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The Growth and Yield Performance of Sweet Melon as Affected by Planting Spacing in North East Nigeria

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ABSTRACT

The study was carried out at Federal University Wukari,Taraba State ,Nigeria to evaluate the performance of sweet melon under three planting spacing. The three planting spacing are:25 x 25cm ,30 x 30cm and 50 x 50cm .The design of the experiment was randomized completely design with three replications. Data were collected on the growth and yield parameters and analyzed using analysis of variance (ANOVA) at 5% level of probability where the least significant difference was used to separate the means. The result showed that planting spacing influence the growth and yield parameters of sweet melon and spacing of 50 x 50cm gave significantly highest number of leaves at 4 and 6week after planting (WAP).Also the highest number of node was from planting spacing of 50 x 50cm at 8WAP.At 4 and 8WAP planting spacing of 50 x 50cm also produced the highest plant height while at 8 WAP spacing of 25 x 25cm gave the highest branch number. Fruit yield was significantly highest with the planting spacing of 50 x 50cm. It is therefore concluded that planting spacing of 50 x 50cm is adequate for sweet melon production in the study area.

Keywords: *sweet melon, planting spacing, growth, fruit yield.*

INTRODUCTION

Sweet melon (Cucumis melo.var.cantalupensis) originated in Africa and south west Asia and over time have travelled from Africa to Asia to Europe to North America (Sabo et al, 2013). It is also known as (Golden Langkawi) in Malaysia and known for its striking golden yellow color and dense white flesh. It is an important commercial crop in many countries and mostly cultivated in the temperate regions of the world due to its good adaptation to temperate soil and climate (Zulkarami et al,2010) In Nigeria it is mostly grown in the Northern part of the country where it is popular because of its sweet pulp and the pleasant aroma (Villanueva et al ,2004).It is rich in bioactive compounds such as Phenolics ,flavonoids and vitamins as well as carbohydrate and minerals especially potassium ,also low in fat and calories with large amount of dietary fiber (Shafeek et al ,2015,Tamer et al ,2010).Population density of a crop determines to a greater extent its performance in terms of growth and yield. Okhira et al (1987) also observed that good planting spacing should ensure that each crop has an adequate chance to grow and express itself to produce higher total dry matter. Spacing also affects the amount of total dry matter production of a crop. It is believed that a well spaced plant will produce higher dry matter by producing enough branches a well spaced developed root (Galanopoulou – sendouka et al, 1980).Although in close spacing allows less competition from weeds (Schippers, 2000) but Pandey et al, (2001) observed the highest plant height in close spacing in Tomato hybrids while wider spacing had the highest number of primary branches per plant. They attributed the higher plant height recorded in close spacing to greater competition for space and light and thereby forcing the plant to grow taller. It was also reported that large spacing significantly increase number of branches per plant in soybeans while close spacing increased significantly plant height (El-Badawy and Mehasen, 2012).Reports are scanty on the effect of planting spacing on the growth and yield of sweet melon hence the study was design to determine the effect of beneficial requirement for optimum growth and fruit yield of sweet melon.

MATERIALS AND METHODS

The experiment was carried out at the teaching and Research farm of the Federal University Wukari Taraba State, Nigeria. Taraba state lie between latitude $6^0$30, 8^0 30N of the equator and between longitude 9^0 and 12^0E of the Greenwich meridian with a land mass of 54.426km^2. It shared boarders with Bauchi and Gombe State in the North, Adamawa State in the East and Cameroon republic in the south west. The state has a tropical wet – dry climate, well drained alluvial soils and has both savannah and Rain forest vegetation. The rainfall ranges between100mm to 250mm per annum in the north with the driest and wettest season lasting from December to February and July to September respectively.

Experimental Design and Treatments

The experiment was laid out in completely randomized design with three replications. The treatments composed of three planting spacing which are: 25cm x 25cm, 30cm x 30cm and 50cm x 50cm which were randomly applied to sweet melon crop to give plant populations of 160,000 plants/ha ,111,111 plant/ha and 40,000 plants/ha respectively. The plants were allowed to grow and developed during which measurements were taken on the growth and yield parameters.

Soil Sampling and Laboratory Analysis

Pre planting soil sampling was carried out on the field before the experiment were laid out. Soil samples were collected at random at 15cm depth and the composite sample was taken for laboratory analysis to determine the physical and chemical properties of the soil using a suitable laboratory analytical procedures of Bouyoucos hydrometer method as used by Shelock and Wang, 1993.The soil was chemically analyzed following the procedures outlined by Carter,(1993).

Planting and Management Practices

Three sweet melon seeds were planted using the three planting spacing mentioned above and after germination the seedlings were thinned to one plant per stand. The plot size was 2m x 2m with 2m gap in between replications and 1m gap between the plots. The total number of plots was nine (9) while the total land area for the experiment was 10m x10m (100m^2). Weeding was done starting from two weeks after planting and continues fortnightly using hoes while pest was controlled using cypermethrin chemical at 2ml per 1liter of water starting from two weeks after planting and as when necessary.

Data Collection and analysis

Data were collected on the growth and yield of the plant at 2, 4,6,8,10,12 weeks after planting (WAP).The measurement taken were: number of leaves, number of branches, stem height, number of node, and number of flowers, number of fruits, plant dry weight and weight of the fruits. Data collected were analyzed using analysis of variance (ANOVA) AT 0.05% level of probability and significant means were separated using least significant difference (LSD) as described by Gomez and Gomez, (1984).

RESULTS

Table 1, showed the physiochemical analysis of the soil used in the experiment and this revealed that the soils were neutral in acidic content and having a texture of sandy loam. It is low in organic carbon, nitrogen and moderate in organic matter content which indicate low fertility status.

The effect of planting spacing on the growth parameters such as number of leaves was shown in Table 2. Irrespective of the treatments the number of leaves increased with an increasing plant age however planting sweet melon at 50cm x 50cm produced significantly higher number of leaves per plant followed by a planting spacing of 30cm x 30cm and least is from spacing at 25cm x 25cm.The number of branches from table 3 showed that planting at 30cm x 30cm significantly produced the highest number of branches at all stages of growth measured expects at 8WAP (weeks after planting) where sweet melon planted at 25cm x 25cm had the highest branch number of (87.00) while other treatments had less values. The length of vine was also influenced by the planting spacing in the study where planting at 50cm x 50cm gave the longest vine at 4 and 8WAP while planting spacing of 30cm x 30cm produced the longest vine at 6 and 10WAP respectively.(Table 4). The number of nodes was also different with different planting spacing used in the study (Table 5). The highest number of node came from plant spaced at 50cm x 50cm only at 8WAP while there was no significant difference in the number of nodes produced at other stages measured. The number of flowers increased with an increase in plant

age and as revealed in table 6,sweet melon planting at 30cm x 30cm produced the highest number of flowers at 8and 10WAP followed by spacing at 25cm x 25cm at 10WAP. The number of fruits was significantly higher at 10WAP from the plants spaced at 50cm x 50cm, followed by 25cm x 25cm planting spacing and the least fruits from 30cm x 30cm treatment.

Table1. *The soil chemical and physical analysis of the Teaching and d Research Farm, Federal University, Wukari*

Properties	Values
$P^{H(H2o)}$	5.75
Organic carbon (%)	1.36
Organic Matter (%)	2.35
Total N (%)	0.98
Available P (MgL^{-1}	0.52
Exchangeable K (mol/kg)	1.6
Exchangeable Na (mol/kg)	2.1
Exchangeable Ca (mol/kg)	3.8
Exchangeable Mg (mol/kg)	1.8
Exchangeable Acidity (mol/kg)	1.10
TEB	9.3
CEC	10.4
Base Saturation (%)	89.4
Sand (g/kg)	76.80
Clay (g/kg)	15.20
Silt(g/kg)	8.0
Textural Class	Sandy soil

Table2. *Effect of planting spacing on number of leaves of sweet melon crop at different planting stages.*

Treatments	4week after planting	6weeks after planting	8weeks after planting
25cm x 25cm	10.10	28.80	47.4
30cm x 30cm	9.83	34.70	57.20
50cm x 50cm	11.00	37.80	50.20
LSD (5%)	1.94	24.80	26.54

Table3. *Effect of planting spacing on number of branches of sweet melon crop at different planting stages*

Treatments	4week after planting	6weeks after planting	8weeks after planting
25cm x 25cm	8.09	31.00	87.00
30cm x 30cm	8.30	36.60	85.30
50cm x 50cm	9.32	36.90	82.10
LSD (5%)	1.86	23.34	50.43

Table4. *Effect of planting spacing on stem height of sweet melon crop at different planting stages*

Treatments	4week after planting	6weeks after planting	8weeks after planting
25cm x 25cm	20.45	67.10	172.00
30cm x 30cm	18.63	78.40	170.00
50cm x 50cm	22.33	74.80	178.00
LSD (5%)	3.91	46.59	99.30

Table5. *Effect of planting spacing on number of nodes of sweet melon crop at different planting stages*

Treatments	4week after planting	6weeks after planting	8weeks after planting
25cm x 25cm	2.33	2.67	2.89
30cm x 30cm	2.33	2.45	2.78
50cm x 50cm	2.33	2.89	3.67
LSD (5%)	2.07	1.11	2.35

Table6. *Effect of planting spacing on number of flowers of sweet melon crop at different planting stages*

Treatments	6week after planting	8weeks after planting
25cm x 25cm	7.33	1.78
30cm x 30cm	7.44	1,00
50cm x 50cm	8.11	1.00
LSD (5%)	6.17	0.76

Table7. *Effect of planting spacing on yield parameters of sweet melon crop at different planting stages*

Treatments	Total fruits number	Total fruits weight	Total plant dry weight
25cm x 25cm	4.33	3.83	15.80
30cm x 30cm	4.83	2.97	24.60
50cm x 50cm	5.03	5.37	22.40
LSD (5%)	1.99	1.84	16.06

The yield parameter of sweet melon at harvest is shown in table 7. The number of fruits was significantly higher in plants spaced at 50cm x 50cm followed by plants at 30cm x 30cm and the least fruits weight came from plants spaced at 25cm x 25cm.The same trend was observed in the weight of fruits where planting spacing at 50cm x 50cm gave the highest fruits weight of (5.37) followed by planting space of 25cm x 25cm and the least of (2.97) from 30cm x 30cm treatment. The results of the plant dry weight at harvest showed that planting at 30cm x 30cm produced significantly highest plant dry weight followed by planting at 50cm x 50cm and the least from 25cm x 25cm treatment.

DISCUSSION

The growth and development of sweet melon was affected by the planting spacing in the study. The number of leaves, nodes and branches as well as the length of the vines was all influenced by the planting spacing. The planting spacing of 50cm x 50cm gave plants with more leaves when compared with other spacing used in the study. This result is in line with the work of Ijoyah et al 2010 ,Islam et al,2011 and Maurya,2013 who reported maximum yield from plant with wider spacing due to the ability of the plants to develop properly with less inter and intra plant competition from available resources resulting in higher plant growth and yield. The number of flowers was significantly higher at 6WAP from planting spacing of 50cm x 50cm .This may be due to the effect of wider spacing which provide adequate space for the plants to be exposed to light and nutrients for optimum growth and development. This supported the work of Mogapi et al, 2015, who recommended wider inter row spacing for production of okra.

The fruit yield parameters of sweet melon such as fruit number, and fruit weight per plant were better in plant planting at 50cm x 50cm .The fruits produced were bigger and heavier as they had stronger plants than at closer spacing. The result is in agreement with the work of Maurya 2015 who reported optimum yield at wide spacing as a result of more available nutrients for the plant. Total plant dry weight was find to be highest at a moderate spacing of 30cm x 30cm .This is in agreement with the work of Maboko and Plooy,(2013) who reported a tendency of increased in leaf fresh and dry mass per unit area (plant dry matter yield) as the plant spacing decreases.

CONCLUSION

Sweet melon requires well planting spacing for optimum growth and fruits yield development, and the results from the study indicates that the best planting spacing for sweet melon is 50cm x 50cm which is found to be adequate for the production of the crop in the study area.

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