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Effect Of Seed Size And Weight On Sex Identification And Productivity Of Telfairia Occidentals Hook F

[1]Ibeawuchi, I.I., Obiefuna, J. C[1]., G.O. Ihejirika[1], S.A dialoke[1], and S.Omovbude[2]

[1]Department of Crop Science and Technology, School of Agriculture and Agricultural Technology, Federal University of Technology, Owerri, Nigeria
[2]Department ofCrop and Soil Science, Faculty of Agriculture University of Port-Harcourt

***Abstract*—Experiments were conducted at the Teaching and Research farm, Federal University of Technology, Owerri (FUTO) in 2011 and repeated 2012 cropping seasons respectively to evaluate the effect of seed size and weight on sex identification and productivity of Telfaira occidentalis Hook F (Ugu) in Owerri Southeastern Nigeria. Results indicate that seed emergence was fast and high in large and medium seeds but slow and low in small seeds. This was as a result of large food in large and medium seeds. Cotyledons dropped 17 and 23 after emergence in small and large seeds respectively.**

Results also, indicate that male plants flower earlier than female plants. Seed size (weighted) as an inappropriate index of sex in *Telfairia occidenialis*. Furthermore, as the *telfairia* plants matured the productivity of the male plant dropped with the vines bearing narrow, small tiny leaves and numerous flowers. The female plants increased in with vigorous strong vines and robust broad leaves that are attractive and highly marketable.

Keywords—Telfairia seed size/weight/sex identification and productivity.

I. INTRODUCTION

Telfairia occidentalis Hook F (Ugu) is one of the popular vegetables grown and eaten in southeastern Nigeria. It is commonly known as fluted pumpkin belonging to the family *cucurbitaceae* and is a native of tropical West Africa [1]. [2] explained that *Telfairia occidenialis (*Ugu) is indigenous to Nigeria, specifically the rainforest agroecology of southeastern Nigeria. It has about 90 genera and 750 species [3]. *Telfairia* is propagated by seed and the edible parts include the young vines or shoots, leaves, seeds and petioles. Its cultivation has gradually spread into northern guinea savanna and other cultures where the crop is extensively used in African traditional herbal medicine for the treatment of anemia [4]. As a vegetable it occupies prominent position in the daily diet of many Nigerians. It is a rich source of vitamins, minerals and proteins which most often is in short supply. Furthermore, the fluted pumpkin is an important commodity for poor households because their prices are relatively cheap and affordable compared to other vegetables and food items. The fluted pumpkin has beneficial effects on the lipid profile with antilipidaemic effects including blood cholesterol and protection from a range of associated complications like cardiac problems, hypertension and diabetes [5]. In most traditional homes in Nigeria, the seeds are processed and ground for use in soups or boiled and eaten as nuts, while the leaves, shoots or vines are used as cooked vegetables [6, 7 and 8]. Nutritionally, the leaves are very important as they contain up to 11% crude protein, 28% carbohydrate, 3% oil, 11% ash and 700ppm of Iron [9, 10, 11, 12]. Furthermore, the seed contains 30% protein and about 50% non drying unsaturated oil [6, 12, 13]. According to [14] the seed oil is of high quality comparable with olive oil. Demand for *teifairia* as a vegetable is all the year round with sharp rise in the dry season. Fluted pumpkin commercially is among the profitable agricultural products and serves as a source of income to the producer and or trade without requiring large capital investment. In agribusiness we have fluted pumpkin market gardens and home gardens which dominate the rural-urban and peri-urban landscape of the country. More so, the rapid expanding cities and the high population of Nigeria offer a large market for sale of the vegetable. In *telfairia* food chain, women and youths play key and leading roles especially during the dry season when the cost of produce is very high. The production of *telfariria* is common place in our rural communities and the farmers involved in its production noted the unique problem in identifying which *telfairia* seed is male or female before planting as the pre-knowledge of this before planting will improve the production. Majority of the rural farmers also believe that large seeds produce females and abundant broad succulent leaf vegetable. Some other

farmers claim that small seeds produce better vegetables in terms of leaves, fruits and vines. Since we cannot rely on farmer speculation **'hear say'** we decided to bring these farmers' problem under empirical test. This formed the background of these experiments on the evaluation of the effect of seed size and weight on sex identification and productivity of fluted pumpkin (*Telfairia occidentalis* Hook F) Ugu.

LL MATERIAL AND METHODS

The experiments were conducted in 2011 and repeated in 2012 cropping seasons respectively at the Teaching and Research farm of the Federal University of Technology, Owerri (FUTO). The farm site is located between latitude 5028' and 5031' North and longitude 60 59' and 70 02' East on an elevation of 57.5m above sea level. Owerri is in the tropical rainforest zone of southeastern Nigeria with minimum and maximum annual ambient temperature of 220c and 32°c respectively. It has a mean rainfall of 2698mm and relative humidity of 89%. The soil is characterized by coastal plain sands which have low mineral reserve and low in fertility and are classified as ultisols [15]. Initial soil sample analysis of the site revealed that it has 0.09% N, 5.72 coml. kg-1P, 1.35%OM, 0.78cmol kg-1Mg, 1.08 coml. kg-lea, 0.94 cmol kg·1K and a soil reaction (pH) of 5.43.

III. EXPERIMENTAL TREATMENT

Eight fluted pumpkin fruits were collected from the germ plasm unit of the Department of Crop Science and Technology, Federal University of Technology, Owerri. Each *teifairia* fruit was opened by cutting longitudinally. The seeds were scooped out and processed. Based on the physical appearance the seeds were selected from each fruit and grouped into small, medium, (3.95-4.99g and 5.0-999g) and large sized seed lots. Each lot was weight and graded to confirm the grouping. Thus the small sized seeds weighed between 3.95-4.99g, the small-medium weighed 5.0 - 9.99g, the medium (10-14.99g), medium-large weighed (15.0-19.99g) and large (20-22.3g).

A. EXPERIMENTAL DESIGN AND LAYOUT

A randomized complete block design (RCBD) was used. The five (5) treatments are small, small-medium, medium, medium-large and large sized seeds were randomized and replicated four (4) times. The experimental site covered a total land area of 52 x 14.8m giving a land area of 769.6m2 or 0.07696ha. Each experimental plot measured 1.2 x 8m, with a 2.0m alley between plots and between blocks and a guard area of 2m round the experimental site. One seed was planted per hole of (10cm deep) and spaced 2.0 x 2.0m.

B. DATA COLLECTION

Growth, yield and reproductive data were collected at 4,8,12,16,20 and 24 weeks after sowing. Data were collected on emergence at 7, 10, 12 and 15days after sowing while observations were made on cotyledon drop at 17, 20, and 23 days after emergence. All data collected were analyzed and presented according to [16] and [17].

IV. RESULTS AND DISCUSSION

A. RESULTS-EMERGENCE:- Seed emergence ranged from 7-15 days after sowing. Most (90-100%) medium, medium-large and large seeds emerged earlier (7-lOdays) than the small and small-medium seeds (9-1Sdays) and (66-83%) respectively.

B. COTYLEDON DROP: The cotyledons of the small and small-medium seeds dripped early, 17days after emergence and late in the medium, medium-large and large seeds that dropped 23 days after emergence (Table 1)

Number of Leaves: The number of leaves (Table 1) showed significant differences at 4-12 weeks after sowing among the seed groups. However, the medium-large and large seeds produced significantly more leaves than the medium, small-medium and small seeds.

C. LEAF AREA: The medium-large and large seeds developed significantly broader leaves than the other seed sizes/weights (Table 1).

Table 1: mean number of leaves and leaf area at 4,8 and 12 weeks after sowings % emergence of the plates at 7, 10, 12 and 15 DAS, and % cotyledon drop at 14, 20 and 23 day after emergence

fluted pumpkin seed size weight (g)	Number of leaves			Leaf area				Days after sowing % emergence			Days after emergence % of cotyledon			
	4	8	12	4	8	12	$\bar{x}$	7	10	12	15	17	20	23
Small (below 5g) (3.95-4.99)	35.75	68.50	205.5	76.6	84.4	90.7	83.9	66.67	83.33	83.33	83.33	33.33	58.33	83.33
Small-medium (below 10g) (5.0-9.99)	36.50	72.50	209.00	78.90	84.20	90.8	83.97	66.67	83.33	83.33	83.33	33.33	58.33	83.33
Medium (below 15g) (10-14.99)	46.75	79.0	218.0	81.2	88.3	98.9	86.1	83.3	91.67	100	100	0.0	50.0	66.67
Medium-large (below 20g) 15-19.99	56.45	90.75	256.55	83.99	90.25	106.25	95.16	83.33	91.67	100	100	0.0	50.0	66.67
Large (20-22.3)	59.50	110.0	256.75	89.7	90.3	106.20	95.4	83.33	91.67	100	100	0.0	50.0	58.33
LSD (0.05)	4.71	7.74	12.5	5.41	5.95	5.89								

Note:WAS-Weeks after sowing DAS- Days after sowing DAE- Days after sowing

D. VINE LENGTH AND GIRTH: The vine length and girth of the *telfairia*. plant were statistically similar at 4 weeks after sowing. However, at 8 and 12 weeks after sowing, the vine lengths of medium-large and large seeds were significantly longer and had broader girths than those of small, small-medium seeds (Table 2).

Table 2: Effect of seed size and weight on mean vine length (cm) and Girth (cm) at 4, 8 and 12 weeks after sowing.

Seed size/weight (g)	Vine length	Weeks after Sowing		Girth		
	4	8	12	4	8	12
Small	10.13	179.15	203.67	1.96	1.96	1.94
Small-medium	101.50	180.00	205.90	1.96	1.98	1.94
Medium	105.73	199.35	284.31	2.16	2.35	2.55
Medium-large	115.50	212.30	308.25	2.25	2.34	2.56
large	112.94	228.59	329.55	2.54	2.68	2.96
LSD(0.05)	NS	29.37	28.71	NS	0.70	0.87

E. NUMBER OF BRANCHES: The branches of large and medium-large seeds were significantly different from those of the small and small-medium seeds. The same seed sizes (large and medium-large) had higher number of branches. At 20 weeks after sowing, the medium-large and large seeds produced 21-23 branches (Table 3).

Table 3: Effect of seed size and weight on number of branches at 4,8,12,16 and 20 weeks after sowing.

Seed and weight (g)	**Weeks after sowing**				
	4	8	12	16	20
Small	3.25	5.90	8.70	12.15	16.50
Small –medium	3.33	6.30	8.95	12.50	16.75
Medium	4.99	8.20	9.40	14.10	19.60
Medium-large	5.40	9.55	10.85	18.95	21.50
Large	6.50	10.50	10.95	19.82	23.94
LSD (0.05)	1.16	1.31	2.92	2.11	2.35

F. SEX IDENTIFICATION: The male plants flowered at 16weeks after sowing while the female plant flowered at the 20th week after sowing. The result obtained indicated higher number of male flowers than the female plants. However, the female plants produced strong vines and luxuriant broad leaves irrespective of the seed size/weight which developed them. The male plants produced tiny vines and narrow small leaves. Although, the number of flowers produced by female plants failed to reflect the number of pods held per seed size (Tables 4 and 5), the small seeds had high female floral abortion. Thus small seeds produced 21 female flowers (Table 4) and only 9 fruits developed to maturity thereafter (Table 5). The other seed groups had less abortion of female flowers e.g. the large seeds had 12 female flowers and all developed and matured as fruits (Table 4 and 5). Flowering continued for the male and female flowers except that the male plants enter senescence phase earlier than the female plants. Results on sex identification revealed that sex is a positive factor for yield increase and there were no statistical differences among the seed sizes and weights as the ratio for male to female plant was 1:1 in all the seed sizes/weights experimented upon.

Table 4: Effect of seed size and weight (g) on the sex identification, the number of flowers of male and female plants of *telfairia occidentalis* at 16, 20 and 24 weeks after sowing.

Seed size And weight (g)		flowers	16 Weeks after sowing		20 flower		24 Male &	Total	Ration
			Plant	Flowers	plant		plant	Female		
Small	Female	0.0	0.0	10.0	9	11	10	19	21	1.16
	Male	28.2	2.0	30.0	8.0	38.50	0.0	18	96.7	1.0
Small-	Female	0.0	0.0	5.0	6.0	6	12.0	17	13	1.0
Medium	Male	32.0	3.0	30.0	8.0	43.33	7	18	103.33	1.0
medium	Female	0.0	0.0	4.0	7.0	52.72	10.0	17	14	1.0
	Male	28.50	2.0	32.25	6.0	2	8.0	17	113.7	1.0
Medium	Female	0.0	0.0	6.0	6	49.93	11	17	15	1.0
Large	Male	29.0	2	37.0	7	70.0	8	17	116.13	1.0
Large	Female	0.0	0.0	5.0	2.0	47.32	11.0	16	12	1.0
	Male	34.0	3.0	38.60	3.0		10.0	16	110.92	1.0
LSD (0.05)			NS		NS		NS			

Ration of male female 1:1.

A. LEAF YIELD: As soon as the plants segregated into male and female plants, the female plants out-yield the males by 4:1 ratio in leaf yield (Table 5). Generally, the large, medium-large and medium sized seeds produced more bundles of marketable leaves and vines than the small and small-medium sized seeds. However, at 16 WAS, when the plants separated into male and female, leaf yield indicated that the female plants had statistically significant ($p \sim 0.05$) broader leaves than the males. Furthermore, the large and medium seed sizes produced more fruits than the small seeds.

Table 5: effect of seed size and weight on the mean fresh vegetable weight (Kg/ head) at 4, 8,12,16 and 20 weeks after sowing and pod number per seed size / weight

Seed size and weight (g)		Weeks after sowing					Yield ration of male female	No of pods/seed size and weight (g)
		4	8	12	20	16		
Small	Female	17.50	18.90	21.50	4.5	4.25	1	9
	Male				16.70	16.33	4	
Small medium	Female	18.75	19.50	32.50	4.95	4.47	1	11
	Male				17.10	15.99	4	
Medium	Female	19.10	20.25	24.50	4.95	4.70	1	12
	Male				17	16.80	4	
Medium-Large	Female	21.20	23.15	24.90	25	5.75	1	14
	Male				5.50	5.75	4	
Large	Female	23.60	23.75	25.21	20.50	20.70	1	12
	Male				6.50	6.10	4	
LSD(0.05)					24.49	24.23	1	
LSD male (0.05) NS			NS		NS		1	
LSD female (0.05) 1.49								

V. DISCUSSION

The differences in emergence and robust growth of the fluted pumpkin at the early stage of the plant growth must have resulted from the large food reserve in the large and medium seeds as against the small seeds. Such food reserves energized and maintained the early growth both of vines, leaves and branches until the plant separated into male and female. Food reserve in small seed weights was low and so delayed emergence and rapid growth of plants from the small seeds [18]. Seed size as determined by weight of individual seed does not give an answer or identity the sex of the seed before planting. However, the male plants flowered earlier than the females [19]. Hence, sex can be seen as a positive factor for yield in *telfairia* production as female and male ratio is 4:1 and the female out-yields the males. The early appearance of flowers in male *telfairia* drastically reversed the productivity as the males produced tiny leaves with tiny vines that look unattractive while the productivity of the female *telfairia* was enhanced as they developed stronger vines, broader succulent leaves and robust growth than the male counterparts.

REFERENCES

[1]Akoroda, M.0.(1990). Ethnotrotany of Telfairiaoccidentalis (cucurbitaceae] among Igbos of Nigeria. Econ: Bot 44 (1) 29-39.

[2]Nwonuala, A.I., J.C. Obiefuna, M.C. Ofoh and 1.1. Ibeawuchi (2008). Inuitro culture of the Embroyos of fluted pumpkin (Telfairiaoccenialis, Hook) ActaAgronomicaNigerianaVoLB.No. Lpp. 54-59.

[3]Whitaker, T.W. and Davis, G.N. (1962). Cucurbiis, Botany, Culturation and Utilization. London: Leonard Hill.

[4]Aiyelaagbe, 1.0.0. (2011). Horticulture facing the challenges of human health and Agricultural productivity. Keynote paper presented at the 29th Annual Conference of Horticultural Society of Nigeria (HaRTSON) held on 24-29th July, 2011 at Makurdi; Nigeria.

[5]Uguru, C.E., Olajide, J.E., Alumana, E.O. and Ezeanyika, L.U. S. (2011).Comparative effects of the leaves of Vernoniaamydalina and Telfairiaoccidentalis incorporated diets on the lipid profile of rats. African Journal of Biochem. Res. 5 (1) 28-32.

[6]Asiegbu, J.E. (1987). Some chemical evaluation offluted pumpkin seed. Journal Sci. Food Agric. 40: 151-155.

[7]Tindal, H.D. (1983) Vegetables in the tropics. AVI West Port CT

[8]Purseglove, J.N. (1968) Tropical Crops (Dicotylendon). London: Longmans, Green and Co. Ltd.

[9]Taylor, O.O.A., Fetuga, B.L., Oyenuga, V.A. (1983) Accumulation of mineral elements in five tropical vegetables as influenced by nitrogen fertilization and age. ScientiaHorticulturae 18:313-322.

[10]Achinewhu, S.C. (1983). Ascorbic content of some Nigerian local fruits and vegetables. Hum. Nutr. 33:261-266.

[11]Sanni, S.B. (1982) The fluoride contents of common Nigeria vegetables. Joumal of Science Food Agriculture. 33: 686-687.

[12]Okoli, B. E and Mbaogu, C.M. (1983) Fluted pumpkin (*Telfairiaoccidentalis*) West African Vegetable Crops, Econs Bot. 37: 145.

[13]Longe, O.G. Fariny, G.O. and Fetuga, B.L. (1983) Nutritional value of the fluted pumpkin (Telfairiaoccidentalis). 1st annual conference. Hort. Soc. Of Nigeria NIHORT, Ibadan, Nigeria.

[14]Akoroda, M.O., Ogbechie-Odiaka, N.1. Ugwu, O.E and Fuwa, B. (1989) Flowering, pollination and fruiting in fluted pumpkin. ScientiaHorti: 43:197-200.

[15]Eshett, E.T. (1993) Wetland and Ecozones: Studies on landwater. National Institute of Ecology: New Delhi and Intern Sci. Publ. New Delhi p. 232-234.

[17]Rilley, J. (2001). Presentation of statistical analysis Experimental Agriculture. Great Britain Cambridge University Press. Pp. 115-123.

[18] Ibeawuchi, I.I., Okorie Ojiugo Happiness, J.C.Obiefuna, R.A. Alagba and N.A. Okoli (2012). Seed weight and organic manure sources: Determinants of quality marketable yields of fluted pumpkin (Telfairia occidentalis Hook F) Ugu. Nigerian Journal of Horticultural Science Vol. 17, pp. 20-26.

[19]Esiaba, R.O. (1982) Cultivating the fluted pumpkin in Nigeria. World Crops (UK) 34 (2) 70-72.

[16] Wahua, T.A.T (1999) Applied Statistics for Scientific Studies. Africa Link Books. pp. 129-189.