EFFECTS OF DIFFERENT LAND PREPARATION METHODS ON THE GROWTH OF THREE CUCUMBER VARIETIES IN EBONYI STATE

Francis Nwangbo Azunku (Ph.D)
Department of Agricultural Education,
Ebonyi State College of Education, Ikwo
Gsm: 08030881623, Email: francaz2000@yahoo.com

Abstract

The study was carried out to investigate the effect of different land preparation methods on the growth of three cucumber varieties in Ebonyi State. The treatments (seed beds) were ridges, raised beds and flatland. The experiment was arranged in a randomized complete block design (RCBD) and replicated three times. Varieties used were Super marketer, Tokyo and Murano. Data were collected on growth parameters. Growth data were collected at 2,4,6 and 8^{th} weeks after planting on number of leaves, stem girth (cm), number of branches, vine length (cm) and leaf area (cm2). The result showed that super marketer variety and bed method out yield other varieties and methods in growth and yield parameters. Yield parameter collected on 2,4,6 and 8^{th} weeks after planting on length of fruit (cm), number of fruit per plant and fruit diameter. Data collected were subjected to analysis of variance (ANOVA) and treatment means separated using Duncan Multiple Range Test (DMRT) at 5% of probability ($P \leq 0.05$) (Sas, 2010). The result indicated that super marketer and raised bed method recorded the highest in terms of yield parameters. Based on the findings of this study the researcher recommended super marketer variety to be made available to farmers and the best method which is raised bed is also recommended for farmers.

Introduction

Cucumber is one of the crops grown lately in Nigeria. Though how it came into the country is presently not clear, the crop is widely grown and consumed among the poor and rich farmers because of its nutritional value. Cucumber scientifically known as *Cucumis sativus* L. belongs to the family *curcubitaceae* together with other *cucumbitales. It* is the fourth most widely cultivated vegetables and onions (Abiodun, 2010). Cucumber is a warm season crop. Cucumber it is said to have originated probably from the Northern part of India and then introduced to Mediterranean at an early date but today it is cultivated in Northern and South America, The Caribbean and most tropical areas (Gyang, 2011). Cucumber is a salad and fruit vegetable.

Cucumber is a creeping vine that roots in the ground and grows up on other supporting frames, wrapping around ribbing with thin spiraling tendrils. Cucumber grown to be eaten fresh (called slicers) and those intended for pickling (called pickles) are similar. Cucumbers are mainly eaten in unripe green form as ripe yellow normally becomes too bitter and sour. Cucumber is usually over 90% water, with an enclosed seed developing from a flower, usually classified as fruits. According to Shaghfta, (2015), much like tomatoes and squas, their sour-bitter flavour contributes to cucumbers being perceived, prepared and eaten as vegetables, which is the accepted culinary term. Cucumber *Cucumis sativus* L. are enjoyed in virtually all continents. They are rich in vitamins and are good sources of triterpene, phyto-nutrients called *cucubitacins* contained in fresh cucumbers (Wilcox, 2015). Cucumber have many varieties which includes Sugar ranch, Early pride, Market more 76, Burpless, Pepino, Murano, Super marketer and Tokyo F1, but this study is concerned in three varieties namely Super marketer, F1 Tokoyo and F1 Murano.

- Super marketer according to Shaghfta, (2015) is an open-pollinated variety with a sweet, mild flavour. It is a smooth, slender fruit that grows eight to nine inches long on vigorous vines and are ready to pick after 55days of growth under normal climatic condition.
- F1 Tokyo is a variety with high quality fruits and yield for outdoor and indoor culture. Wilcox (2015) noted that Tokyo F1 is an improved slicing variety of cucumber. Fruits are attractive, uniform and dark green. Fruit quality is very high because it has high multiple disease tolerances ability which makes a preferred choice for most farmers in the tropics.

- Murano 2 F1 cucumber is a hybrid seed variety that is commonly used for outdoor and indoor propagation of cucumbers under tropical conditions, its fruits are dark-green, cylindrical, and tolerant. The maturity period of the offered product is 40-45days after sowing. Elum, (2016), noted that, because of its high output when planted across region, many farmers tend to prefer this specie among other ones.

The major constraints of the production of cucumber according to Elum, (2016), are pests and disease attacks, poor funding, poor climatic conditions, poor extension services and land unavailability / land tenure system. Emehute, (2010) include inappropriate spacing, distance to market, farm size, improper or inadequate fertilizer application and poor storage facilities. Other constraints according to inadequate literature on the crop, poor government attention, and perish ability of the goods.

Despite the constraints, cucumber can do very well when the land in which it is grown is properly prepared. Land preparation involves clearing the land and cultivating it before planting takes place. Land preparation involves clearing, stumping, tilling the ground, ridging and providing necessary soil conditions which will enhance successful establishment of the young roots (Wein and Zaid, 2008). Preparing the land for crop propagation serves many purposes which include: creation of seedbeds was planted seeds are to be in contact with the soil moisture so they will germinate. Providing conducive environments for the crops to establish quickly, perforating the soil for aeration and water circulation among others.

At present the growth and production of cucumber is still very low to the extent that consumers' needs are not met all year round. Observations and personal experiences of the researcher reveal that despite the high demand for the crop and its nutritional value, the method of cultivating the crop from place to place appears to vary. This could be why the same crop grown in different environment produce differently. These differences makes impossible for farmers in different location to make uniform output and gain. It is against this background that the study sets to determine the effects of different land preparation methods on the growth and yield of three cucumber varieties namely: Super marketer, F1 Tokyo and Murano 2 F1 in Ebonyi State.

Statement of the Problem

Cucumber is one of the most important market vegetables in the tropics and subtropics. However, the production of the fruit in Nigeria is concentrated in the Northern part of the country. Despite the numerous benefits and economic importance of cucumber, its production in Ebonyi State is still very low. Observations by the researcher show that Cucumber farmers often encounter many problems regarding the agronomy of the crop because of the existing gaps in the local knowledge. Some of the key controversial issues in this concern are the selection of methods land preparation and varieties. Because of that, farmers in Ebonyi State tend to grow more of other tuber crops such as cassava, yam, cocoyam, cereals crops such as maize, leafy vegetables such as fluted pumpkin, bitter leaf and amaranthus while salad and fruit vegetable such as cucumber.

In developing state like Ebonyi where the population is on the increase, improved technologies including the rationale of use of varieties and best method must be employed to meet the food requirement of the people especially in the growth of cucumber. In order to sustain high quality yield of cucumber, there is need for farmers to maintain high productivity if the methods and varieties adaptable to the rainforest agro-ecological zones with respect to high and stable yield and other improved technology are identified. The study therefore sought to determine the effects of different land preparation methods on the growth and yield of three cucumber varieties in Ebonyi State. The result of the findings could be beneficial to: Students, Research Institutes; Teachers; Farmers and Government.

Purpose of the study

The main purpose of the study is to determine the effects of different land preparation methods on the growth of three cucumber varieties in Ebonyi State:

1. To determine the effect of zero tillage methods on the growth of three cucumber varieties namely: Super marketer, F1 Tokyo and Murano 2 F1 in Ebonyi State.
2. To determine the effect of seedbed land preparation method on the growth of three cucumber varieties namely Super marketer, F1 Tokyo and Murano 2 F1 in Ebonyi State.
3. To determine the effects of ridge land preparation method on the growth of three cucumber varieties namely: Super marketer, F1 Tokyo and Murano 2 F1 in Ebonyi State.

4. To determine the effects of different land preparation method on the mean stem girth (cm) of three *cucumis sativus L* varieties namely: Super marketer, F1 Tokyo and Murano 2 F1in Ebonyi State.
5. To determine the effects of different land preparation method on the mean leaf area (cm^2) of three *cucumis sativus L* varieties namely Super marketer, F1 Tokyo and Murano 2 F1in Ebonyi State.

Scope of the Study

This research work is limited to investigating the effects of different land preparation methods on the growth of three cucumber varieties namely Super marketer, F1 Tokyo and Murano 2 F1 to different land preparation methods in Ebonyi State.

Research Questions

The study seeks to answer the following questions:

1. What are the effect of zero tillage methods on the growth of three cucumber varieties namely Super marketer, F1 Tokyo and Murano 2 F1 in Ebonyi State?
2. What are the effect of seedbed land preparation method on the growth of three cucumber varieties namely Super marketer, F1 Tokyo and Murano 2 F1 in Ebonyi State?
3. What are the effects of ridge land preparation method on the growth of three cucumber varieties namely Super marketer, F1 Tokyo and Murano 2 F1 in Ebonyi State?
4. What are the effects of different land preparation method on the mean stem girth (cm) of three *cucumis sativus L* varieties namely Super marketer, F1 Tokyo and Murano 2 F1in Ebonyi State?
5. What are the effects of different land preparation method on the mean leaf area (cm^2) of three *cucumis sativus L* varieties namely Super marketer, F1 Tokyo and Murano 2 F1in Ebonyi State?

RESEARCH METHOD

Experimental design was adopted for this study. The design is considered appropriate for this study because the work is intended to collect data from farm with a view to describing the entire land preparation techniques involved in three cucumber varieties namely Super marketer, F1 Tokyo and Murano 2 F1 to different land preparation methods. The experiment was carried out in the research farm of Ebonyi State fertilizer Blending Plant, Onuebonyi, Izzi. Onuebonyi. This farm is situated in Izzi Local Government Area of Ebonyi State. The varieties used were super-marketer, FI Tokyo and F1 murano and were obtained from (open market) Agro-seed shop at international market in Ebonyi State. The experiment was laid out in a randomized complete block design (RCBD) replicated three times each plot used measured 2mx4m with 0.6m in between plots (beds and flatland) and 7m long x 1m width for the ridges with 0.6m furrow. A total of 18 plots were used on the whole, while a total land area of 108m2 was used. The treatments for experiment were different land preparation methods and varieties.

Field was cleared manually with cutlass. The site was marked out using measuring tape, rope and pegs. The flat land was tilled; beds and ridges were made measuring 2 X 4m and 7 X 1m respectively. The crops were planted on the 10^{th} of September 2021. Two seeds were planted on a hole at a depth of 1 inch and at a spacing of 30cm X 40cm and covered with top soil. The plot were kept weed free-though out the duration of the experiment. Harvesting of cucumber fruits commenced at six weeks after planting when the fruits had turned deep green in color. Harvesting was done by hand picking the matured fruits twice weekly.

Three plants were randomly selected from the middle rows in each plot and tagged for sampling at various stages of growth and development. Growth parameters were recorded at 2, 4, 6 and 8 weeks after planting (WAP). The growth parameters measured include:

i. Number of leaves per plant: This parameter was determined by counting the number of leaves on a given plant.
ii. Number of branches was determined by counting the number of branches per plant stand.
iii. Vine length (cm): This was determined by measuring the height of the plant from the base of the main stem to the stem to the tip using a measuring tape.

iv. Stem girth (cm) was determined by measuring the circumstances of the stem base near the ground with rope and measuring tape.

v. Leave area (cm^2): This was determined by adopting the method of Sharma (2000) as length x broadest width x 0.065.

vi. The length of the fruit (cm) was measured from the top of the fruit to the base.

vii. The diameter of the fruit (cm) was determined by counting, from all tagged plants that were randomly selected from each plot.

Data collected were subjected to the variance (ANOVA) and the treatment means were separated using Duncan multiple range (|DMRT 5% level of probability) According to SAS (2010).

PRESENTATION OF RESULTS

Table 1: Effect of different land preparation method on the mean number of leaves produced by three *cucumis sativus L varieties.*

Treatment	**2(WAP)**	**4(WAP)**	**6(WAP)**	**8(WAP)**
T_1 V_1	5.67^b	7.00^b	18.67^a	22.67^a
T_2 V_2	6.67^a	8.00^a	19.33^a	21.43^b
T_3 V_3	5.33^c	8.00^a	15.33^b	18.48^c

Table 1 shows the effect of different land preparation methods on the mean number of leaves produced by three *cumcuis sativus L*. varieties at 2,4, 6 and 8 weeks after planting. The result showed that the number of leaves increased progressively with the age of the plants throughout the sampling periods. At 2nd WAP, super marketer variety planted on bed planted on bed platform recorded the highest number of leaves (6.67), followed by Tokyo variety sown on flat land with the number of leaves of (5.67) while ridge platform planted with murano variety produced the highest of leaves (5.33). At 4th WAP, bed platform planted with super marketer variety produced the highest number of leaves (8.00), followed by murano variety sown on ridge platform with number of leaves (8.00) and flatland platform produced the least number of leaves (7.00). At 6th WAP, ridge platform planted with murano produce the least number of leaves (15.33) followed by flatland platform planted with Tokyo variety with number of leaves (18.67) and bed platform planted with super marketer variety produced the highest number of leaves

(22.67), followed by super marketer variety sown on bed platform with the number of leaves (21.43) and murano variety sown on ridge platform produced the least value of (18.48).

Table 2: Effect of different land preparation method on the mean number of branches produced by three *cucumis sativus L* varieties.

Treatment	**2(WAP)**	**4(WAP)**	**6(WAP)**	**8(WAP)**
T_1 V_1	9.23^b	30.33^c	93.10^c	96.22^c
T_2 V_2	11.32^a	33.33^a	112.67^a	115.67^a
T_3 V_3	7.24^c	31.33^b	94.67^b	97.67^b

Table 2 shows the effect of different land preparation methods on the mean number of branches of three *cucumis sativu L* varieties at 2, 4, 6 and 8 weeks after planting. The result showed that the number of branches increased progressively with the age of the plants throughout the sampling periods. At 2nd WAP, murano variety sown on ridge plat form produced the least number of branches (7.24), followed by Tokyo variety sown on flatland platform recorded the highest number of branches (11.32). At 4th WAP, super marketer variety planted on bed platform recorded the highest number of branches (33.33), followed by murano variety planted on ridge platform with number of branches (30.33). At 6th WAP, bed platform planted with super marketer variety recorded the highest number of branches (112.67), followed by flatland platform planted Tokyo variety with number of branches (94.67) while murano variety planted on platform produced the least number of branches (93.10). At 8th WAP, Tokyo variety planted on flatland platform recorded the highest number of branches (115.67), closely followed by super marketer variety planted on bed ridge platform produced the least number of branches (96.22).

Table 3: Effect of different land preparation method on the mean vine lengths (cm) of three *cucumis sativus L.* varieties.

Treatment	**2(WAP)**	**4(WAP)**	**6(WAP)**	**8(WAP)**
T_1 V_1	7.24^c	30.34^b	95.67^b	87.67^b
T_2 V_2	11.32^a	34.33^a	112.33^a	107.67^a
T_3 V_3	8.23^b	28.33^c	91.10^c	91.22^c

Table 3 shows effect of different land preparation methods on the mean vine lengths produced by three *cucumis sativus L* varieties at 2nd, 4th, 6th and 8th weeks after planting. The result showed

that the vine length increased progressively with the age of the plants throughout the sampling periods. At 2nd WAP, super marketer variety planted on bed platform recorded the highest vine length (12.32cm), followed by murano variety sown on ridge platform with the value of (99.23cm) while flatland with Tokyo variety produced the least vine length of (8.24cm). at 4th WAP, super marketer variety planted on the bed platform recorded the highest vine length of (33.33cm), followed by Tokyo variety sown on flatland with the value of (31.34cm) while murano variety sown on ridge platform recorded the least value of vine length (29.33.cm). At 6th WAP, murano variety sown on ridge platform recorded the least value of vine length (92.10cm) followed by Tokyo variety sown on ridge platform with the value of (96.67cm) while super marketer variety planted on bed platform recorded the highest vine length with the value of (113.52cm). At 8th WAP, super marketer variety planted on bed platform recorded the highest vine length of (117.67cm), followed by Tokyo variety sown non flatland with the value of (97.67cm) while murano variety planted on ridge platform recorded the least vine length of (90.22cm).

Table 4: Effect of different land preparation method on the mean stem girth (cm) of three *cucumis sativus L* varieties.

Treatment	**2(WAP)**	**4(WAP)**	**6(WAP)**	**8(WAP)**
T_1 V_1	3.48^a	2.03^b	4.05^b	3.33^b
T_2 V_2	3.47^a	2.32^a	3.77^b	3.57^a
T_3 V_3	2.99^b	3.96^a	3.26^a	3.42^a

Table 4 shows the effect of different land preparation methods on the mean stem girth of three *cucumis sativus L* 2, 4, 6 and 8 weeks after planting. The result showed that the number of increased progressively with the age of the plants throughout the sampling periods. At 2nd WAP, super marketer variety planted on bed platform recorded the highest value stem girth (2048cm) followed by Tokyo variety planted on flatland platform with mean stem girth (2.47cm) while murano variety planted on ridge platform produced the least value of stem girth (1.99cm). At 4th WAP, super marketer variety planted on bed platform recorded the highest value of stem girth (3037cm), followed by murano variety sown on ridge platform recorded the least value of stem girth (2.62cm) followed by Tokyo variety sown on flatland platform with stem girth (2.77cm) while super market planted on bed platform recorded highest value of stem girth (3.03cm). At 8th WAP, Tokyo variety planted on flatland platform recorded highest stem girth (3.57cm), closely

followed by super market variety planted. On bed with stem girth (3.42cm) while murano variety planted on ridge platform recorded the least stem girth (3.33cm).

Table 5: Effect of different land preparation method on the mean leaf area (cm^2) of three *cucumis sativus L* varieties.

Treatment	**2(WAP)**	**4(WAP)**	**6(WAP)**	**8(WAP)**
T_1 V_1	28.00^c	101.27^b	106.01^b	110.63^b
T_2 V_2	34.82^a	103.56^a	111.99^a	122.01^a
T_3 V_3	28.62^b	91.76^c	102.69^c	106.81^c

Table 5 shows the effect of different land preparation methods on the mean leaf area of three *cucumis sativus L* at 2, 4, 6 and 8 weeks after planting. The result showed that the leaf area of each varieties increases with the age of the plants throughout the sampling periods. At 2nnd WAP, super marketer variety planted on bed platform produced the highest value of leaf area ($34.92cm^2$), followed by murano variety planted on ridge platform with the value of leaf area ($28.72cm^2$) while Tokyo variety planted on flatland platform produced the least value of leaf area ($28.10cm^2$). At 4^{th} WAP, murano variety planted on ridge platform produced the least value of leaf area ($90.76cm^2$), followed by Tokyo variety planted on flatland platform with the value of leaf area ($100.2cm^2$). At 6^{th} WAP, murano variety planted on flatland platform with the value of leaf area ($107.10cm^2$, while super marketer variety produced the highest value of leaf area ($107.10cm^2$), while super marketer variety planted value of leaf area ($118.99cm^2$). At 8^{th} WAP, super marketer variety planted on bed platform produced highest value of leaf area ($122.63cm^2$) while murano variety planted on ridge platform produced the least value of leaf area ($106.81cm^2$).

Findings

1. The treatment has shown significant effect on growth and yield of three cucumber varieties.
2. Variety super market provide superior in growth and yield parameters followed by Tokyo and murano.
3. Raised bed provides the best method among the methods used in growth and yield parameters, followed by flatland than ridge platform.

4. Gradual increases were observed among the three cucumber varieties across sampling periods.

Discussion of the findings

Treatment has shown significant effect in the growth of cucumber. This agrees with the findings of Akinbile and Suffian (2011) who reported that tillage and seed bed preparation methods have significant effect on the biomas yield and growth of vegetables. This is in line with the findings of Singh and Ram (2012) who reported that cucumber genotype grown in differently to a range of climatic conditions, soil characteristics and even technical practices.

Raised bed proved the best method among the three methods used, in growth and yield parameters, followed by flatland and ridge platform. This agrees with the findings of Bruns and Young (2002) who reported that raised beds increased yield of soybean over flatbeds. The observed early emergence and higher vine length and of course growth of cucumber in raised bed treatment corroborates with the reports of Humeseeds (2012), raised beds aid in seeding emergence because the soil dries out and warms up quicker.

Growth parameter such as leaf area and leaf number raised bed showed highest performance. This also implies that the growth parameters all correlate with the eventual yield of the crop. This fact has been supported by Momemi and Ghaffarinegad (2010) who reported that components such as plant height, number of leaves, photosynthetic area, number of flower and number of pickling fruit showed that they are correlated with fruit yield.

The result shows that raised bed is having higher performance followed by flat bed, this can be related to the findings of Momeni and Ghaffarenegad (2010), who found out that flatbed had the highest performance of greenhouse cucumber amongst ridges and furrow. The control which was undisturbed (no bed preparation) gave the least performance. Thompson and Morgan (2013) reported that raised beds have following advantages: Good drainage and warmer soils prevent soil compaction as you do not need to walk on the soil surface in order to maintain your plants. Raised beds have bigger volume and required less watering and have easier access.

Gradual increases were observed among the three cucumber varieties across the sampling period. The gradual increase observed could be attributed to the genetic diversity of the cultivars, difference in environmental and edaphic conditions and potentials to transport photosynthesis materials within the cultivars. This finding is in concurrent with that of Shetty and Wehner (2002) who reported that cucumber genotypes grown in multi-environmental structures react differently to a range of climatic conditions, soil characteristics and even technical practices.

Conclusion

In conclusion, the importance of choosing the right seed bed and variety for the production of cucumber as any other vegetables cannot be overemphasized. In other to achieve good productivity and high yield of the crops, cucumber as a vegetable needs proper variety (super marketer) and proper seed bed preparation and management. A bed which keeps the seeds of the crops from being washed away and also creates suitable environment for not penetration and crop stand.

Recommendations

Based on the findings of the study, it is recommended that: Super Marketer variety of cucumber should be made available to farmers for cultivation because of high growth performance and that preparation of raised bed for planting super marketer variety will produce best yield. The raised bed creates an environment which raises the crop above the flat ground which could be water logged or washed off. It also gives an environment for root development.

References

Abiodun, O.A. (2010). Comparative study on nutritional composition of four melon seeds varieties. *Parkistan Journal of Nutrition.*9:905-908.

Akinble, C.O. & Suffian, M.Y. (2011). Effect of tillage methods and fertilizer application on Amaranthus curenus in Nigeria. *International Journal of Agriculture, 6:280-289.*

Bruns, T. & Young, H.T. (2002). The natural history. The nature and cultivation of flex and an account of various garden plants. (HAPT, 23(5), *vegetables of cartilaginous natur-cucumbers. Edition translation by pling the elder.* Retrieved September, 28, 2022.

Elum , A.A. (2016). *Influence of residual manure on selected nutrient elements and microbial composition of soil under long term crop rotation.* south African J plant and soil, 18:1-6.

Emehute, L. (2010). Performance of Vegetative and yield accession of cucumber *cucumis sativus L* horticulture social of Nigeria (HORTSON) Proceedings *of 21st Annual Conference,* 10-13 Nov.2003.

Gyang, K.D. (2011). Effect of variety and different manures on the growth, development and yield of cucumber in Jos Platue State. A B.Sc. project submitted to the department of plant science, University of Jos.

HumeSeeds, C. E. D. (2012). http://www. Hume seeds. Comlnogrow. Htm.kareem, I.A. (2004). *Effect of the Rattle Tree (Albizialebbeck) on soilnutrients and Irish potatoes yield on the Jos Plateau (Ph.D) Thesis (Unpublished) pp.13-23.*

Momeni, D. & Ghaffarinegad, A. (2010). Effect of different methods of seed bed preparation greenhouse cucumber. *Journal of Science and Technology,* 1(3): 43-50.

Shetty, R.G., &Wehner D.A. (2002). *Principles and procedures* of *statistics:- A biometric approach, (3rd edition*) McGraw-Hill publishing company Toronto.

Shagufta A. (2015). *International encyclopedia of agriculture volume 7-vegetable and crop production.* Published by S.B Nangia APH Publishing Coporation, pp.68-69.

Singh, K.L. & Ram, J. S. (2012). *Stale bed as a weed management alternative for machine harvested cucumbes cucumis sativus L. weed science society American*, 17(6): 724-730.

Thomas, O.A. & Morgan S.Y. (2013). Effect of tillage methods and fertilizer applications on Amaranthus currentus in Nigeria. *International Journal of Agricultural Research, 6:280-289.*

Wein, N. & Zaid, R. (2008). Horticulture. Published by Biotech books 2010 Lelhi, 517-520.

Wilcox, A.M. (2000). Cucumber and melon. In handbook of vegetable science and technology: Production, composition, storage and processing “ed. DK. Sulunkhe, 8. Skadam, Marcee Dekker, Inc. NY, pp.245-272.