FIELD STUDIES ON SWEET POTATO GENOTYPES FOR ADAPTATION TO THREE LOCATIONS IN RAINFOREST AGROECOLOGICAL ZONES

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Abstract

Field studies on five sweet potato genotypes (TIS 8164, TIS 8441, TIS 870087, Ex-Igbarium and TIS 2552) for adaptation to three locations (Ozoro, Asaba and Warri) in rainforest agroecological /ones were carried out. Data collected were length of vine, leaf area, number of tubers and tubers weight The results showed significant differences ($P<0.05$) in length of vine, leaf area, number of tubers, fresh tubers weight and harvest index among the three locations at five months after planting. Warri had the highest for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index whereas the lowest was recorded at Asaba. Genotypic differences ($P<0.05$) were observed across locations for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index al (he final harvest. TIS 8164 produced the highest for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index. Ex-lgbarium had the lowest mean values for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index at 5 months after planting. Also, significant differences ($P<O.05$) were observed among the genotypes for the parameters measured within locations. At Warri, TIS 8 I 64 and TIS 8441 had the highest values for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index while in Ozoro. TIS 8164 and TIS 870087 produced the highest values for the parameters measured whereas at Asaba, TIS 8164 and TIS 870087 performed better than other genotypes evaluated. In overall, TIS 8164 produced the highest values length of vine, leaf area; number of tubers, fresh tubers weight and harvest index. The results of this study suggest that three sweet potato genotypes (TIS 8164, TIS 870087 and TIS 8441) seem to have high length of vine, leaf area and number of tubers. Also, these genotypes are relatively high yielding potential for fresh tubers weight in these three locations. Thus, these genotypes should be made available to fanner for planting in rainforest agro-ecological zone.

Introduction

Sweet potato *(Ipomoea batatas Lam)* is a dicotyledonous plant which belong to the family convolvulaceae (Onwueme, 1978; Akparobi, *et al* 2003). It is believed to have originated in South America and spread through the tropical America into the Caribbean and across the South Pacific to Easter Island (Wooife 1992). Today, sweet potalo is grown in nearly all parts of the tropical and subtropical world (Wanda 1994). It is a crop plant whose large, starchy, sweet- tasting tuberous roots are important vegetables (Ewell and Mutuura, 1994). The root tuber is along and tapered, with a smooth skin, it's the ranges from while to yellow, orange or purple (Onwucnie, 1978).

The root tubers are most frequently boiled, fried or baked and can also be processed into starch and flour (Kimber, 1972; Onwueme, 1978). The leaves are eaten as vegetable, all part of the plant are use for animal feed. Industrial uses include the production of starch and industrial alcohol. Akoroda and Nwokocha, (1996) reported that sweet potato root in form of fries feature prominently in the breakfast menu of majority of urban dwellers in Nigeria.

Irrespective of the enormous effort of farmers towards sweet potato cultivation yield are still relatively low in rainforest agro-ecological zones (Akparobi *et al,* 2003). This has become a major constraint to the cultivation of sweet potato by farmers in rainforest areas of Nigeria. To reduce this problem, there is a need to screen for sweet potato genotype which produces relatively high yielding. This will arose the interest of farmers in cultivation of sweet potatoes in these areas. Thus, the main objective of the study is to screen and identify superior sweet potato genotypes with high stable yield in three locations of rainforest agro-ecological zone of Nigeria.

Materials and Methods

Experimental Site: This research was carried out in three locations (Delta State Polytechnic, Ozoro; College of Education Demonstration Secondary School, Warri and Delta State University, Asaba Campus). Delta Stale **Polytechnic,** Ozoro is located at laliludc 6° I3[1] *E* and longitude 5°33[J]N and about 50m above sea level. It has average annual rainfall of2,500mm and average temperature of 30°e. Asaba Campus is located at 06° 14[!] Nand 06°49' E of the equator. It lies in the tropical rainforest zone, characterized by seven months of rainy season between April and October, punctuated by a short break in August. An annual rainfall range of 1500mm to 1849.3mm. Warri is located at 5° 30*N and 6°30'E. It lies at the boundary between the tropical rainforest zone and mangrove swamp. The rainy season occurs between March and November, with annual rainfall ranging between 2040mm and 3000mm. The mean temperature is 26°C with a maximum temperature of 37.3°e. The relative humidity is 65.80% for most part of the year while the monthly sunshine is 4.2 hours during the rainy season (Asaba Meteorological Bulletin, 2006)

Experimental design: At each location, an area measunng 30m by 30m were cleared, ploughed, harrowed and mapped out. The experimental unit consists of four ridges of 1.2m x 5m with I m gap separating one plot from the other. Five sweet genotypes (TIS 8164, TIS 844 I, T1S 870087, Ex-Igbarium and TIS 2552) of sweet potato were selected based on earlier research by National Root Crop Research Institute, Umudike, who recommended these genotypes for planting in Southern Nigeria. The vine cutting of 50cm long is cut from the various genotypes and planted on the ridges at the spacing of I m by 1 m. Data collected were length of vine, leaf area, number of tubers and tubers weight. At 5 months after planting, final harvest was done. The harvest index was calculated according to Hunt (1982). Data collected were subjected to statistical analysis using the procedures outlined in the general linear model (SAS, 1996) and mean differences determined by Duncan Multiple Range Test at 5% level of significance.

Results and Discussion

The results showed significant differences ($P<0.05$) in length of vine, leaf area, number of tubers, fresh tubers weight and harvest index among the three locations at five months after planting (Table I). Warri had the highest for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index whereas the lowest was recorded at Asaba (Table I). Similar results have been observed in sweet potato genotypes (Akoroda and Nwokocha, 1996; Evvcll and Mutuura, 1994) who reported that environmental factors have strong influences on the growth and yield of sweet potato. The implication is that genotype performance will be enhanced by planting certain genotypes in a particular location.

Genotypic differences ($P<0.05$) were observed across locations for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index at the final harvest (Table 2). TIS 8164 produced the highest for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index (Table 2). Ex-Igbarium had the lowest mean values for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index at *5* months after planting (Table 2). This differences among sweet potato genotypes observed in this study agreed with earlier studies on sweet potato carried out by Jana (1982); Okwuowulu (2000); Akparobi *et al (2003).* They reported that significant differences were observed among the sweet potato genotypes for growth parameters.

Significant differences ($P<0.05$) occurred in length of vine, leaf area, number of tubers, fresh tubers weight and harvest index within locations (Table 3). At Warn, TIS 8164 and TIS 8441 had the highest values for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index while in Ozoro, TIS 8164 and TIS 870087 produced the highest values for the parameters measured whereas at Asaba, TIS 8164 and TIS 870087 performed better than other genotypes evaluated. It has been reported that cultivars differ from one another in the size of the tubers and leaves (Villareal *et al.* 1985; Kays, 1985; Akparobi *et al,* 2003}. The increase in quantity of tubers and fresh tubers weight recorded at different locations can be attributed to efficient conversion of assimilate to tuberous roots by TTS 8164.

In overall, TIS 8164 produced the highest mean values for length of vine, leaf area, number of tubers, fresh tubers weight and harvest index. Also, the results of this study suggest that three sweet potato genotypes (TIS 8164, TIS 870087 and TIS 8441) seem to have high length of vine, leaf area, number of tubers and are relatively high yielding potential for fresh tubers weight. Thus, these genotypes should be made available to fanner for planting In rainforest agro-ecological zones.

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Table I. Effect of three Locations on Growth and Yield Parameters of five Sweet Potato Genotypes at 5 Months after Planting

Locations	Vine length (cm)/ plant	Total leaf Area (cm^2) / plant	Number of tubers / slant	Fresh tuberous root weight (ton/ha)	Harvest index
Warri	563a	66878a	42a	3.3a	0.73a
Ozoro	305b	27181b	23b	2.2b	0.67ab
Asaba	189c	15773b	13c	1.9b	0.50b

Means in the same column with the same letter (s) are not significantly different (P = 0.05), using DMRT

Table 2. Genotypic Differences on Growth and Yield Parameters of five S Genotypes in Across Locations at 5 Months after Planting

Genotypes	Vine length (cm)/ plant	Total leaf area (cm^2) / plant	Number of tubers / plant	Fresh tuberous root weight (ton/ha)	Harvest index
TIS 8164	45 7a	31425a	27a	3. la	0.69a
TIS 8441	400ab	30592ab	26a	2.3b	0.62a
TIS 870087	3525	31021ab	19b	2.2b	0.62a
3x-Igbarium	294c	2023 Ib	16b	1.7b	0.50b
TIS 2552	300c	28067b	25ab	2,0b	0.60a

Means in the same column with the same letter (s) are not significantly different (P = 0.05), using DMRT.

Table 3. Genotypic Differences on Growth and Yield Parameters of Five Sweet Potato Genotypes at three Locations (Asaba, Qzoro and Warri) at 5 Months after Planting

Genotypes	Vine length (cm)/ pi ant	Total leaf area (cm^2) / plant	Number of tubers / plant	Fresh tuberous root weight *(ton/ha)*	Harvest --- index
	ASABA				
TIS 8 164	373a	9479a	17.1 a	3.3a	0.69a
TIS 8441	200ab	7453b	13.Ib	2.2b	0.60b
TIS 870087	293b	8949a	16.5a	2.8ab	0.67a
Ex-Igbarium	177b	746 Ib	12.6b	2.3b	0.59b
TIS 2552	142c	7728b	11.5b	2.0b	0.58b
	OZORO				
TIS 8 164	615a	8290a	23.9a	l.7a	0.52a
TIS 844 1	339b	529 lab	11. 7b	1.3ab	03%
TIS 870087	535a	7238a	18.9a	1.4a	*OA6h*
Ex-Igbarium	224b	5123ab	14.5b	1.4a	0.35b
TIS 2552	212b	4993b	8.13b	1.1 b	0.34b
	WARRI				
TIS 8 164	728a	4929a	54a	*2Aa*	0.59a
TIS 8441	642a	4159a	45 ab	2.3a	0.53 a
TIS 870087	534ab	3105ab	37b	2.6b	0.52a
Ex-Igbarium	477b	242Ib	22b	2.3b	*OAIb*
TIS 2552	434b	2090b	30b	2.1 b	*OAOb*

Means in the same column with the same letter (s) and in the same location are not significantly different (P - 0.05), using DMRT.