number of leaves, length and width of leaves, as well as number of flowers per ten plants randomly selected from each farm bed of the cucumber varieties: Dakar variety (Bed A), Smart variety (Bed B), and Giant variety (Bed C). The parameters of the growth morphological characters were measured using a flexible tape and compared. There was a significant influence from the application of organic manure. The highest in every character was the Giant cucumber var, followed by the Smart var., and the Dakar var. was the lowest.

Keywords: *Cucumber, organic manure, Cucumis sativus L., morphology, characters.*

INTRODUCTION

The cucumber (*Cucumber sativus* L) plant is a member of Cucurbitaceae family, widely cultivated for its edible fruits. In this family, different types of melon, such as bitter and squashed ones, are also included. There are about 825 species in this family, with 118 genera, and the *Cucumis sativus*, known as the garden species, originated from Asia, and

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is the most widely cultivated species of cucumber, characterised by its long and slender fruits. Cucumber is one of the oldest vegetables cultivated by man, with historical records dating back 5,000 years (Wehner and Gunner, 2004). It 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 the tomato in Western Europe (Phu, 1997). In tropical Africa, its place has not been ranked because of limited use. Other species of Cucumis are: *C. melon* (musk melon), originated from Africa and Asia; *C. metuliferus* (horned cucumber) from Africa; *C. angaria* (West Indian guard) from Africa and Asia; *C. hirsutus* (Hairy cucumber) from Asia; *C. prophetarum* (Prophets cucumber) from the Middle East; *C. dispaceus* (Teasel cucumber) from Africa.

The cucumber plant is known for its large leaves and curling tendrils. The leaves are arranged on the vines, and the flowers are yellow, about 4cm in diameter. The fruits of the cucumber are cylindrically shaped, round at both ends, with a length ranging from 6 to 10cm. The cucumber is an annual plant that survives one growing season. The vine may reach up to 5m in length. Cucumbers are a general fruit, but are also used as a fresh vegetable and consumed fresh in salads. Cucumis sativus is an important vegetable crop with chromosome number 2n = 14 (Pal *et al.*, 2020).

Dakar FI Hybrid (Variety) is a superb quality cucumber fruit that is long, ribbed, and free from bitterness, perfect for late planting and thrives in tropical wet climates with a maturity period of 55 days, suitable for both indoor and outdoor gardening, ensuring a bountiful harvest. They are high-quality cucumbers for early cropping.

Africa Giant F1 Hybrid (variety: CU99) is the largest variety of cucumber in Southern Nigeria with the highest yielding fruit size bred by Chia-Thia Agro, a Thailand-based seed breeding firm located in Owerri, Imo State. It has a gynoecious flowering habit, producing more female flowers than male flowers. This variety matures in 45-50 days and is resistant to mosaic virus diseases as well as to some diseases and pests. The leaves are broad, measuring approximately 25-30 cm in diameter and 5-6 cm in width, with a weight of about 350-500g. The fruits are pale green in colour, cylindrical, and uniform in shape. The variety is well known for its adaptation to various climatic conditions, quick maturity rate, producing excellent yields that are tolerant to heat, diseases, and pests, and of course, boosting farmers' revenue.

Smart variety is mostly desired by residents of some parts of the South-Eastern (Aba) and South-South (River State) regions of Nigeria, due to their stout and short features. They can adapt to any climatic situation and mature quickly with outstanding yields, and are very tolerant to heat, diseases and pests. The seed size type is Asian-medium that germinates within 3-4 days and matures between 27-29 days after sowing. The first harvest is between 39 and 40 days, the fruit is green in colour, with about 4 by 14 cm, weighing about 150g to 170g.

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As a member of the Cucurbitaceae family of plants, cucumbers contain high levels of bitter-tasting nutrients known as cucurbitacin, which prevent cancer. The fibre found in cucumbers can help to manage cholesterol and prevent related cardiovascular problems, according to the American Heart Association. Cucumbers play a role in diabetes preventing and controlling diabetes by containing substances which help to lower blood sugar and stop blood glucose from rising too high. One theory is that the cucurbitacins in cucumber help regulate insulin release and the metabolism of hepatic glycogen, a key hormone in the processing of blood sugar (Mallick, 2022). Cucumbers are a good source of potassium, magnesium, and dietary fibre. These nutrients are known to lower blood pressure, thus reducing the risk of heart disease. Research has also proved that regular consumption of cucumber juice helps reduce blood pressure in elderly people with hypertension. Cucumber acts as a coolant for our stomach. The soluble fibre in cucumbers helps in slowing down digestion. Also, the high water content in cucumber makes our stools soft, prevents constipation, and keeps our bowel movements regular (Chakraborty and Rayalu, 2021). They are used as culinary tools in salad making, sandwiches, snacks, pickling, and juicing. In health and wellness, cucumbers are made up of about 96% water, making them an excellent source of hydration. They contain anti-inflammatory properties, antioxidants, and help in digestion. Cucumbers are useful in skin care and beauty, such as face masks, eye care, and skin toner.

Organic manure has been used as a soil conditioner since ancient times, and its benefits have not been fully harnessed due to the large quantities required to satisfy the nutritional needs of crops (Makinde *et al*., 2007). The need for renewable forms of energy and reduced cost of crop fertilisation has revived the use of organic manure (Ayoola and Adenirum, 2006). Improvement in environmental conditions and public health are vital reasons for advocating increased use of organic materials (Ojenigi, 2008; Vleic, 2001). However, because organic manure is bulky, the cost of transportation and handling poses a challenge to its use by peasant farmers. Organic manures release nutrients slowly and steadily activate soil microbial biomass (Belay *et al.,* 2001). Organic manure can sustain a cropping system, improve nutrient recycling and improve soil physical attributes (El-Shakweer *et al.,* 1998).

This study was therefore conducted to investigate the effects of organic manure on the growth parameters of three Nigerian varieties of the cucumber species.

MATERIALS AND METHOD

A field experiment was conducted at the Biology Demonstration Garden of Alvan Ikoku Federal University of Education, Owerri, Imo State, Nigeria, located on the grounds of old Shell Camp Owerri, extended across Orlu road on the Banks of the Nworie River at Lat $5^{0}30^{1}1.07413$ 'N and $7^{0}7^{1}26.96250$ 'E. The experiment commenced on the 15th of

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August, 2024, by planting two seeds of each variety of the cucumber, each on Bed A, Bed B, and Bed C, respectively, at a spacing of 75 by 75cm planting distance, and the seeds germinated after 3-5days. This is the current recommended distance of planting cucumbers in Nigeria. The organic bags weighing 25kg were uniformly spread on each of the beds before planting the seeds. Manual weeding was carried out 3 and 5 weeks after planting. Insect pests were controlled with lambda-cyhalothrin as Karate (0.5L per bed) at biweekly intervals for effective insect control.

The growth parameters were assessed at 4, 6, and 8 weeks after planting. Ten stands of the cucumbers were randomly selected from each of three beds, making a total of 30 stands of cucumber vines. The vine length, leaf length, and leaf width were measured using a flexible tape rule. The number of leaves was assessed by visual counting of the green leaves as well as the number of flowers. This methodology aligns with the work of Eifediyi and Remison (2010) on the growth and yield of cucumber (*Cucumis sativus* L.) as influenced by farmyard manure and inorganic fertiliser. The morphological characters were measured and recorded. The data were presented in tables and charts.

RESULTS AND DISCUSSION

Table 1: The mean value of the vine length of the three cucumber varieties

Plant Stands	Dakar (Cm)	Giant (Cm)	Smart (Cm)
1	33.13	97.73	56.98
2	51.08	65.75	68.95
3	53.58	59.80	49.18
4	48.25	54.73	50.60
5	47.65	65.68	35.63
6	54.48	36.78	35.78
7	42.28	57.03	56.50
8	51.48	37.23	31.80
9	50.23	49.90	49.25
10	62.01	84.70	47.65
$\sum X$	493.175	609.3	446.675
$\sum x/n$	49.3	60.9	44.7

The vine length increased significantly in Giant varieties (61cm) on average in length with the application of organic manure, as shown in Table 1 and Fig. 1. The second was the Dakar varieties, 49.3 cm, and the lowest vine length was recorded in the Smart variety with an average vine length of 45cm. The application of organic manure on cucumber varieties had a significant effect on the growth length of the vine of the cucumber varieties (Fig.1).

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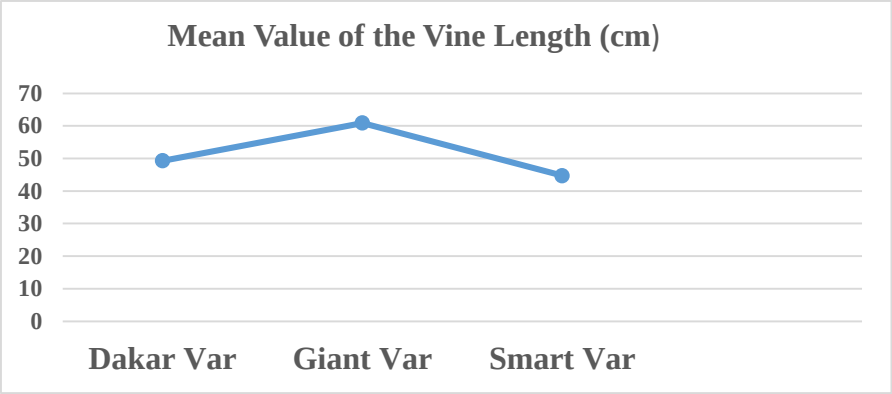

Fig. 1: Line Graph showing the mean value of the vine length.

Table 2: Average Leaf length of the three cucumber varieties.

Plant Stands	Dakar (Cm)	Giant (Cm)	Smart (Cm)
1	7.85	11.03	10.25
2	10.80	13.05	10.65
3	10.93	11.73	11.53
4	10.50	11.00	9.38
5	11.25	11.15	9.68
6	9.75	8.73	10.25
7	9.80	9.78	11.58
8	10.13	9.33	9.23
9	9.78	11.45	11.50
10	9.28	11.98	11.00
∑X	100.05	109.2	105.03
∑x/n	10	10.9	10.5

The values of the leaf length of the three varieties of cucumber plant were insignificantly influenced by the application of the organic manure, as shown in Table 2. The highest average leaf length was observed in Giant cucumber varieties with 10.9cm, followed by Smart varieties with 10.5cm, and the lowest was in Dakar varieties with 10.0cm average leaf length (Fig. 2).

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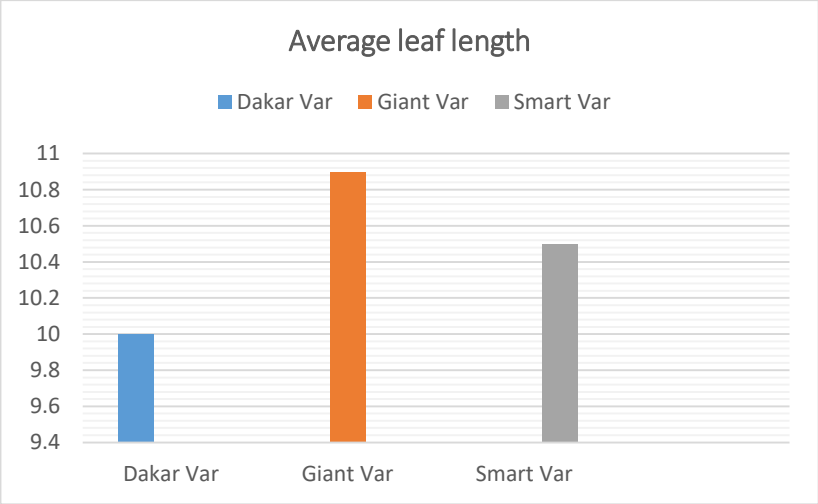

Fig 2: The Bar Chart showing the average value of the leaf length of the three Cucumber varieties.

Table 3: The Average leaf width of the three Cucumber varieties

Plant Stands	Dakar (Cm)	Giant (Cm)	Smart (Cm)
1	7.7	11.63	9.88
2	10.6	10.98	9.63
3	9.9	11.08	10.43
4	10.3	9.53	10.8
5	9.1	10.48	9.75
6	9.4	8.33	9.88
7	9.5	9.28	10.58
8	10.6	8.8	8.75
9	8.5	10.53	10.13
10	8.8	11.23	11.13
∑X	94.35	101.83	100.93
∑x/n	9.4	10.2	10.1

Table 3 shows the average leaf width of the three cucumber varieties after the application of organic manure, the highest was observed in Giant Var with an average leaf width of 10.2cm, Smart Var 10.1cm and the lowest recorded in Dakar Var of cucumber (Fig. 3).

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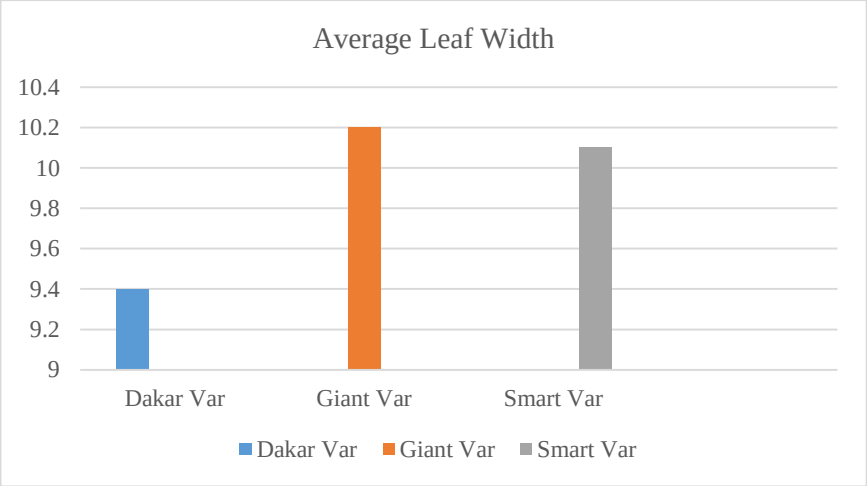

Table 4: The Average number of Leaves of the three cucumber varieties

Plant Stands	**Dakar (Cm)**	**Giant (Cm)**	**Smart (Cm)**
1	6	8	8
2	8	8	11
3	8	8	8
4	7	7	7
5	8	8	6
6	8	7	12
7	7	7	6
8	9	7	5
9	8	7	6
10	10	8	7
∑X	79	75	77
∑x/n	8.0	8	8

The mean number of leaves on the three varieties of cucumber was significantly different by the application of organic manure as shown in Table 4; the highest number of leaves was observed in Dakar Var with an average leaf number of 7.8, Smart Var 7.6 and the lowest were recorded in Giant Var with 7.2 number of leaves (Fig. 4).

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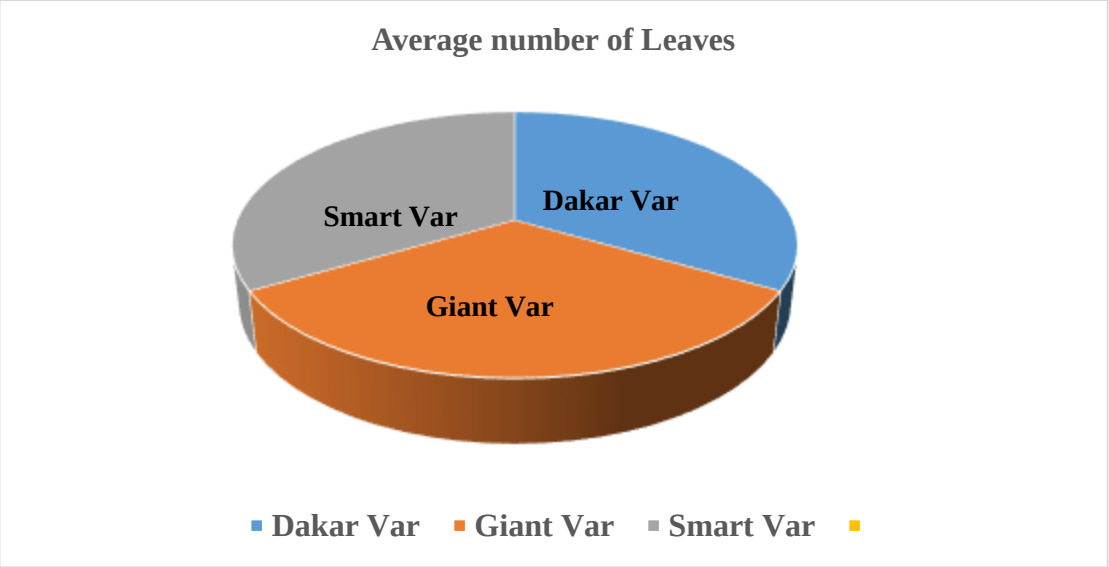

Fig 4: A pie Chart showing the average number of leaves of the three cucumber varieties.

Table 5: Average number of flowers of the three varieties of cucumber.

Plant Stands	Dakar (Cm)	Giant (Cm)	Smart (Cm)
1	5	14	7
2	7	14	10
3	8	13	9
4	4	12	10
5	10	13	5
6	9	12	10
7	3	12	5
8	13	13	3
9	9	13	8
10	18	14	6
∑X	86	130	73
∑x/n	8.6	13	7.3

The average number of flowers of the three cucumber varieties showed a significant influence of the application of organic manure, as shown in Table 5. The highest average number of flowers was recorded in Giant Var (13), followed by the Dakar Var (8.6), and the lowest was Smart (7.3), as shown in Fig. 5.

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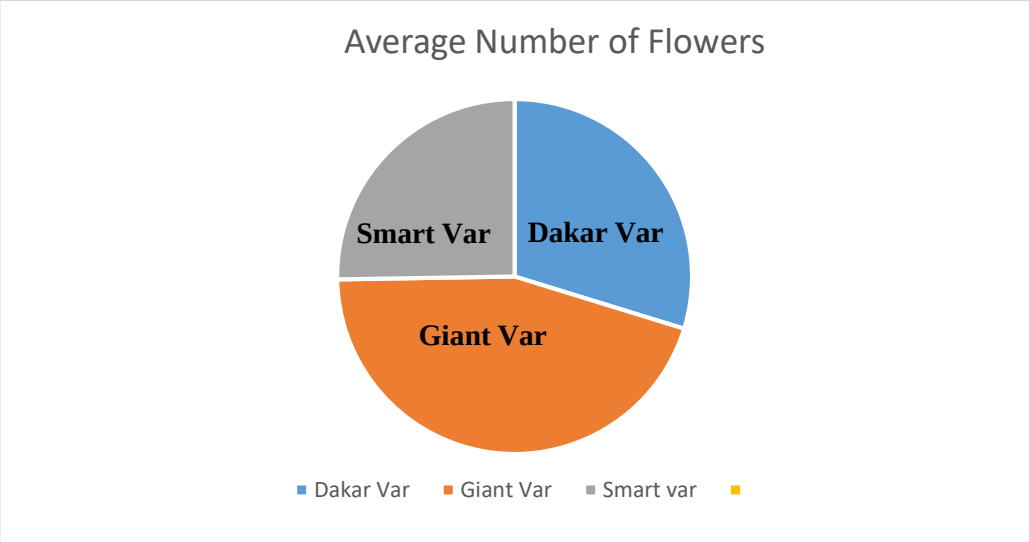

Fig 5: Pie Chart showing the average number of flowers of the three varieties of cucumber.

The organic manure applied was just enough to satisfy the nutritional requirements of the three varieties of cucumber. This was evident in the growth parameters measured after the application of the organic manure. This experiment agreed with the report of Murimira and Circhman (1993), who found an increased yield of crops through the combination of farmyard manure and inorganic fertiliser and the findings of Titiloye (1982), who reported that the best way to increase maize yield was by the combination of organic wastes and inorganic fertilisers. The application of organic manure increased the water-holding capacity of soil and reduced the incidence of erosion, thereby making more nutrients available to the soil (Costa *et al.*, 1991). The highest grain yield of rice has been obtained when farmyard manure was applied at 10 t/ha combined with 120: 60: 45 N. P_2O_5 and K_2O ha^{-1} (Satyanaray *et al.*, 2002). Bayu *et al*. (2006) also reported that Sorghum yield increased when 5t/ha of farmyard manure was combined with 20kg N +10kg P ha^{-1}. Eifediyi and Remision (2010) reported cucumber yields compared to farmyard manure and fertiliser alone, especially at higher rates of application. Makinde *et al*. (2007) reported an increase in melon growth and an optimum yield with organo-mineral fertiliser at t/ha or the application of inorganic fertiliser at 41kg N + 20kg P.

CONCLUSION

This study was conducted to investigate the effects of organic manure on the growth parameters of three Nigerian varieties of the cucumber species. The significant increase in growth parameters and morphological features of the three varieties of cucumbers investigated could be attributed to the fact that nutrients were applied to the soil. This study has clearly shown that the growth yield and rate of the three Cucumber varieties can be promoted by the application of organic manure, and farmers will be encouraged to apply organic manure in their cropping practices for healthy yields of Cucumber plants.

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