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EVALUATION OF FOUR VARIETIES OF WATERMELON (*CRITRULLUS LANATUS* THUMB*)* IN ASABA AGRO-ECOLOGICAL ENVIRONMENT

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ABSTRACT
A study was carried out in 2008 to evaluate the performance of four varieties of watermelon (Green Gold, Sugar baby, Charsleton gray and Crimson sweet) as influenced by Asaba agro-ecological environment with a view to recommending the best variety that will best adapt to the unfavorable conditions in the Southern part of Nigeria to farmers. The experiment was laid out in a randomized complete block design with three replications. The results showed that the length of vines, number of leaves, days to 50% flowering, number of pods, weight of pod/plant, and number of seeds/pod at harvest and palatability/acceptability of Sugar baby variety significantly ($P \leq 0.05$) differed from the other varieties. Based on the results of this study, sugar baby is hereby recommended to farmers in Asaba agro-ecological environment and other Southern parts of Nigeria.

KEYWORDS: *Critrullus lanatus* varieties, growth, yields, Asaba agro-ecological environment.

INTRODUCTION

Watermelon, family Cucurbitaceae is a vine-like (scrambler and trailer) flowering plant originally from Southern Africa. Its fruit which is called watermelon is a special kind referred to by Botanists as pepo, a berry that has a thick exocarp and fleshy mesocarp and endocarp (Peet, 1995; Peet, 2005). Although China is today the World's single largest watermelon producer, the fruit is indigenous to tropical Africa and many other countries including Europe are doing well in its production (Scher, 1972; Fonsah and Wolfe, 2002). Parsons (2002) noted that watermelon varies in sizes, shapes, colours and tastes. It has a lot of uses (FAO, 2002). It is an aggressively annual crop that requires four months to mature. It is monoceious (Nonneeke, 1989).

The nutritional value per 100g (3.503) of the raw edible parts is given in Table 1 below. A fruit of watermelon contains 6% sugar, 92% water by weight and good source of vitamins A, B and C. it also contains lycopene (Maynard, 2001; Levetin and Mrnahoii, 2003). The sugar content and sweetness are the critical factors in determining the quality of many watermelon cultivars (Harlair, 1999). The water melon could be grown as a cover crop (Foster *et al.*, 1995; Foster *et al.*, 2003). It is used as fresh salad, dessert, pies, vegetable entries, snacks, food and ornamental decoration (Hamish, 2005).

In Nigeria, it is mostly cultivated in the Northern part because it is a warm loving plant and this makes its production seasonal in the Southern part of the country (Charles, 2005). The crop is affected by excess water especially in its least developmental stage (Feher, 1993; Athens, 1998). The sugar content of the fruit is diluted and further internal pressure due to excess absorption of water could lead to cracking and spoilage of the fruit thus edibility and market yield significantly (Boyhan and Masiunas, 1999; Lacier and Plummer, 2003). The high demand of this vegetable fruit is not met in the Southern part of the Nigeria because this part has high rainfall covering many months of the year. The production of watermelon all year round in all parts of Nigeria is expected to improve nutrition, contribute to food security as well as increase revenue of the producers/farmers and create employment opportunities thereby improving on the efficiency of utilization of labour (Musmade and Desai, 2001). Premise on the above understanding, this study has been designed to evaluate four varieties of watermelon in order to select the best variety that will best adapt to the unfavourable conditions in the Southern part of Nigeria using a typical example of Asaba agro-ecological environment.

MATERIALS AND METHODS

Study area

The experiment was carried out in 2008 at the Teaching and Research farm of the Department of Agronomy, Faculty of Agriculture, Delta State University, Asaba Campus, Nigeria. A composite soil sample (0 – 15 cm) was collected from the experimental area prior to treatment application and analyzed using the standard laboratory methods. The experimental site was cleared, packed, filled and seedbeds prepared before planting was done. The experimental site was 11m x 11m covering an area of 12plots and each measured 2m x 3m separated by 1m each between plots and between replicates. The set up was arranged in a randomized complete block design and replicated three times.

Source of experimental materials

The four varieties of *Critrullus lanatus* (Charsleton gray, Crimson Sweet, Sugar baby and Green gold) constituted the treatments. The four (4) varieties were procured from the Delta Sate Agricultural Procurement Agency (DAPA), Ibusa, Delta State.

Planting and weed control

after thinning to 1 per stand. Pest attacks were prevented by spraying of chemical (Cyper-methrin) and weeding was done as and when due before harvesting. Data collected at 2 weeks interval till 8 weeks after planting were length of vines, number of leaves, number of days to 50% flowering, number of fruits per plot, weight of fruits per plot, number of seeds per pod and palatability/acceptability of each variety.

Data analysis

Data collected were subjected to analysis of variance (ANOVA) while significant means were separated with the Duncan's multiple range tests using SAS (2005).

RESULTS AND DISCUSSION

The initial pre-planting soil properties of the area under study is study is shown in Table 2. Generally, the results of the pre-planting soil analysis shows that the soil is marginally fertile which implies that the soil is low in N content, organic matter, available phosphorus exchangeable bases and c exchangeable cations following Federal Ministry of Agriculture and Natural Resources (FMANR, 1990). This further implies that the soil is poor in nutrients and of low productivity therefore, response to organic manure would be encouraged (Table 2). The observed 5.60 value of the pH of the soil indicates that the soil is slightly acidic and this can be attributed to the high rainfall prevalent in the area leading to leaching of the basic cations from the surface area of the soil. The low organic matter content and total nitrogen could be attributed to the effects of soil erosion, leaching and bush burning predominant in the study area. Similarly, the low exchangeable cations may be due to the low clay activity and low organic content of the soil. The CEC was average (15.20 cmol/kg^{-1}) while the base saturation indicates that the study area has low fertility status which may be due to the long usage of the area for serious cropping without replenishing the lost nutrients through fertilizer application. The results of the pre-planting soil analysis agree with the findings of Enwezor *et al.* (1991) and Egbuchua (2007). The soil is sandy loam in texture with characteristics of 84.60% sand, 6.92% silt and 8.48% clay. The result of the soil experimental site confirms to the findings of Egbuchua (2007) on the nutrient status of Anwai/Asaba soil. This observation could be as a result of basic macronutrients such as N,P,K, Ca, Mg, S and the biological production of acid which limits plant growth and development (Agbogidi *et al.*, 2006; Agbogidi *et al.,* 2011).

The length of vines (cm), number of leaves, days to 50% flowering, number of pods, weight(kg) of pods/plant, number of seeds/pods at harvest and palatability/acceptability of *Critrullus lanatus* varieties as influenced by Asaba agro-ecological environment are presented in Tables 3, 4, 5, 6, 7, 8 and 9 respectively. The results showed that sugar baby variety performed best in all the parameters measured when compared to values obtained for other varieties (Green Gold, Charsleton gray and Crimson sweet). Significant differences ($P \leq 0.05$) were observed in length of vines, number of leaves, days to 50% flowering, number of seeds/pod at harvest and palatability of *Critrullus lanatus*. It took Sugar baby only 33 days to achieve 50% flowering while Green gold too 41.7 days, Charsleton gray took 40 days and Crimson sweet took 39.7 days to achieve 50% flowering respectively (Table 5). In the same vein, Sugar baby had 203.3 seeds/pod at harvest and this value differed significantly ($P \leq 0.05$) from Crimson sweet (174.3), Green gold (165.0) and Charsleton gray that had 145.3 seeds respectively (Table 8). Similarly, the results obtained from a panel of ten persons organized to taste for organized to taste for palatability/acceptability of the different varieties showed that Sugar baby was most significant and appreciable when compared to the other varieties. This was followed by Green gold while Crimson sweet was the least (Table 9).

The increase in length of vine of Sugar baby over the experimental period could be related to the ability of Sugar baby to effectively adapt to the environmental factors of Asaba ecological zone. It may also indicate the ability of the variety to morphologically, physiologically and anatomically function to utilize available nutrients and water in the area over the other varieties. Sugar baby covered the ground faster when compared with other varieties and this could have increased its competitiveness and its ability to discard or overcome adverse crop competition for environmental resources (Teasdale, 1996).

The observed variation in the number variation in the number of days to 50% flowering agrees with the reports of Anthens (1998), Agbogidi *et al. (* 2006) and Agbogidi *et al. (*2007) that hybrid crosses have higher yield potentials and quality. The high number of pods in Sugar baby could be due to low density of crop competition which has the natural resources to its advantage (Wahua, 1985; Anuebunwa, 1991). Variation in weight of pod is not unconnected with natural traits in the different varieties (Motes *et al., 2*005). Similarly, variations among the varieties with respect to acceptability is in consonance with the earlier reports of Athens (1998) that sugar content and sweetness were critical factors in determining the quality of many varieties.

Based on the results of this study, Sugar baby is hereby recommended to farmers in the Southern part of Nigeria due to its outstanding performance in growth, development and yield in Asaba agro-ecological environment.

TABLE 1. Nutrition as value per 100g

Items measured	Value
Energy	127kg (kcal)
Carbohydrates	7.55g
Sugars	6.2g
Dietary fibers	0.4g
Fat	0.15
Protein	0.61g
Water	91.45g
Vit. A	28mg
Thiamin (Vit. B_1)	0.033mg
Riboflavin (Vit. B_2)	0.021mg
Niacin (Vit. B_3)	0.173mg
Pantothenic acid (B_5)	0.221mg
Vitamin B_2	0.045
Folate (Vit. B_{12})	311g
Vitamin C	8.1mg
Calcium	7g
Iron	0.24
Magnesium	10mg

Potassium	112mg	**Source: USDA Nutrient Database (2005).**
Zinc	0.10mg	

TABLE 2. Physio-chemical properties of soil before experimentation

Parameters	**Values**
Sand (%)	84.60
Silt (%)	6.92
Clay (%)	8.48
Soil pH	5.60
Textural class	Sandy loam
Organic carbon (%)	0.91
Organic matter (gkg^{-1})	2.64
Total N (%)	0.06
Available P (mg/kg)	30.00
Ca^{2+} (cmol/kg)	1.31
Mg^{2+} (cmol/kg)	0.16
Na^{+} (cmol/kg)	0.25
K^{+} (cmol/kg)	0.17
H^{+} (cmol/kg)	0.45
Al^{3+} (cmol/kg)	0.08
ECEC (cmol/kg)	2.42
Base saturation (%)	78.10

TABLE 3. Length of vines (cm) of *Critrullus lanatus* in response to Asaba agro-ecological environment

Varieties of	Length of vines/WAP			
C. lanatus	2	4	6	8
Green gold	8.5_d	96.3_d	215.0_d	402.7_d
Sugar baby	15.9_a	112.7_b	224.3_a	420.0_a
Charsleton gray	14.0_b	108.7_b	218.3_c	410.0_c
Crimson sweet	10.4_c	101.3_c	222.4_b	415.0_b

Means with different letters are significantly different (P≤0.05) with the Duncan's multiple range tests

TABLE 4. Number of leaves of *C. lanatus* varieties as influence by Asaba environment

Varieties	Number of leaves/WAP			
C. lanatus	2	4	6	8
Green gold	6.0_b	26.0_d	104.3_c	117.3_d
Sugar baby	6.6_a	37.0_a	111.7_a	160.0_a
Charsleton gray	6.6_a	34.3_b	106.00_b	145.0_b
Crimson sweet	6.6_a	29.3_c	102.2_d	415.0_b

Means with different letters are significantly different (P≤0.05) with the Duncan's multiple range tests

TABLE 5. Days to 50% flowering of *C. lanatus* varieties as influenced by Asaba agro-ecological environment

Varieties	Days to 50% flowering
C. lanatus	
Green gold	41.7_a
Sugar baby	33.0_c
Charsleton gray	40.1_b
Crimson sweet	39.7_b

Means with different letters are significantly different (P≤0.05) with the Duncan's multiple range tests

TABLE 6. Number of pods of *C. lanatus* varieties as affected by Asaba agro-ecological environment

Varieties	No of pods/unit area at
C. lanatus	harvest
Green gold	13.3_c
Sugar baby	35.0_a
Charsleton gray	8.7_d
Crimson sweet	19.0_b

Means with different letters are significantly different (P≤0.05) with the Duncan's multiple range tests

TABLE 7. Weight of pods (kg)/plant *C. lanatus* varieties as affected by Asaba agro-ecological environment

Varieties *C. lanatus*	Weight of pod/plant
Green gold	1.3_b
Sugar baby	1.9_a
Charsleton gray	0.9_c
Crimson sweet	0.5d

Means with different letters are significantly different (P≤0.05) with the Duncan's multiple range tests

TABLE 8. Number of seed/pod at harvest of *C. lanatus* varieties as influenced by Asaba agro-ecological environment

Varieties of *C. lanatus*	Number of seeds/pod
Green gold	165.0_c
Sugar baby	203.3_a
Charsleton gray	145.3_d
Crimson sweet	174.7_b

Means with different letters are significantly different (P≤0.05) with the Duncan's multiple range tests

TABLE 9. Palatability/acceptability of *C. lanatus* varieties at harvest

Varieties of *C. lanatus*	Palatability/acceptability at harvest
Green gold	164.0_b
Sugar baby	236.00_a
Charsleton gray	0.0_d
Crimson sweet	120.0_c

Means with different letters are significantly different (P≤0.05) with the Duncan's multiple range tests

Note

Because fungi attached Charsleton gray it did not get mature. It got rotten and could not be presented when others (Green Gold, Charsleton gray and Crimson sweet) were presented.

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