Evaluation of Cucumber (*Cucumis sativus* L.) Genotypes for Growth and Yield in Ifite-Ogwari, Southeastern Nigeria

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ABSTRACT

The quest for increased cucumber productivity in Nigeria's diverse agro-ecological zones necessitates the continuous evaluation of promising genotypes. This study delves into the yield potential of five cucumber genotypes (Oliveira Bold F1, Amarisa Super F1, Gorald, CU99, and Darina) cultivated in Ifite-Ogwari, Anambra State. Conducted under a Randomized Complete Block Design with three replications, the experiment meticulously tracked various parameters including flower initiation, leaf morphology (number and width), vine length, and most importantly, yield components (fruit circumference, length, weight, and number). The findings unveiled significant variations among the genotypes, painting a nuanced picture of their strengths and weaknesses. Jorad and Darina emerged as potential champions, demonstrating impressive yield attributes. Notably, Jorad produced the highest number of fruits (7.00 per plant) at 7 weeks after planting, significantly outperforming its counterparts. Furthermore, Darina showcased remarkable fruit weight (356.33 g), highlighting its potential for heavier harvests. These findings are particularly encouraging for farmers seeking high-yielding cucumber varieties in the Ifite-Ogwari region. Evaluating these promising genotypes under different agro-ecological conditions and exploring their suitability for large-scale commercial production will provide a more comprehensive understanding of their potential impact on regional cucumber production. Additionally, investigating the underlying factors contributing to the superior performance of Jorad and Darina could pave way for breeding programs focused on developing even more productive cucumber varieties adapted to the specific needs of Nigerian farmers. By unveiling high-yielding genotypes and pinpointing areas for further exploration, this study contributes valuable knowledge to the ongoing pursuit of sustainable and productive cucumber cultivation in Nigeria.

INTRODUCTION

Cucumber (*Cucumis sativus*) originated in South Asia, specifically in the area encompassing present-day India and Pakistan. Its wild ancestor, known as *Cucumis hardwickii*, is native to these regions (Dhillon *et al*., 2012). Cucumbers were introduced to other parts of the world through trade and exploration. They were

brought to the Mediterranean region by the Romans and later spread to other parts of Europe (Grumet *et al.*, 2019).

Over time, cucumber cultivation and selection led to the development of various cucumber varieties with different characteristics, such as size, shape, color, and taste. Today, cucumbers are grown in diverse regions worldwide, adapted to a range of climatic conditions and agricultural practices. They have become an important vegetable crop in many countries, providing nutritional value and culinary versatility to various cuisines (FAO, 2020).Cucumbers are highly appreciated for their refreshing flavor, high water content, and nutritional benefits, making them a popular ingredient in salads, pickles, and other culinary preparations (FAO, 2020).Despite the wide range of cucumber genotypes available, there is a lack of information on the comparative yield of cucumber genotypes. This lack of information makes it difficult for farmers and breeders to select the best cucumber varieties for their specific needs. By unveiling high-yielding genotypes and pinpointing areas for further exploration, this study contributes valuable knowledge to the ongoing pursuit of sustainable and productive cucumber cultivation in Nigeria.

MATERIALS AND METHOD

The experiment was carried out in Anambra State at the Ifite-Ogwari Campus of Nnamdi Azikiwe University. The study region is situated at latitude 6.6041° North and longitude 6.9507° East, in Southeast Nigeria. The experiment was laid out in a Randomized Complete Block Design (RBCD) with 3 replications. Five cucumber genotypes (C*ucumis sativus L.*) was sown as treatments.

The treatments include; T1- Oliveira bold F1, T2- Amarisa super F1, T3- Jorald, T4- CU99 and T5-Darina. The experimental field size of 183.75m² was marked using measuring tape, rope and peg. Land clearing was done and debris was packed using rake. Poultry manure was integrated into the soil. Total of nine (9) planting holes were made on each bed. Four seeds were planted in each hole. The planting depth was 2.5cm. The four seeds planted were later thinned to two (2) seedlings per hole, four (4) days after germination. Each planting space was 0.5m(50cm) apart vertically and horizontally. After thinning, total of 18 seedlings were left on each bed with two (2) seedlings per hole.

Data Collection:

Data was collected on the following parameters: Vegetative parameters (leaf width, number of leaves, petiole length, vine length), Floral parameters (days to flowering, days to 50% flowering), and Yield parameters (Number of fruits, fruit length, fruit weight, fruit width).

Statistical Analysis:

Analysis of variance (ANOVA) was computed using Genstat Release 10.3 Discovery Edition 9PC/Windows) for the agronomic traits. Separation of means was done using LSD at ($P>0.05$) probability level.

RESULTS

Number of Leaves of Cucumber genotypes at 3, 5 and 7 Weeks after planting

Table. 1 revealed a significant difference ($p<0.05$) in the number of leaves among the cucumber genotypes studied at 3 weeks after planting. Jorad recorded the highest number of leaves while Amarisa Super F1 has the lowest number of leaves at 3 weeks after planting. At 5 weeks after planting, there was no significant difference ($p>0.05$) in the number of leaves among the cucumber genotypes. Amarisa Super F1 had the highest number of leaves followed by Oliveira Bold F1, CU999 and Jorad while Darina has the lowest number of leaves. There was also no significant ($p>0.05$) difference in the number of leaves among the genotypes at 7 weeks after planting. Oliveira Bold F1 had the highest number of leaves (44.67) while Darina had the lowest number of leaves (18.56).

Table 1. Number of Leaves of Cucumber genotypes at 3, 5 and 7 weeks after planting

Cucumber genotype	Number of leaves at 3 WAP	Number of leaves at 5 WAP	Number of leaves at 7 WAP
Olievera Bold F1	6.78	23.56	44.67
Amarisa Super F1	6.00	24.44	36.11
Jorad	11.89	20.56	22.56
CU99	13.55	23.11	24.78
Darina	10.00	16.22	18.56
LSD (0.05)	4.556	12.539	18.011

WAP= Weeks After Planting

The result of the analysis of variance showed no significant difference ($p>0.05$) among the genotypes at 3 weeks after planting. America Super F1 had the lowest leaf width (11.89cm) while Jorad has the highest leaf width (17.56cm). There was a significant difference ($p<0.05$) among the genotypes at 5 weeks after planting. Oliveira Bold F1 had the highest leaf circumference with a mean value of 19.44cm followed by Jorad(18.22cm). At 7 weeks after planting, there was also a significant difference ($p<0.05$) among the cucumber genotypes in terms of leaf width. Oliveira Bold F1 had the highest leaf width with a mean value of18.23cm while CU999 had the lowest leaf width with a mean value of 14.89cm (Table 2).

Table 2. Leaf width of the cucumber genotypes at 3, 5 and 7 (cm) Weeks after planting.

Cucumber genotype	3 WAP (cm)	5 WAP (cm)	7 WAP (cm)
Olievera Bold F1	12.67	19.44	18.23
Amerisa Super F1	11.89	16.28	16.28
Jorad	17.56	18.22	17.67
CU99	15.44	16	14.89
Darina	15.33	16.11	15.67
LSD (0.05)	5.697	1.659	2.066

WAP= Weeks After Planting

Vine Length of the Cucumber genotypes at 3, 5 and 7 weeks after planting

From the analysis, there is a significant difference ($p<0.05$) among the five cucumber genotypes at 3 weeks after planting in the vine length parameters. Oliveira Bold F1 and AmarisaSuper F1 have the lowest mean values of 15.33cm and 15.56cm respectively. CU999 recorded the mean

Table 3: Vine Length of the Cucumber genotypes at 3, 5 and 7 weeks after planting

Cucumber Genotype	3 WAP (cm)	5 WAP (cm)	7 WAP (cm)
Olievera Bold F1	15.33	88.11	158.67
Amarisa Super F1	15.56	88.39	157.78
Jorad	50.78	131.67	132.78
CU99	60.11	136.67	134.67
Darina	43.67	111.89	157.78

LSD (0.05)	12.044	44.96	51.982

Petiole length parameters of the five cucumber genotypes measured at 3, 5 and 7 WAP.

The result of the analysis of variance showed that there was a significant difference ($p<0.05$)in petiole lengths of the cucumber genotypes studied. CU99 had the longest petiole with a mean value of 12.55cm, Amarisa Super F1 showed the shortest petiole with a mean value of 6.67cm (Table 4).At 5 weeks after planting, there was also a significant difference ($p<0.05$) among the cucumber genotypes in their petiole length. CU999 had the shortest petiole with a mean value of 10.11cm While Darina had the longest petiole with a mean value of 16.00cm. Moreover, at 7 weeks after planting, there was no significant difference ($p>0.05$) among the genotypes. CU999had the shortest petiole having recorded a lowestmean value of 12.11cm and Amarisa Bold F1 had the longest petiole with a mean value of 16.44cm.

Table 4: Petiole Length of the Cucumber genotypes at 3, 5 and 7 weeks after planting

Cucumber genotype	3 WAP (cm)	5 WAP (cm)	7 WAP (cm)
Olievera Bold F1	7.11	11.28	14.33
Amarisa Super F1	6.67	10.39	13.11
Jorad	11.45	14.78	13.22
CU99	12.55	10.11	12.11
Darina	11.22	16.00	16.44
LSD (*0.05*)	3.091	2.915	3.153

Percentage Flower Initiation of the cucumber genotypes

The cucumber genotypes displayed no significant differences ($p>0.05$) in percentage flower initiation at 5 weeks after planting (Table 5). Nevertheless, Amarisa Super, Jorad, CU99 and Olievera Bold F1, showed slight differences in their mean values.Amarisa Super, Jorad, CU99 and Darina recorded 100% flower initiation at 5 weeks after planting while Darina differ slightly with 83% flower initiation. The genotype that recorded lowest percentage flower initiation was Oliveira Bold F1 both at 3 and 5 weeks after planting respectively.

Table 5. Percentage Flower initiation of Cucumber genotypes at 3 and 5 weeks after planting

Cucumber Genotype	Flower initiation at 3WAP (%)	Flower initiation at 5WAP (%)
Olievera Bold F1	0.00	83.33
Amarisa Super F1	0.00	100.00
Jorad	50.00	100.00
CU99	50.00	100.00
Darina	50.00	100.00
LSD(*0.05*)	NS	24.307

Yield parameters of the Cucumber Genotypes

There were significant differences ($p<0.05$) among the genotypes in their yield parameters. Darina had the moderate fruit length with a mean value of 22.22cm while Amarisa Super F1 and CU99 had the longest fruits with mean values of 23.45cm and 23.44cm respectively.

Amerisa Super F1 had the highest fruit weight (22.0t/ha) while Jorad had the lowest fruit weight (11.56t/ha). Number of fruits revealed significant difference. Jorad, had the highest number of fruits(7.00) while Olievera Bold F1 had the lowest number of fruits (4.00).

Table 6: Yield parameters of the Cucumber genotypes

Cucumber Genotype	Fruit width (cm)	Fruit Length (cm)	Fruit weight(t/ha)	Number of Fruits
Olievera Bold F1	20.67	22.89	21.8	4.00
Amarisa Super F1	20.56	23.45	22.0	4.33
Jorad	17.45	20.78	11.56	7.00
CU99	19.56	23.44	14.8	5.00
Darina	19.56	22.22	14.2	4.33
LSD (*0.05*)	NS	1.823	121.443	2.228

DISCUSSION

The evaluation of the cucumber genotypes in Ifite Ogwari, Southeastern Nigeria, revealed varying growth and yield performances. The number of leaves parameter indicated significant differences at 3 weeks after planting, with Jorad having the highest leaf count. At 5weeks after planting, Amarisa Super F1 displayed the highest leaf count. This aligned with the findings of Md. Nabiul *et al.*(2020), who observed that variation in leaf numbers can be attributed to genotype-specific growth patterns. At 7 weeks after planting, Oliveira Bold F1 demonstrated the highest leaf count, while Darina had the lowest, showcasing genotype-specific growth trajectories.

Leaf width parameters exhibited significant differences at 5 weeks after planting. Gul *et al*. (2019), emphasized on the influence of genotype on leaf development. At 5 weeks after planting, Oliveira Bold F1 excelled in its leaf width, suggesting its potential for robust foliage as a result of the influence of its genotype on the leaf development. However, the leaf width differences observed at 7 weeks after planting indicate genotype-specific growth patterns influencing cucumber plant development.

Vine length parameters showed significant differences at 3 weeks after planting, with CU999 displaying the longest vine. At 7 weeks after planting, there were no significant differences among genotypes, suggesting convergence in vine lengths. This may indicate that while initial growth patterns differ, the genotypes eventually reach similar vine lengths (Justine *et al*., 2016).

The percentage flower initiation parameter highlighted differences in flowering among genotypes (Teixido *et al*., 2018). Notably, Oliveira Bold F1 exhibited the lowest flower initiation at both 3 and 5 weeks after planting. This was in conjunction with the works of Justine *et al*., 2016, who opined that potential delay in flowering could affect fruit production timelines.

Significant differences persisted in fruit length, weight, and the number of fruits. Darina excelled in fruit length, while Amarisa Super F1 had the highest fruit weight(22t/ha),Jorad produced the highest number of fruits(7), suggesting its potential as a high-yielding genotype (Gul *et al*., 2019).

CONCLUSION

In conclusion, the evaluation of cucumber genotypes in Ifite -Ogwari, Southeastern Nigeria, provided valuable insights into their growth and yield performances. The study identified genotype-specific characteristics influencing leaf development, vine length,flowering and yield parameters. The findings contribute to the knowledge base for cucumber cultivation in the region.Selection of cucumber genotypes should align with specific cultivation objectives, considering factors such as growth patterns , yield potential, and adaptability (Md. Nabiul *et al.*, 2020).

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