PLANTING DATES EFFECT ON GROWTH AND YIELD OF YAMS (*Dioscorea* spp.) IN ASABA AREA, DELTA STATE, NIGERIA.

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ABSTRACT

An experiment was conducted in 2010 and 2011 planting seasons to evaluate the effects of planting dates on growth pattern and yield of white yam (Dioscorea rotundata Poir) in Asaba area of Delta State, Nigeria. The study consisted of six planting dates (1st, 2nd 3rd, 4th, 5th & 6th) March to June (treatments). The study was laid out in a randomized complete block design replicated three times. The result showed that yam setts planted in 3rd, 4th and 5th planting dates (April and May) had (P < 0.05) higher growth parameters, (plant heights, girths, number of internodes, nodes and leaves than in planting dates of 1st, 2nd and 6th in the months of March and June in both 2010 and 2011 cropping seasons. Tuber yield were (P < 0.05) higher in the first three planting dates (March and early April) for both seasons. Fresh tuber yields were (P = 0.05) at 1st, 2nd and 3rd planting dates and significantly least at 6th planting date (5.5 and 5.3 t/ha) for 2010 and 2011 planting seasons. Percentage ware yam was (P < 0.05) higher in 3rd planting date (93.3% and 91.7%) and least in the 6th planting date (13.0 and 11.7%) for the two years planting. Conversely, the percentage seed yam was (P < 0.05) higher is the 6th planting date (86.7 and 92.7%) and least in the 3rd planting date (6.7 and 5.0%) for the study period. Thus, 1st, 2nd and 3rd planting dates are recommended for ware yam productions while the 6th planting date for seed yam production in Asaba area of Delta State.

Keywords: Yam tuber, wareyam, seedyam, growth parameters, yield.

INTRODUCTION

Yams are annual or perennial vines climbers with annual or underground tubers (Burkill, 1985), belongs to the genus *Dioscorea* in the family Dioscoreaceae. It is a major staple food for an estimated sixty million people in the production area (Nweke *et al*, 1991). These production areas include Nigeria, Republic of Benin, Togo, Ghana, Cameroon, Cote d'Ivoire and some part of Central Africa. Global yam output was estimated at 32.9 million metric tones in which Nigeria alone produces 23.9 metric tones, equivalent to about 71% of the world production (FAOSTAT, 1997; IITA, 1995). Another report revealed that between 1.5 – 2 million hectares of land are put to yams production annually with bulk production coming from the Southern Nigeria (Enwezor *et al.*, 1989) Nigeria is the largest world producer with about 31.5 million metric tones annually (CBN, 2003) and also the largest consumer of the produce (Ezulike, *et al*, 2006).

Tuber yield is a function of leaf, its photosynthetic efficiency, crop growth duration and harvest index (the ratio of tuber dry weight to total plant biomass). For yam, it is closely related to the effective spread of the leaf area for maximum light interception, photosynthate production and net assimilate. Staking was also reported to enhance photosynthetic efficiency of the plant (Akoroda, 1993), through light capture and increases the biological efficiency of the plant (Orkwor and Asadu, 2000). Similarly, Long *et al.* (2006) reported that photosynthetic efficiency of a crop is vital to crop yield. Staking reduces the incidence of shading of leaves and over lapping of the leaves and enhances the display of the leaves for photosynthetic efficiency of the crop (Peter, 2008; Emuh e*t al*, 2012). Similarly, Enyi (1972) posited that staking increased duration of leaf and leaf area and enhanced tuber yield while Osiru and Hahn (1994) reported that higher tuber yield was due to stakes in yam production. Yam production in Nigeria is largely rainfed thus limiting cultivation to the raining seasons and swampy areas. Studies have tended to show differential response of the crop to some environmental factors and time of planting as found in other crops like potato (IITA, 1995). Seasonal variations have been known to determine to some extent the efficiency of crop growth and overall yield (Degras, 1993). This study was carried out to evaluate the effects of planting (sowing) dates on

growth and yields of this very important staple food in Delta State, Nigeria.

MATERIALS AND METHODS

The study was carried out at the Teaching and Research Farms of Faculty of Agriculture, Delta State University, Asaba Campus between 2010 and 2011 in the early cropping seasons. Study area is located at Lat 6°, 14` N and Long. 6° 49` E of the equator with a hot humid climate, bimodal rainfall pattern with mean annual rainfall of 1500 – 2000 mm, which last between April and October with peak period in July and September. The relative humidity is 77.2%, temperature 37.3°C, the soil temperature at 100cm depth is 28.3°C while the monthly sunshine stands at 4.8 bars (Federal Ministry of Aviation, 2011).

Experimental field was manually prepared using local implement (hoe, cutlass, spade, garden fork axe etc) for both cropping years. A six year fallowed land with natural soil nutrients due to copious decayed vegetation cover was chosen. The plots had attendant good organic matter contents coupled with unhindered and adequate biological agents activities in the soil resulting in proper soil aeration and structure. Yam heaps/mounds were made with Abakaliki traditional hoe (Ikeorgu and Igwilo, 2002) with spacing of 1.5m between plots while the blocks were separated with 2m apart. The experiment consisted of six different planting dates (March 8, March 29th, April 14th, May 5th, May 26th and June 16th) mapped into 18 plots of 3m x 5m representing 15 heaps/plot. The treatment were replicated three times and arranged in completely randomized block design.

Yam setts (*Dioscorea rotunda* cv. Adaka) weighing 200 – 250g of mixed tuber portions were planted in a designated mounds/heaps spaced 1m x 1m apart and 1 sett/mound at an assigned planting or sowing date. After sprouting and good vine establishment, the yam plots were staked with 2.5 Indian bamboo stakes. Plots were kept weed free manually by hoeing at 3, 8 and 12 Weeks After Planting (WAP).

The tubers were grown under natural rainfed conditions and tubers were harvested when all the aerial shoots have completely turned brownish in colour, at senescence.

Data collection and analysis

Data collected were on plant heights using meter rule, plant girths with the aid of veneer caliper, plant internodes, number of nodes and number of leaves were visually counted, at 8 weeks after sprouting. Fresh tuber weights, was taken when tubers have been harvested. Data collected were subjected to analysis of variance (ANOVA) while the means sharing significant difference were separated using Least Significant Difference (LSD).

RESULTS AND DISCUSSION

Planting dates had varied significance differences in the growth parameters of yam tubers in 2010 (Table 1). At the third and fourth plantings (April/May), plant height, girth, number of internodes and nodes had the highest values and were ($P < 0.05$) higher than in the 1st and 6th plantings (March 8th and June 21st) for plant heights 104, 135 and 1.17, 0.97 for plant girth respectively (Table 1). Thereafter, the subsequent dates May 31st and June 21st representing 5th and 6th plantings, the growth parameters decreased significantly. Numbers of internodes and nodes recorded in the 3rd and 4th planting were equally higher while the number of leaves were increasing gradually from first planting with March 8 (33.7) with highest at 5th planting date (146.6) which was significantly higher than in all the planting dates evaluated (Table 1).

The subsequent year plantings (2011) followed similar growth trend except that the values obtained for all the growth parameters were generally lower (Table 1). This could be as a result of the fallow effects on the first year plantings, which enhanced the growth parameters and the yield. The subsequent depletion of nutrients (natural soil fertility) in the succeeding plantings year resulted in lower yield as a result of growth resource depletion although not investigated and analyzed. This can be adduced to soil fertility problems in the humid tropics of Africa (Agboola, 1989).

The fresh tuber yield percentage wareyams and seed yams produced in both 2010 and 2011 cropping seasons are presented in Table 2. Tuber yield in the first three plantings; March 8th, 29th and April 19th were 24.6, 26.1, 23.9 and 22.8, 25.4, 24.0 in 2010 and 2011 respectively were significantly higher ($P \leq 0.5$) than the latter planting dates. The least tuber yield in 2010 was 5.5 t/ha obtained at the last planting date (June 21st) while the highest was 26.1 t/ha recorded in the second planting date (March 29th). This trend was equally recorded in 2011 cropping season (Table 2). This indicates that the 1st three planting dates is most suitable for optimum fresh tuber productions in Asaba area of Delta State.

The wareyam produced in both seasons were highest in the 2nd and 3rd plantings as 90.0, 93.3 and 87.7 and 91.7 t/ha for 2010 and 2011 respectively. Thereafter, number of wareyam recorded started decreasing gradually with least as the last planting dates with yield as 13.0 and 11.7 t/ha for 2010 and 2011 respectively which and were significantly least in the

planting dates evaluated (Table 2). Conversely, the seedyams produced increase steadily from 4th planting (May 10th) with peak production recorded in the last planting date (June 21st) where 86.7% and 92.7% were recorded for both 2010 and 2011 respectively and were significantly higher ($P \leq 0.5$) than other five early plantings. This implies that seed yam production is best suited from June 21st planting date in Asaba area of Delta State.

It has been reported by Autsin (1986), that high yield potential attainment and realization of high yield in some crops may depend to a large extent on the crop having a sustained rapid rate of photosynthesis as well as responding appropriately to environment to obtain good and optimum developments. The impact of time of planting on yields and yield components in tuber production indicated that time of planting is a major factor to be considered in yam tuber production. Any yam cropping system with good tuber yield results should not be less than 6 – 8 months in the field after planting before harvest (Hahn *et al.*, 1987; Okwor, 1996; Onwueme, 1978) in most parts of Nigeria like Niger-Delta and other agro-ecological zones which are depended on natural rain (rain-fed) cropping. To increase food production to meet the national food sufficiency and security, close attention must be paid to adequate knowledge and information on when and where to plant respective crop plants to achieve the desire yield results.

Conversely, the percentage seed yam was ($P < 0.05$) higher is the 6th planting date (86.7 and 92.7%) and least in the 3rd planting date (6.7 and 5.0%) for the study period. Thus, 1st, 2nd and 3rd planting dates are recommended for ware yam productions while the 6th planting date for seed yam production in Asaba area of Delta State.

Table 1: Effects of planting dates on yam growth parameters for 2010/2011 croppings season

Treatment (Planting dates)		Plant height (cm)		Plant girth (cm)		No of internodes		No of nodes		No of leaves	
		2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
1st planting	March 8th	57.1	53.0	0.67	0.60	10.5	9.2	5.5	5.0	33.7	32.8
2nd planting	March 29th	34.0	29.8	0.94	0.87	4.1	3.9	3.2	2.9	34.2	31.4
3rd planting	April 19th	104.1	98.3	1.17	0.96	14.6	12.3	7.4	6.8	94.8	90.2
4th planting	May 10th	135.3	132.0	0.97	0.85	19.0	18.0	8.5	7.8	94.7	90.0
5th planting	May 31st	96.0	92.0	0.71	0.59	11.2	9.8	6.6	6.0	146.6	138.5
6th planting	June 21st	68.6	58.0	0.60	0.59	8.9	6.9	5.9	5.0	85.5	83.1
	LSD (0.05)	21.26	20.1	0.19	0.16	4.97	4.22	1.36	1.20	26.8	26.8
	CV (%)	40.27	39.2	0.24	0.22	5.61	3.75	1.94	1.70	41.3	41.1

Table 2: Planting dates effects on yield of yam in 2010 and 2011 cropping seasons

Treatments	Fresh tuber wt t/ha^{-1}		% Wareyam t/ha^{-1}		% Seedyam t/ha^{-1}	
	2010	2011	2010	2011	2010	2011
1st planting	24.6	22.8	76.7	74.0	23.3	21.0
2nd planting	26.1	25.4	90.0	87.7	10.0	10.0
3rd planting	23.7	24.0	93.3	91.7	6.7	5.0
4th planting	17.7	16.1	70.0	66.0	30.0	27.0
5th planting	10.8	10.0	50.0	47.7	50.0	54.3
6th planting	5.5	5.3	13.0	11.7	86.7	92.7
LSD (0.05)	**3.55**	**3.55**	**16.9**	**15.8**	**16.9**	**15.8**
CV (%)	**8.19**	**8.19**	**30.3**	**29.2**	**30.3**	**29.2**

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