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EFFECT OF TRELLIS HEIGHT AND CUTTING FREQUENCY ON LEAF AND FRUIT YIELD OF FLUTED PUMPKIN (*Telfairia occidentalis* Hook F.)

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ABSTRACT

The horticultural management practices of trellis height and cutting frequency were evaluated to determine their effect on the yield of fluted pumpkin. Three bamboo trellis heights (non-trellised, 45 cm, and 90 cm) were combined with two cutting (uncut and bi-weekly) intervals to give six treatment combinations replicated three times in a 3 x 2 factorial in RCBD. The data collected were; length of the longest vine, number of leaves/plant, number of leaves/vine length of 40 cm, length and width of the central leaflet, vine diameter, marketable leaf yield by weight, days to first male and female flowering, number, weight, length, and circumference of the fruits. The data collected were subjected to analysis of variance (ANOVA) using GenStat Release 10.3DE statistical software. Trellis height of 90 cm was significantly ($p<0.05$) higher in most of the morphological parameters measured. Although there were no significant effects of trellis on number of days to anthesis, the result revealed improvement on the number of days to flowering as the trellis height increased. The trellised plants were significantly ($p<0.05$) higher than the non-trellised in total leaf yield/hectare. The uncut vines produced higher values in average fruit weight, fruit circumference, fruit length and total fruit weight/ha than the cut vines in both years. Trellis (staking) improved the vegetative phase, flowering and yield of *T. occidentalis* and should therefore, be introduced as an agronomic practice in fluted pumpkin production.

Keywords: Cutting frequency, *Telfairia*, staking, trellis height, yield**.**

INTRODUCTION

Fluted pumpkin (*Telfairia occidentalis* Hook F.) is mainly cultivated for its leaves, tender vines and seeds (Ajayi *et al.*, 2007). The leaves are rich sources of protein, oil, vitamins and minerals (Aregheore, 2007). Relative to most common vegetables, its protein content is high (Ladeji *et al*., 1995). Fluted pumpkin has been shown to protect and ameliorate oxidative brain and liver damage induced by malnutrition in rats (Kayode *et al.*, 2009, 2010).

Fluted pumpkin is extensively cultivated in southern Nigeria especially by the Igbos (Aremu and Adewale, 2012). Its cultivation has spread to other areas of Nigeria where Igbos and their neighbours have settled (Schippers, 2002). The increasing popularity of the crop beyond the south eastern states of Nigeria had increased the demand on its produce. To bridge this gap, yield increase can be through expansion or improvement in the productivity of the cultivated land area. The choice of the latter option is preferable as agricultural land is constantly under pressure for non-agricultural uses. Currently there are no standardized or formalized techniques of producing *Telfairia* (Odiaka *et al.*, 2008) which had led to yield loss. Standardization of *Telfairia* production technique will in no doubt improve the yield.

Ogar and Asiegbu (2005) concluded that agronomic practices like fertilizer rate and cutting frequency had significant effect on the harvestable leaf and fruit yield of fluted pumpkin. Similarly, Odiaka and Akoroda (2009) reported significant effect of stage of fruit harvest and storage period on seed viability of *T. occidentalis*. The horticultural practice of staking had been reported to improve yield in ridge gourd (Hilli *et al*., 2009); cucumber (Hardy and Rowell, 2002) and yam (Ndegwe *et al.*, 1990). Asante (1996) maintained that in cultivation of climbing crops, the use of suitable supports, in the form of stakes or trellises, is very important as they not only expose the leaves to sunlight for optimum photosynthesis but also keep the fruits off the ground, thereby preventing them from being infected by soil-borne pathogens.

There is dearth of information on the yield performance of *T. occidentalis* under staking management practice. The objective of the study, therefore, was to determine the effect of trellis and cutting frequency on yield of *T. occidentalis* in Nsukka agro-ecology.

MATERIALS AND METHODS

Field experiments were conducted at the Department of Crop Science Teaching and Research Farm, Faculty of Agriculture, University of Nigeria, Nsukka (07 ^{0} 29 N, 06 ^{0} 51 E, and 400 m.a.s.l.). Nsukka is characterized by lowland humid tropical conditions with bimodal annual rainfall distribution that ranges from 1155 mm to 1955 mm with a shift in the second peak of rainfall from September to October, a mean annual temperature of 29 ^{0} C to 31 ^{0} C and a relative humidity that ranges from 69% to 79 % (Uguru *et al*., 2011).

Soil samples were collected at random from 12 representative points augered to a depth of 0-20 cm. These were bulked to form a composite sample from which a sub-sample was taken for soil analysis to determine the physical and chemical properties of the experimental field.

Meteorological data were collected on temperature, rainfall, and relative humidity from the Department of Crop Science Meteorological Unit, University of Nigeria, Nsukka during January, 2011 to December, 2012.

The experimental design was a 3 x 2 factorial in a randomized complete block design (RCBD). Three bamboo trellis heights (non-trellised, 45 cm, and 90 cm) were combined with two cutting (uncut and bi-weekly) intervals to give six treatment combinations replicated three times.

The experimental field measuring 294 m^2 was cleared, ploughed, harrowed and marked out into three blocks. Each block was divided into six plots, each measuring 4 m x 3 m (12 m^2). A distance of 1 m and 0.5 m were allowed between blocks and plots, respectively. The seeds were pre-sprouted in the nursery and transplanted at a distance of 1 m apart with 12 seedlings per plot giving a population of 10,000plants/hectare.

Well cured pig manure was applied at 20 t/ha to the plots two weeks before transplanting and supplemented with inorganic fertilizer (15:15:15) NPK at 750 kg/ha split at four and ten week after transplanting (WAT) (Ogar and Asiegbu, 2005). The vines were guided to the trellis one WAT while cutting started at three WAT.

The following data were collected bi-weekly at the vegetative stage: length of the longest vine, number of leaves/plant, number of leaves/vine length of 40 cm, length of the central leaflet, width of the central leaflet, vine diameter, marketable leaf yield by weight, days to first male and female flowering while number, weight, length, and circumference of fruits were measured at the end of the experiment. The experiment was carried out in 2011 and repeated in 2012.

Statistical Analysis: The data collected were subjected to analysis of variance (ANOVA) using GenStat Release 10.3DE (2011) statistical software. The means were compared using Fisher's least significant difference (F-LSD) as described by Obi (2002).

RESULTS

High rainfall that would permit cropping was evident from April and lasted till October while January, November and December were periods of little or no rainfall in both years (Table 1). Rain days were fairly stable from May to October, although there was no rainfall in August, 2012. The total rainfall/month peaked bi-modally in July and September for 2011; May and September for 2012 but was higher in September 2012 compared to other months. There was more quantity of rainfall and lower rain days during 2012 than 2011. Temperature was high throughout the years and did not appear significantly limiting at any period. Relative humidity closely followed the monthly rainfall pattern.

The soil of the experimental site was characterized texturally as a sandy clay loam (Table 2). The pH was rather low, being high in exchangeable acidity. The N, P and K contents were low. Magnesium and Calcium contents and base saturation were also low.

Table 3 showed non-significant ($P<0.05$) differences for vine diameter among the trellis heights for periods measured except at nine WAT, where trellis height of 90 cm was significantly ($P<0.05$) higher than trellis height of 45 cm and the non-trellised. At seven and nine WAT, the non-trellised treatment was significantly ($P<0.05$) lower than 45 cm and 90 cm trellis heights in length of the longest vine. It also gave the highest number of leaves/plant over the periods that were not significantly ($P<0.05$) different from the others. At nine WAT, trellis height of 45 cm was significantly ($P<0.05$) higher in length of the central leaflet than the others.

There was non-significant ($P<0.05$) difference between the cutting frequencies in vine diameter at the early stage until at seven WAT, where the uncut vines were significantly ($P<0.05$) higher than the bi-weekly cutting (Table 4). Length of the longest vine, number of vines and number of leaves/plant of the uncut were significantly ($P<0.05$) higher than bi-weekly cutting at five, seven, and nine WAT. The uncut and trellis height of 90 cm was significantly ($P<0.05$) higher in vine diameter than others at seven and nine WAT (Table 5). The uncut and trellis height of 45 cm produced a significantly ($P<0.05$) higher vine length than those cut bi-weekly and trellis height of 45 cm, and the non-trellised at five WAT. Those uncut vines and non-trellised were significantly ($P<0.05$) higher in number of leaves/plant than others at five, seven and nine WAT. At nine WAT, the non-trellised and cut bi-weekly were significantly ($P<0.05$) lower in number of vines.

There was a non-significant ($P<0.05$) difference between the cutting frequencies and among the trellis heights although there was a reduction in number of days to first female anthesis as the trellis height increased (Table 6). The uncut and trellis height of 45 cm and 90 cm gave the shortest number of days of 115, each for first female anthesis which were significantly ($P<0.05$) lower than bi-weekly cutting and trellis height of 45 cm. The uncut male plants flowered earlier than the cut male plants (Table 7). There was a non-significant decrease in number of days to first male anthesis as the trellis height increased. The uncut and trellis height of 90 cm gave the shortest number of days to first male anthesis of 103 days.

Trellis height of 90 cm was significantly ($p<0.05$) higher in harvestable leaves than the other heights at three WAT (Table 8). It was also significantly ($p<0.05$) higher than the non-trellised in total leaf yield/hectare. The uncut vines gave non-significant high values for all the fruit parameters measured with the exception of number of fruits/hectare where the bi-weekly cutting was high (Table 9).

Table 1: Nsukka meteorological data for 2011 and 2012

	2011						2012					
	Rainfall (mm)		Temperature (º C)		Relative Humidity (%)		Rainfall (mm)		Temperature (º C)		Relative Humidity (%)	
	Total	Days	Max	Min	10am	4 pm	Total	Days	Max	Min	10am	4 pm
January	0.0	0	32.1	18.4	57.1	44.7	0.0	0	31.7	19.8	58.2	48.7
February	54.9	3	32.3	22.1	73.8	60.5	23.1	3	31.8	21.7	73.6	61.3
March	14.5	2	33.9	22.9	72.2	57.3	0.0	0	33.4	23.0	71.3	53.4
April	87.1	8	30.8	22.0	74.3	65.1	103.9	4	31.4	22.4	73.8	62.8
May	140.5	12	30.4	21.9	74.5	70.1	282.1	13	30.2	21.0	74.1	67.8
June	127.3	12	28.6	21.5	75.7	71.3	193.6	13	28.4	20.3	75.8	71.5
July	193.0	13	27.7	21.0	75.7	72.5	276.1	20	27.8	20.3	75.4	72.3
August	149.1	14	26.9	20.7	76.5	73.9	0.0	0	26.6	20.1	74.6	71.9
September	254.0	15	27.6	20.7	76.8	73.7	307.5	16	27.7	20.4	75.8	75.3
October	183.9	12	28.3	20.8	75.6	72.1	291.6	18	28.3	20.1	73.2	73.0
November	27.9	2	30.3	20.8	69.3	59.5	61.0	4	30.1	21.6	73.8	73.8
December	0.0	0	31.6	16.7	56.5	47.4	0.0	0	30.9	18.7	75.0	75.0

Table 2: Soil physical and chemical properties of the experimental site

Mechanical properties	
Clay (%)	25
Silt (%)	8
Coarse sand (%)	40
Fine sand (%)	28
Textural class	Sandy clay loam
Chemical properties	
pH in water	4.8
pH in KCl	3.8
Organic carbon (%)	1.46
Organic matter (%)	2.52
Total nitrogen (%)	0.042
Phosphorus (ppm)	22.38
Exchangeable bases in me/100 g soil	
Sodium (Na+)	0.19
Calcium (Ca2+)	2.2
Potassium (K+)	0.06
Magnesium (Mg2+)	1
CEC	8.8
Base saturation (%)	39.2
Exchangeable acidity in me/100 g soil	
Aluminum (Al_3^+)	-
Hydrogen (H^+)	2

In average fruit weight and fruit circumference, trellis height of 90 cm was significantly ($P<0.05$) higher than others (Table 10). It also gave the longest fruit length that was not significantly ($P<0.05$) different from others.

The uncut and trellis height of 90 cm gave the highest average fruit weight of 5.11 kg per hectare that was significantly ($P<0.05$) higher than bi-weekly cutting and trellis height of 45 cm, and the non-trellised that was cut bi-weekly (Table 11). Trellis height of 90 cm and bi-weekly cut treatment gave the highest fruit circumference of 69.1 cm that was significantly (P<0.05) higher than bi-weekly cutting and trellis height of 45 cm, and the non-trellised and bi-weekly cut. It also produced the longest fruit length of 46.5 cm that was significantly (P<0.05) higher than bi-weekly cutting and trellis height of 45 cm. The uncut vines and trellis height of 45 cm gave the highest total fruit weight/hectare of 30.52 t/ha that was significantly (P<0.05) higher than bi-weekly cutting and trellis height of 45 cm.

Table 3: Main effect of trellis heights on morphological growth parameters of *T. occidentalis* nine weeks after transplanting

Trellis Height	VD	NOV	LLV	LP	LVL	WCL	LCL
				3 WAT			
Non-trellised	5.22	1.42	44.50	17.00	5.50	4.52	7.73
45 cm	5.13	1.50	40.60	14.80	5.42	4.31	8.27
90 cm	5.18	1.50	49.80	16.40	4.42	5.02	9.13
F-LSD(P=0.05)	n.s	n.s	n.s	n.s	0.86	n.s	1.32
				5 WAT			
Non-trellised	7.22	4.25	63.20	46.90	6.67	5.87	10.33
45 cm	6.94	3.17	80.80	41.20	6.08	6.55	12.38
90 cm	7.22	3.50	80.80	45.60	6.00	6.59	12.21
F-LSD(P=0.05)	n.s	0.88	n.s	n.s	n.s	n.s	0.74
				7 WAT			
Non-trellised	7.51	6.38	114.00	74.00	4.88	7.54	12.88
45 cm	7.34	4.00	150.80	62.70	4.00	8.56	14.11
90 cm	7.79	4.75	141.80	73.10	4.75	7.59	13.72
F-LSD(P=0.05)	n.s	1.94	15.14	n.s	0.85	n.s	n.s
				9 WAT			
Non-trellised	7.93	5.25	136.20	97.20	4.38	8.54	12.88
45 cm	8.28	5.50	199.10	81.20	3.50	8.33	14.48
90 cm	9.40	5.62	220.50	96.50	3.75	8.50	13.29
F-LSD(P=0.05)	0.81	n.s	22.30	n.s	0.52	n.s	0.91

VD=Vine diameter (mm), NOV=Number of vine, LLV=Length of the longest vine (cm), LP= Number of leaves per plant, LVL= Number of leaves per vine length of 40 cm, WCL=Width of the central leaflet (cm), LCL= Length of the central leaflet (cm), WAT= Weeks after transplanting and n.s=non-significant.

Table 4: Main effect of cutting frequency on morphological growth parameters of *T. occidentalis* over weeks after transplanting

Cutting Frequency	VD	NOV	LLV	LP	LVL	WCL	LCL
				3 WAT			
Uncut	5.08	1.33	45.00	16.80	5.28	4.53	7.89
Bi-weekly	5.27	1.61	44.90	15.30	4.94	4.71	8.86
F-LSD(P=0.05)	n.s	n.s	n.s	n.s	n.s	n.s	n.s
				5 WAT			
Uncut	7.16	4.11	83.90	53.00	6.39	6.55	12.06
Bi-weekly	7.09	3.17	66.00	36.10	6.11	6.12	11.22
F-LSD(P=0.05)	n.s	0.72	16.47	9.81	n.s	n.s	0.61
				7 WAT			
Uncut	7.92	5.75	151.20	86.20	4.58	7.06	12.45
Bi-weekly	7.18	4.33	119.80	53.70	4.50	8.73	14.69
F-LSD(P=0.05)	0.51	1.58	12.36	17.00	n.s	1.03	1.48
				9 WAT			
Uncut	8.82	6.08	247.50	121.60	3.33	8.93	13.69
Bi-weekly	8.25	4.83	123.10	61.80	4.42	7.98	13.40
F-LSD(P=0.05)	n.s	0.98	18.21	24.24	0.42	0.74	n.s

VD=Vine diameter (mm), NOV=Number of vine, LLV=Length of the longest vine (cm), LP= Number of leaves per plant, LVL= Number of leaves per vine length of 40 cm, WCL=Width of the central leaflet (cm), LCL= Length of the central leaflet (cm), WAT= Weeks after transplanting and n.s=non-significant.

Table 5: Trellis heights x cutting frequency interaction on morphological growth parameters of *T. occidentalis* nine weeks after transplanting

Trellis Height	Cutting Frequency	VD	NOV	LLV	LP	LVL	WCL	LCL
					3 WAT			
Non-trellised	Uncut	5.30	1.67	41.70	18.20	5.83	4.38	7.63
Non-trellised	Bi-weekly	5.13	1.17	47.30	15.80	5.17	4.67	7.82
45 cm	Uncut	4.73	1.17	43.50	16.30	5.67	4.43	7.50
45 cm	Bi-weekly	5.52	1.83	37.70	13.30	5.17	4.18	9.03
90 cm	Uncut	5.20	1.17	49.80	16.00	4.33	4.78	8.55
90 cm	Bi-weekly	5.17	1.83	49.70	16.80	4.50	5.27	9.72
F-LSD(P=0.05)		n.s	n.s	n.s	n.s	1.22	n.s	1.86
					5 WAT			
Non-trellised	Uncut	7.67	5.00	70.30	60.70	6.83	5.80	10.48
Non-trellised	Bi-weekly	6.77	3.50	56.20	33.20	6.50	5.90	10.17
45 cm	Uncut	6.32	3.83	98.50	47.20	5.83	7.10	13.53
45 cm	Bi-weekly	7.57	2.50	63.00	35.20	6.33	6.00	11.23
90 cm	Uncut	7.48	3.50	82.80	51.20	6.50	6.70	12.17
90 cm	Bi-weekly	6.95	3.50	78.80	40.00	5.50	6.45	12.25
F-LSD(P=0.05)		n.s	1.25	28.53	16.99	n.s	1.28	1.05
					7 WAT			
Non-trellised	Uncut	7.65	7.50	129.20	96.00	5.00	7.23	11.90
Non-trellised	Bi-weekly	7.38	5.25	98.80	52.00	4.75	7.85	13.85
45 cm	Uncut	7.70	4.25	175.20	75.20	4.00	7.95	13.80
45 cm	Bi-weekly	6.98	3.75	126.20	50.20	4.00	9.18	14.42
90 cm	Uncut	8.40	5.50	149.00	87.50	4.75	6.00	11.65
90 cm	Bi-weekly	7.18	4.00	134.50	58.80	4.75	9.18	15.80
F-LSD(P=0.05)		0.88	2.74	21.42	29.44	n.s	1.79	2.56
					9 WAT			
Non-trellised	Uncut	7.73	6.50	184.20	134.50	4.00	9.10	13.25
Non-trellised	Bi-weekly	8.13	4.00	88.20	60.00	4.75	7.98	12.50
45 cm	Uncut	8.48	5.75	293.00	105.20	3.00	8.73	14.33
45 cm	Bi-weekly	8.08	5.25	105.20	57.20	4.00	7.93	14.62
90 cm	Uncut	10.25	6.00	265.20	125.00	3.00	8.95	13.50
90 cm	Bi-weekly	8.55	5.25	175.80	68.00	4.50	8.05	13.08
F-LSD(P=0.05)		1.14	1.70	31.53	41.98	0.73	n.s	1.29

VD=Vine diameter (mm), NOV=Number of vine, LLV=Length of the longest vine (cm), LP= Number of leaves per plant, LVL= Number of leaves per vine length of 40 cm, WCL=Width of the central leaflet (cm), LCL= Length of the central leaflet (cm), WAT= Weeks after transplanting and n.s=non-significant.

Table 6: Effect of trellis height and cutting frequency on number of days to first female anthesis

Cutting Frequency	Trellis Height			Mean
	Non-trellised	45 cm	90 cm	
Uncut	125	115	115	118
Bi-weekly	121	127	118	122
Mean	123	121	116	

F-LSD (P=0.05) for Cutting Frequency (CF) = non-significant F-LSD (P=0.05) for Trellis Height (TH) = non-significant
F-LSD (P=0.05) for CF X TH = non-significant

Table 7: Effect of trellis height and cutting frequency on number of days to first male anthesis

Cutting Frequency	Trellis Height			Mean
	Non-trellised	45 cm	90 cm	
Uncut	108	107	103	106
Bi-weekly	111	111	107	110
Mean	110	109	105	

F-LSD (P=0.05) for Cutting Frequency (CF) = non-significant F-LSD (P=0.05) for Trellis Height (TH) = non-significant
F-LSD (P=0.05) for CF X TH = non-significant

Table 8: Main effects of trellis heights on harvestable leaf yield (t/ha) of *T. Occidentalis*

Trellis Height	3 WAT	5 WAT	7 WAT	9 WAT	TOTAL
Non-trellised	0.78	0.93	1.22	1.74	4.66
45 cm	1.08	1.31	1.56	2.21	6.17
90 cm	1.27	1.21	1.63	2.29	6.40
F-LSD(P=0.05)	0.16	n.s	n.s	n.s	1.59

WAT= Weeks after transplanting, t/ha=tonnes/hectare and n.s=non-significant

Table 9: Main effects of cutting frequency on fruit yield of *T. Occidentalis*

Cutting Frequency	NFH	TFWH (t/ha)	AFW (kg)	FC (cm)	FL (cm)
Uncut	6042	25.41	4.4	63.7	42.9
Bi-weekly	6806	23.19	3.6	61.7	40.2
F-LSD(P=0.05)	n.s	n.s	n.s	n.s	n.s

NFH=Number of fruits/hectare, TFWH=Total fruit weight/hectare (t/ha), AFW= Average fruit weight (kg), FC=Fruit circumference (cm), FL=fruit length, and n.s=non-significant.

Table 10: Main effects of trellis heights on fruit yield of *T. Occidentalis*

Trellis Height	NFH	TFWH (t/ha)	AFW (kg)	FC (cm)	FL (cm)
Non-trellised	7396.0	24.46	3.5	60.3	40.2
45 cm	7083.0	24.50	3.5	59.6	39.1
90 cm	4792.0	23.94	5.0	68.2	45.2
F-LSD(P=0.05)	2356.3	n.s	1.2	6.2	n.s

NFH=Number of fruits/hectare, TFWH=Total fruit weight/hectare (t/ha), AFW= Average fruit weight (kg), FC=Fruit circumference (cm), FL=fruit length, and n.s=non-significant.

Table 11: Trellis heights x cutting frequency interaction on fruit yield of *T. Occidentalis*

Trellis Height	Cutting Frequency	NFH	TFWH (t/ha)	AFW (kg)	FC (cm)	FL (cm)
Non-trellised	**Uncut**	5625.0	20.62	3.95	61.60	42.50
45 cm	**Uncut**	7500.0	30.52	4.18	62.10	42.20
90 cm	**Uncut**	5000.0	25.08	5.11	67.30	44.00
Non-trellised	**Bi-weekly**	9167.0	28.31	3.07	59.00	38.00
45 cm	**Bi-weekly**	6667.0	18.48	2.82	57.00	36.10
90 cm	**Bi-weekly**	4583.0	22.79	4.90	69.10	46.50
F-LSD(P=0.05)		3332.3	10.54	1.67	8.78	9.12

NFH=Number of fruits/hectare, TFWH=Total fruit weight/hectare (t/ha), AFW= Average fruit weight (kg), FC=Fruit circumference (cm), FL=fruit length, and n.s=non-significant.

DISCUSSION

The high number of leaves/vine length of 40 cm in the uncut vines showed that it had shorter internodes distance which suggested slow rate of vine growth as against the cut vines that had longer internodes distance as a result of new flushes.

Staking (trellis) improved the vine length over the unstaked. Nweke *et al.* (2013) reported that the number of branches, number of leaves, vine length and leaf area were higher in staked cucumber (*Cucumis sativus* L.) than the non-staked plants. They suggested that the leaves on the staked plants were all exposed to greater light interception leading to a higher accumulation of photosynthates for vegetative growth.

Okoli and Mgbeogu (1983) noted that fluted pumpkin is grown close to trees, walls, fences and structures on which the shoots are allowed to climb. Hilli *et al*. (2009) reported that trellis provides better opportunity for crop to exploit sunlight which will lead to maximum production of vine, number of leaves and side branches that will result in better assimilation of carbohydrates. Trellis height of 90 cm in this study was significantly ($p<0.05$) higher in most of the morphological parameters measured which translated to higher leaf yield. This increase may be attributed to the more penetration and better utilization of sunlight for producing maximum number of leaves resulting in increased photosynthetic activity and assimilation of photosynthates. This is in agreement with the findings of Hilli *et al*. (2009) in ridgegourd and Patil *et al.* (1973) in muskmelon.

Although there were non-significant effect of trellis on number of days to anthesis (Tables 6 and 7), the result revealed improvement on the number of days to flowering as the trellis height increased. Schiavinato and Válio (1996) had earlier reported improvement in flowering of staked *P. tetragonolobus* over unstaked plants.

There was increase in total leaf yield as the trellis height increased. Trellis height of 90 cm was significantly ($p<0.05$) higher than the non-trellised in total leaf yield. Hilli *et al*. (2009) reported a significant difference in growth, fruit set, and seed yield of staked ridgegourd (*Luffa acutangula* L. Roxb), another member of the Cucurbitaceae family. The agronomic practice of staking had been reported to improve yield in crops like yam (Ndegwe *et al.,* 1990), beans (*Vigna spp*) (Akobundu, 1987), and cucumber (Nweke *et al*., 2013). Ogar and Asiegbu (2005) showed that agronomic practices like fertilizer rate and cutting frequency had significant effect on the harvestable leaf and fruit yield of fluted pumpkin.

The uncut vines produced higher values in average fruit weight, fruit circumference, fruit length and total fruit weight/ha than the cut vines in both years. This agrees with Ogar and Asiegbu (2005) where successive increase in interval between harvests progressively increased the weight of fruits/plant. The better performance of the uncut vines was due to availability of more leaves that were photosynthetically active in translocation of assimilates to the sink (fruit) for storage. It compensated for its leaf yield lost in fruit yield.

Trellis height of 90 cm gave significantly ($p<0.05$) higher fruit length, circumference and average fruit weight than the non-trellised which aligned with the findings of Hilli *et al*. (2009) in ridgegourd; Hardy and Rowell (2002) in cucumber where staking improved fruit yield parameters. Igwilo (1989) and Ndegwe *et al.* (1990) concluded that staking increased the tuber yield of yam. The earliness in flowering of trellis height of 90 cm may have contributed to its high performance in fruit yield parameters. This is in agreement with the suggestion of Odiaka and Akoroda (2009) that time of flower set affects fruit yield parameters in fluted pumpkin. Nweke *et al.* (2013) suggested that staking reduced overcrowding and enhanced exposure or positioning of cucumber leaves to sunlight for effective photosynthetic activities. The distribution of solar energy within the plant community is affected by the leaf canopy's density, height, and capacity to transmit the energy for photosynthesis (Agricultural Technology, 2010).

Conclusion: Staking (trellis) improved the vegetative phase, flowering and yield of *T. occidentalis* probably as a result of adequate canopy spacing with more penetration and better utilization of sunlight for maximum photosynthetic activity. The result showed that the improvement progressed with increase in trellis height. Therefore, staking should be introduced as an agronomic practice in fluted pumpkin production in Nsukka agro-ecology.

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