



Effect of seed positions within the pod on some growth indices of fluted pumpkin (*Telfairia occidentalis* Hook. F.)

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Summary: The research on the effect of seed positions within the pod on some growth indices of fluted pumpkin (*Telfairia occidentalis* Hook F.) was conducted at the Western Farm of Michael Okpara University of Agriculture during 2019 and 2020 cropping seasons. It was laid out in a randomized complete block design (RCBD) replicated three times. The treatments comprised the seed positions of distal position, middle position and proximal position. Results of the research showed that fluted pumpkin stands with the longest vines of 4.72 and 5.89 cm; highest number of leaves of 48.77 and 44.29 as well as highest germination percentage of 35.25 and 35.00% in 2019 and 2020 cropping seasons were recorded by seeds located within the distal position of the pod. Similarly, days to 50% flowering of 75.50% and 76.00% in both cropping seasons revealed that seeds within the proximal position produced stands that gave early flowers over distal and middle positions which recorded late flowering. From the results therefore, seeds within the distal positions of fluted pumpkin pod gave stands with improved growth indices and are therefore recommended for the cultivation of fluted pumpkin (*Telfairia occidentalis* Hook. F.).

Key words: seeds, seed positions, growth indices, fluted pumpkin, pods

Introduction

Telfairia occidentalis Hook. F., which belongs to the family of *Cucurbitaceae* is believed to have originated from West Africa (Schippers, 2000). It is cultivated for its edible leaves and seeds and is commonly grown in homestead garden in south-eastern Nigeria (Willie et al., 2018). Although a perennial crop, it is cultivated as an annual crop (Ogbonna, 2009). Low soil fertility is identified as a major factor militating against the cultivation of fluted pumpkin (Eteng, 2015). As a remedy to low soil fertility, Eteng (2017) recommended the addition of either inorganic or organic fertilizers to augment nutrient lost through crop harvests.

The seeds of *Telfairia* which contain 58% oil and 27% protein with high methionine are eaten boiled, roasted, fermented or processed into a high protein soup seasoning or infant food (Akwaowo and Ndon, 2000; Giami et al., 2003). It is highly demanded by suckling mothers because of its high lactating properties and the leaves are used in traditional medicine in treating anaemia (Schippers, 2000). Fluted pumpkin roots have high alkaloid content and their extracts which have high mammalian toxicity are used in trailing rodents as well as killing fishes (Ajibesin et al., 2002).

Agwu and Obiefuna (1987) reported that distal position of fluted pumpkin pods produced more female plants than the proximal and middle positions. Ogbonna (2009) further noted the highest percentage of female plants from the middle position in one of his pods. Modupeola et al. (2014) reported that seeds from the proximal and distal positions exhibited the highest and lowest percentage of seedling emergence, respectively. These authors further reported that seeds within the proximal position germinated to produce plants with the longest vines, compared with seeds from the middle as well as the distal positions of the pod, while seeds within the middle position produced the leafiest plants. Therefore, this research assessed the effect of seed positions within the pod on some growth indices of fluted pumpkin (*Telfairia occidentalis* Hook. F.).

Materials and Methods

The research was conducted at the Western Farm of Michael Okpara University of Agriculture, Umudike. Umudike is located on latitude 05° 29' N and longitude 09° 33' E on the elevation of 122.0 m above sea level. It has maximum and minimum temperature of 33°C and 24°C, mean annual rainfall of 2169 mm and relative humidity of 50–95% respectively. It has a bimodal rainfall pattern, with rainfall starting from March to October and a short dry spell in August (NRCRI, 2007). The research was arranged in randomized complete block design (RCBD) replicated three times. The treatments included seed positions; of distal position, middle position and proximal position.

The research field was manually slashed and tilled by hired labor. The research layout was 27 m × 20 m or 540 m² (0.054 ha). Beds were marked out using wooden pegs, measuring tapes and ropes. Each plot measured 6 m × 6 m with 1 m spacing between plants and 1 m spacing between replications. Planting points were subsequently marked on the beds at a spacing of 1 m × 1 m, resulting in 36 plants per plot, while actual planting was conducted on 15th August in 2019 and 22nd July in 2020 with one seed planted per hole.

Telfairia has pods of varying sizes with color varying from white ash and light purple. Leaves are single and lobed on petioles. At each axil of the vine, there is a vegetative bud, a flower and a tendril. The plant is massively nutritious (Eteng, 2017). Seeds for planting were procured as pods from the open market in south-eastern Nigeria, and later processed according to the treatments of the experiment (distal, middle and proximal positions). Weeding as well as application of NPK 10:10:10 at the rate of 200 kg ha⁻¹ was conducted at three weeks after planting. The site was also properly netted to prevent the entrance of destructive pests into the plots. Data collected for growth parameters including vine length, number of leaves per plant and germination emergence was conducted 3 weeks after planting while days to 50% flowering was conducted 5 months after planting. Four sampled plants were marked out at the net plots for growth parameters.

Before the commencement of the research, composite soil samples were collected randomly at the depth of 0 – 20 cm for physico-chemical analyses. Meteorological data on rainfall (mm), relative humidity (%) and temperature (°C) were collated from the meteorological Department of Natural Roots Crops Research Institute, Umudike. All growth parameters were subjected to analysis of Variance (ANOVA) method (Gomez and Gomez, 1984) while Fisher's least significant difference (F – LSD) at 5% probability level was adopted to separate significant means.

Results and Discussion

Soil physico-chemical properties

The physico-chemical properties of the research site (Table 1) revealed that the textural class was sandy loam with the sand fraction of <80%. The chemical properties including pH of 5.3 and 5.8, total N of 0.098 and 0.65%; organic carbon of 1.94% and 1.60%; organic matter of 1.63 and 1.04% as well as available P of 25.28 and 27.10 (mg kg⁻¹) for 2019 and 2020 cropping seasons were moderate and capable of sustaining fluted pumpkin cultivation. The textural class as well as the pH levels of 5.3 – 5.8 conformed with the recommendations of (Ibia and Udo, 2009 and Remison, 2012).

Table 1. Soil physico-chemical properties of the research site during 2019 and 2020 cropping seasons

Parameters	2019	2020
Physical properties		
Sand	73.6	73.2
Silt	12.8	11.9
Clay	13.6	14.9
Textural class	Sandy loam	Sandy loam
Chemical properties		
pH	5.3	5.8
Total N (%)	0.098	0.065
Organic carbon (%)	1.94	1.60
Organic matter (%)	1.63	1.04
Available P (mgkg ⁻¹)	25.28	27.10

The meteorological properties of the research site (Table 2) showed that rainfall pattern for both cropping seasons increased in the month of April and dropped in November preparatory for the dry season. The temperature and relative humidity trend also fluctuated in accordance with the pattern of rainfall for both cropping seasons (Table 2). This shows that fluted pumpkin being a tropical leafy vegetable can thrive well in the agro-ecology given the prevailing meteorological indices during the research period. This corroborates an earlier report by Eteng (2019) that fluted pumpkin thrives well under a warm environment with planting of sunshine and rainfall. The plant thrives well in a sandy loam, well-drained soil with high organic matter with pH level of 4.5–6.0.

Table 2. Meteorological properties of the research site during 2019 and 2020 cropping seasons

Month	Rainfall (mm)		Temperature (°C)				Relative humidity (%)	
	2019	2020	Maximum		Minimum		2019	2020
	2019	2020	2019	2020	2019	2020	2019	2020
Jan	0	51	34.1	34.2	21.6	22.8	53	50
Feb	80.1	0	34.5	33.1	24.4	23.5	77	62
Mar	9.6	80.5	34.4	33.2	23.9	22.8	80	83
Apr	337.5	140.7	33.5	32.4	23.9	22.8	76	79
May	246.6	144.8	32.6	32.5	23.4	22.8	81	82
Jun	236.6	274.4	30.9	31.6	22.7	21.5	80	85
Jul	237.0	457.6	29.5	32.8	20.5	22.8	86	89
Aug	173.3	133.1	30.4	31.5	21.7	23.6	87	89
Sept	334.7	263.7	30.1	31.5	23.0	23.0	85	86
Oct	238.9	203.5	31.1	30.6	23.1	21.5	83	80
Nov	44.3	82	32.2	32.8	23.8	22.8	82	71
Dec	0	0	32.2	33.4	20.8	22.8	70	68
TOTAL	2073.6	2322.7						

Source: Meteorological Unit, NRCRI, Umudike

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The growth indices (Table 3) showed that distal seed position produced fluted pumpkin stands with the longest vine values of 4.72 and 5.89 cm; highest number of leaves values of 48.77 and 44.29 as well as germination emergence of 35.25% and 35.00% in 2019 and 2020. Cropping seasons compared with the middle and proximal position with lower values although their performances were generally

statistically similar (Table 3). Seeds from proximal position however produced fluted pumpkin stands that recorded highest 50% flowering of 75.50 and 76.00% in both cropping seasons compared with the distal and middle positions which recorded lower value (Table 3).

Seed positions did not significantly ($p > 0.05$) affect vine length and number of leaves in 2019 and 2020 cropping seasons; 50% flowering varied significantly ($p < 0.05$) with seed positions in both cropping seasons while germination count was significantly ($P < 0.05$) affected by seed position only in 2020 cropping season.

Table 3. Effect of seed positions in the pod of some growth indices of fluted pumpkin at 3 weeks after planting during 2019 and 2020 cropping seasons

Seed positions	Vine length (cm)		Number of leaves		50% flowering		Germination percentage (%)	
	2019	2020	2019	2020	2019	2020	2019	2020
Distal Position	4.72	5.89	48.77	44.29	67.75	68.25	35.25	35.00
Middle position	4.45	5.08	37.19	35.73	71.25	71.25	34.75	33.50
Proximal position	4.10	5.77	35.04	34.42	75.50	76.00	33.75	32.75
Mean	4.42	5.41	4.33	38.15	71.50	71.83	34.58	33.75
LSD	ns	ns	ns	ns	1.70	1.87	ns	0.74

This research therefore suggests that growth performances of fluted pumpkin seeds will vary with their positions of extraction within the fluted pumpkin pods. The observation that seeds extracted from the distal position gave the longest vines, highest number of leaves and germination counts did not conform with the earlier observations by Modupeola et al. (2012), who reported the opposite of our findings. However, observations on distal position performance in terms of germination emergence, number of leaves and vine length conformed with the report by (Willie and Amaechi, 2017).

Pearson correlation association between vegetative growth parameter of fluted pumpkin during 2019 and 2020 cropping seasons

Vine length in 2019 cropping season was positively correlated but not significant ($P < 0.05$) with vine length ($r = 0.0272$) and leaf number ($r = 0.0245$) in 2020. Vine length in 2019 positively correlated and significant ($p < 0.05$) with leaf number ($r = 0.595^*$) in 2019. Vine length in 2019 was negatively correlated but significant ($p < 0.05$) with time of flowering ($r = -0.053$) in 2019 and time of flowering ($r = -0.073$) in 2020.

Vine length in 2020 was positively correlated but not significant ($p < 0.05$) with leaf number ($r = 0.542$) in 2019. It was negatively correlated but positive ($p < 0.05$) with leaf number ($r = -0.0134$) and time of flowering ($r = -0.0330$) in 2020. Vine length in 2020 was however negatively correlated but significant ($p < 0.05$) with time of flowering ($r = -0.0618^*$) in 2019.

Leaf number in 2019 was positively correlated but not significant ($p < 0.05$) with leaf number ($r = 0.410$) in 2020. It was negatively correlated and significant ($p < 0.05$) with time of flowering ($r = -0.0351^*$) in 2019 and time of flowering ($r = -0.0195$) in 2020. Leaf number in 2020 was negatively correlated and not significant ($p < 0.05$) with percentage flowering ($r = -0.0252$) and ($r = -0.0356$) in 2019 and 2020, respectively. Percentage of flowering in 2019 was positively correlated and highly significant ($p < 0.01$) with percentage flowering ($r = 0.0888^{**}$) in 2020 cropping season.

This suggests that the performance of some growth parameters of fluted pumpkin is directly dependent on another. It shows, however, that the negative or positive performance of a given parameter may likely affect another or vice versa. The findings are in the earlier report by Willie and Amaechi (2017), Ajibasin et al. (2022) and Giami et al. (2003).

Table 4. Pearson correlation association between vegetative growth parameters of fluted pumpkin during 2019 and 2020 cropping seasons

PARAMETERS	ED2019	MKTYIELD	VEDIBLE	VL 2019	VL 2020	LEAF NUMBER 2019	LEAF NUMBER 2020	% FLOWERING 2019	% FLOWERING 2020	POD NUMBER 2019	POD NUMBER 2020
ED2019	1										
MKTYIELD	0.0138	1									
VEDIBLE	0.0162	-0.0993**	1								
VL 2019	0.0282	-0.0473	-0.0489	1							
VL 2020	0.0233	-0.0156	-0.0173	0.0272	1						
LEAF NUMBER 2019	0.0246	-0.0677*	-0.0717**	0.0595*	0.0542	1					
LEAF NUMBER 2020	0.0249	-0.0260	-0.0309	0.0345	-0.0134	-0.041	1				
% FLOWERING 2019	0.0085	0.033	0.089	-0.085	-0.0616*	-0.0351	-0.0252	1			
% FLOWERING 2020	-0.0060	-0.003	0.066	-0.073	-0.0350	-0.0195	-0.0356	0.0898**	1		
POD NUMBER 2019	-0.0292	0.0199	0.0127	-0.0115	0.0241	0.0254	0.0515	-0.0448	-0.0451	1	
POD NUMBER 2020	-0.0121	0.000	-0.063	-0.088	0.0379	0.0312	0.0635*	-0.0650*	-0.0609*	0.0807**	1

** Correlation is significant at the 0.01 level (2 tailed)

*Correlation is significant at the 0.05 level (2 tailed)

Conclusions

The research has revealed that growth performance of fluted pumpkin seeds varies with seed positions within the pod. However, to ensure the effect of seed position within the pod on seed performances, there is a greater need for fluted pumpkin farmers to extract seeds from the different positions separately and as well plants them separately. This suggests further that mixing of seed from the three positions after extraction should be avoided by farmers. This will enhance proper monitoring and evaluation of seed performances from the distal, proximal and middle positions of fluted pumpkin pods. Consequently, seeds located within the distal and proximal positions of fluted pumpkin pods are recommended to farmers over those located within the middle positions.

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Uticaj položaja semena unutar mahune na neke pokazatelje rasta tikvice sa uzdužnim žlebovima (*Telfairia occidentalis* hook. F.)

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Sažetak: Istraživanje o uticaju položaja semena unutar mahune na neke pokazatelje rasta tikvice sa uzdužnim žlebovima (*Telfairia occidentalis* Hook F.) sprovedeno je na Zapadnoj farmi Univerziteta poljoprivrede Michael Okpara tokom sezona setve 2019. i 2020. godine. Istraživanje je bilo organizovano u potpunom nasumičnom blok rasporedu (RCBD) sa tri ponavljanja. Tretmani su obuhvatali položaje semena - distalni položaj, srednji položaj i proksimalni položaj. Rezultati istraživanja su pokazali da tikvice sa semenima smeštenim u distalnom položaju mahune pokazuju najduže stabljike od 4,72 i 5,89 cm; najveći broj listova od 48,77 i 44,29 kao i najviši procenat klijanja od 35,25 i 35,00% tokom sezona setve 2019. i 2020. godine. Takođe, dani do 50% cvetanja od 75,50% i 76,00% u obe setve otkrili su da su tikvice sa semenima smeštenim u proksimalnom položaju procvetale ranije u poređenju sa distalnim i srednjim položajem koji su zabeležili kasnije cvetanje. Na osnovu rezultata, može se zaključiti da tikvice sa semenima smeštenim u distalnom položaju mahune imaju poboljšane pokazatelje rasta i stoga se preporučuju za gajenje tikvica sa uzdužnim žlebovima (*Telfairia occidentalis* Hook F.).

Ključne reči: seme, pokazatelji rasta, rebrasta bundeva, mahuna, položaj semena