PERFORMANCE OF GROWTH CHARACTERS OF WATER MELON (*Citrullus lanatus* .Thumb) VARIETIES AS INFLUENCED BY INTRA ROW SPACING AT SAMARU.

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Abstract

The experiment was conducted in year 2019 under wet season at students' demonstration field at Samaru college of Agriculture, Ahmadu Bello University, Zaria. To study the performance of growth characters of watermelon varieties as influenced by intra row spacing at Samaru. The experiment consisted of four levels of varieties (SUGAR BABY, SWEET SANGARIA, KAOLACK, and MARMARA) and two levels of intra row spacing (1x1m and 1x2m) respectively. The treatments were factorially combined and laid out in a randomized completely block design (RCBD). The data was analyzed using SAS Software and the treatment means was separated using Duncan multiple range test at 5% level of probability. The results indicate that MARMARA watermelon variety significantly recorded the highest values for numbers of leave, leaf area index and vine length than the other varieties used. Also the use of intra row spacing at 1m x 2m significantly recorded higher values for stand count, number of branches, vine length and leaf area index. It can be concluded that sowing MARMARA watermelon variety and the use of intra row spacing at 1m x 2m produced the best growth characters of watermelon at Samaru.

KEYWORDS: Watermelon varieties, Growth characters and Intra row spacing.

Introduction

Watermelon (*Citrullus lanatus* Thumb.) is a fruit vegetable which belong to the family *Curcubitacea* (Wikipedia, 2013). It is widely cultivated mainly in the warmer region of the continent which is referred to as a warm season fruit vegetable (Wikipedia, 2013).

Watermelon is one of the most widely cultivated crops in the world with global production reaching about 89.9 million mega gramme (FAO, 2003). The area under cultivation in Africa, Asia and North America were 124,000ha, 1,463,000ha and 135,000 ha respectively (Ibrahim, 2000). According FAO (2011) China, Iran and Turkey are the world leading producers of watermelon, with the estimated production figures was 69,576,643 metric ton (MT) 4,501,250MT and 3,864,496MT respectively.

The crop has an excellent source of vitamin A, B and C necessary for energy production pink watermelon is also a source of the arginine, carotenoids, lycopene, carbohydrate, sodium, magnesium, and water (Perking – Veazie *et al.*, 2006).

The seed are also rich in micro - and macro - nutrients such as Magnesium, Calcium, Potassium, Phosphorus, Zinc (Hayashi *et al.,* 2005; Adawg and Taha, 2001). Watermelon seed are source of healthy fat (unsaturated), almost 90%, vitamins, antioxidants, minerals,

proteins and phytochemicals, which is very good. Water melon rich in water, Citrulline, Deiminase, Alanine, Glutamic Acid, Fructose, Glucose, Vitamin C, Calcium, Potassium, Phosphorus and other minerals.

Watermelon being a horticultural crop (Dane *et al.,* 2007*;* Tóth *et al.*, 2007) that provides a high return and has relatively low water requirement compared to other crops (Wang *et al*., 2004). It is a traditional food plant in Africa (Janick *et al.*, 2007; Gyulau *et al.,*2011) with potential to improve nutrition, boost food security, foster rural development and support sustainable land cares (Peet, 1995; Anon.b., 2008).

In Nigeria, commercial production of watermelon is both during the rainy and dry season. Seasonally damp or flooded "Fadama" and river valleys of the Sudan and Sahel Savannah.(Amans *et al*., 1992). Although there are no official production data for the country the states of Borno, Yobe, Bauchi, Kano, Gombe, Jigawa and Kaduna are the leading areas of watermelon production in Nigeria (Majia, 1999).

Unlike standard conventional ridges that are use for arable crops, watermelon farmers don't have any specific spacing for sowing the crop. Farmers sow the crop at their own discretion which in turn affect the yield potential of the crop mainly, due to closely or widely spacing at sowing.

Planting a variety that is not suited for the available market and the particular production situation leads to lower profits or possibly crop failure Anon, (2006). Therefore, for a variety to be generally accepted by consumers the variety must be adapted to the environment, less susceptive to diseases and pest with high yielding qualities and longer storage life.Strauss (2015).

On the other hand, the use of improved resistance varieties with longer shelf life could curtail the menace of disease and pest in farmer's field and beyond.

Therefore, this research was conceived with the following objectives:

Objective

1. To determine suitable intra row spacing for better growth and yield of watermelon.
2. To determine the most appropriate watermelon varieties suitable to Samaru condition.

Materials and Methods

The experiment was conduct at the student demonstration field in Samaru College of Agriculture, Division of Agricultural College Ahmadu Bello University, Zaria (11^0 $11^{'}$ N and longitude 07^0 $38^{'}$ E 686 M above sea level) in the Northern Guinea Savannah, Agro ecological Zone of Nigeria. The experiment consisted of four levels of varieties (SUGAR BABY, SWEET SANGARIA, KAOLACK, and MARMARA) and 2 level of intra row spacing (1x1m and 1x2m) given a total number of eight (8) treatments replicated 3 times given 24 treatment in total. The experiment was factorially combined and laid out in a randomized complete block design (RCBD) with a plot size of $3x4m^2$. The Land was harrowed to a fine tilt and plots were converted to sunken beds and marked into 24 plots with a plot size of 3×4 m^2 with 1m spacing between plots and between blocks with spacing of 1m between plants. Two watermelon seeds were sown per hole. Five plants were randomly tagged from the net plot for periodic observation. Data on stand count was collected by counting the numbers of plants that emergence within the net plot. Number of leaves was taken by randomly tagging five plants in each net plot and the numbers of leaves at 6 WAS were counted and the averaged was computed. Leaf area index is the area of ground covered per plant in a plant community.

The leaf area of five sampled from the net plot was carefully measured using a Leaf Area Meter (Ceptometer Model Li-3100C). This was done at 6 WAS and the values obtained were recorded. The cumulative leaf area per plant was used to compute the leaf area index as described by Watson (1958). LAI= LA/GAWhere LA= leaf area, GA= Ground Area Covered by the leaves. The vine of five tagged plant in each of the net plot was measured at 6 WAS and the average was recorded. Number of branches per plant was determined by counting of the 5 tagged plants and was recorded.The data collected was subjected to Analysis of Variance (ANOVA) using general linear model GLM of the Statistical Analysis System package (SAS, 2003) and the means was separated using the Duncan's Multiple Range Test (5% probability level) (Duncan, 1955).

Results

Table 1 shows the effect of intra row spacing and varieties on number of leaves, leaf area index and vine length of watermelon during 2019 wet season at Samaru**.**Plot sown to 1m x2m intra row spacing produced longer vine length and higher values for leaf area index than plot sown to 1m x 1m intra row spacing.

Sowing MARMARA watermelon variety significantly produce higher value for number of leaves, leaf area index and vine length than the rest of the watermelon varieties used. Though statistically at par with KAOLAC only on number of leaves.

The effect of intra row spacing and varieties on stand count and number of branches of watermelon during 2019 wet season at Samaruis presented in Table 2. Stand count and number of branches significantly recorded higher values when watermelon was sown at 1m x 2m intra row spacing only.

Plots sown to KAOLAC and SWEET SANGARIA watermelon varieties produced higher number of branches alone. Though statistically similar to MARMARA watermelon variety while SUGAR BABY produced the least number of branches.

Discussions

Effect of intra row spacing on the growth of watermelon.

At the termination of the trial the values for stand count, number of branches and vine length was at maximum when watermelon was grown at 1m×2m intra row spacing while 1m×1m did not.

The reason for this tremendous difference could be done to less competition for growth factors; Light, moisture, nutrient and soil. There by the crop grows luxuriously which in turn translate to better yield.

Also the use of 1m×2m intra row spacing helps in minimizing the prevalence of the spread of disease and pests like Anthracnose and Fruit fly in watermelon field.

According to Celac (2011) reported that adequate space ensure less competition for sunlight, water and fertilizers. Spacing also presents the spread of pest and diseases from one plant to another.

Performance of variety on the growth of watermelon

Plots grown to MARMARA watermelon variety significantly produced the highest value for vine length, number of leaves and number of branches than the rest of the watermelon

varieties, while SUGAR BABY recommended the least value for the aforementioned growth attributes.

The reason for larger population of MARMARA variety others could be due to its high germination % couple with shorter duration to attained physiological maturity (75-80 days) give its an edge over other varieties that was test during the trial.

Similar finding by Majanbu *et al.* (1996); Ibrahim *et al*. (2000) and Sajjan *et al*.(2002) reported that genetic constitution of crop varieties, influence their growth characters. It is also in harmony with the finding of Iken and Anusa (2004) that attributed the growth and yield difference among crop varieties to right choice of suitable agro-ecological zone.

Conclusions

From the result obtained, it can be concluded sowing of MARMARA watermelon variety produced the highest stand count, number of leaves, and number branches.

Likewise the use of intra row spacing of 1m×2m produced the highest value for aforementioned parameter.

REFERENCE

Amans E. Cecilia, C., Lacruz, G., Masaosa, A., Moss, R. and Schouten, C. (1992). Analysis of the farming system in the HadejiaJamaare flood plain of northern Nigeria. *A working Document Series. 20113p.*

Anon.(2006) Nasarawa state Agricultural Development programme, Annual crop area and yield survey (CAYS), Lafia, Nasarawa state.

Anonb. (2008). www.essentialgardenguide.com/gardenfruit(o)cucurbitae. http://ecoport.org/ep?plant=708&entityType=plxxx. (Accessed 3/3/2011).

Celac (2011). Reported crop spacing for higher crop yield. Wordpress.com/category/farmer-to-farmer-advice p.3

Dane F, Liu J, Zhang C (2007) Phylogeography of the bitter apple, Citrulluscolocynthis. *Genet. Resour. Crop. Evol, 54;327-336.*

Duncan D.B (1955). Multiple range and multiple F. tests biometrics. 11:1-42

FAO (2003). World Agriculture: towards 2015/2030. Summary report, Rome.

FAO (2011). Production year book. Food and Agriculture Organisation of the United Nations Rom Italy.

Gyulai G., Toth Z., Bittsanszy A. (2011). Medieval citrullus DNAs-unlocking domestication events (13th and 15th Cent). In plant Archaegenetics. Ed. By G.Gyukai. chapter 7. *Nova Sci publisher Inc. New York. USA. ISBN 978-1-61122-644-7.*

Hayashi, T. *et al.,*(2005).L-citrulline and L-arginine supplementation retards the progression of high cholesterol-diet-induces athrosclerosis in rabbits. *Proc, Natl, Acad, Sci, USA; 2005; 102:13686.*

Ibrahim K, Amans E and Abubakar, I.U (2000). Growth indices and yield of tomato (*Lycopesicon esculentum* .karest) varieties as influenced by crop spacing at Samaru. *Proceedings of the 18th HORTSON conference proceedings (1): 40-47.*

Iken J.E and Anusa A (2004). Maize Research and Production in Nigeria. *African Journal of Biotechnology. 3 (6):302-307*

Janick, Paris H.S, Parrish D. (2007). The effect of supplemental irrigation on watermelon (*Citrullus lanatus*)production in gravel and sand mulched fields in the loss plateau of northwest China. *Agric. Water manage. 69; pg no. 29-41.*

Majanbu I.S, Ogunlella V.B and Ahmed M.K (1996). Responses of Two Okro (*Abelmoschusesculentus* (L) Moench) varieties of fertilizer growth and nutrient concentration as influenced by nitrogen.

Majia, U.M. (1999). The Effect of Nitrogen Levels and Intra row Spacing on Growth and Yield of watermelon. Unpublished Msc. Thesis Department of Agronomy, Ahamdu Bello University,Zaria.49pp.

Peet M. (1995). Sustainable practice for vegetable production in the South, NCSU.

Perkins-Veazie P. and Collins J.K.,(2004). Flesh quality and lycopene stability of fresh-cut watermelon. *Postharvest Biol. Technol., 31, 159-166.*

Sajjan, A.S., Shekargounda, M and Badanur. (2002). Influence of data of sowing, spacing and levels of nitrogen on yield attributes and seed yield of okro. *Ikamata Journal of Agricultural Science. 15:2, 267 – 274.*

SAS. (2003). Statistical Analysis Software Data watch.com.

Strauss, Mark (2015). "The 5,000-Year Secret History of the Watermelon" . National Geographic News . Archived from the original.

Tóth Z, Gyulai G, Szabó Z, Horváth L, Heszky L (2007) Watermelon (Citrullus lanatus) production in Hungary from the Middle Ages (13th century). *Hungarian Agric. Res, 4; pg no. 14-19.*

Wikipedia (2013). Free encyclopedia. HTTP://en.Wikipedia.org/windex.

Table 1: Effect of intra row spacing and varieties on number of leaves, leaf area index and vine length of watermelon during 2019 wet season at Samaru.

Treatments	Number of leaves	Leaf Area Index	Vine length (cm)
Intra-row spacing (I)			
1m x 1m	13.51	0.40b	22.23b
1m x 2m	14.74	0.48a	27.34a
SE±	0.771	0.024	0.882
Varieties (V)			
SUGAR BABY	8.33c	0.33c	17.16b
KAOLAC	16.88ab	0.31c	22.13b
SWEET SANGARIA	13.88b	0.50b	25.02b
MARMARA	17.42a	0.61a	34.83a
SE±	1.091	0.033	1.247

Means followed by the same letter (s) within the treatment group are not significantly different using D. M.R.T at 5% level of probability.

Table 2: Effect of intra row spacing and varieties on stand count and number of branches of watermelon during 2019 wet season at Samaru.

Treatments	Stand count	Number of Branches
Intra-row spacing (I)		
1m x 1m	2.50b	7.77b
1m x 2m	4.25a	10.13a
SE±	0.255	0.473
Varieties (V)		
SUGAR BABY	3.16	7.11b
KAOLAC	2.83	9.72a
SWEET SANGARIA	3.66	10.44a
MARMARA	3.83	8.55ab
SE±	0.302	0.669

Means followed by the same letter (s) within the treatment group are not significantly different using D. M.R.T at 5% level of probability.