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AGRONOMIC ASSESSMENT OF SOME SWEET POTATO VARIETIES FOR INTERCROPPING WITH PIGEONPEA IN SOUTHERN GUINEA SAVANNA OF NIGERIA

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ABSTRACT

Field experiments were conducted at the National Root Crops Research Institute Sub-Station, Otobi in 2006 and 2007 to assess the suitability of improved Sweet potato varieties for intercropping with pigeonpea and also determine the planting pattern and productivity of this intercropping system. Intercropping decreased total fresh root and saleable root yields of sweet potato when mixed or row-intercropped with pigeonpea. All intercropping combinations of sweet potato varieties and pigeonpea had land equivalent ratio above 1.0, except that with WA Gabolige, signifying high intercrop advantages. TIS 87/0087 produced the highest total fresh root and saleable root yields in both cropping systems, irrespective of the planting pattern used. TIS 2532.O.P.1.13 and TIS 86/00356 sweet potato varieties had comparable yields with TIS 87/0087 in both cropping systems. Pigeonpea was the more competitive component of the intercropping. Farmers' willingness to adopt this technological option of sweet potato + pigeonpea intercropping further assured its potential benefits and sustainability in Southern Guinea Savanna of Nigeria.

Keywords: sweet potato, intercropping, pigeonpea, southern guinea savanna.

INTRODUCTION

Sweet potato (*I pomea batatas* L. Lam) is a major food and industrial root crop in Nigeria with an estimated annual production figure of 2.516 million tons (FAO, 2004), and mean yield on farmers' fields (3-7 t/ha) is considered low (Udealor *et al*., 2006). Sweet potato has a long history as a crop to stave off famine-especially as a cheap source of calories (Adam, 2005). Pigeonpea (*Cajanus cajan* (L.) Millsp.) is a multipurpose leguminous crop that can provide food, fuelwood and fodder for small-scale farmer in subsistence agriculture (Egbe and Kalu, 2006;Tabo *et al*.,1995) Intercropping sweet potato with pigeonpea would ensure the supply of dietary carbohydrate, protein, fats, vitamins and minerals (calcium, magnesium, copper, iron, and zinc) of the rural household. Furthermore, intercropping both crops would not only ensure better environmental resource utilization, but would also provide better yield stability, reduce pests and diseases and diversify rural income (Egbe, 2005; Njoku *et al*., 2007). Although presently unpopular, growing sweet potato with pigeonpea in mixtures or intercropping has enormous potentials in Southern Guinea Savanna agro-ecological zone of Nigeria, where poverty level is high, income generation opportunities are few and soil fertility status is low (Egbe, 2005; Egbe and Kalu, 2006).

The sweet potato variety commonly cultivated by farmers in Southern Guinea Savanna Zone of Nigeria often result in low yields (3-9.0 t ha $^{-1}$) (BNARDA, 2007) and when intercropped with pigeonpea, the planting pattern is highly variable from one farm to the other. Though yield advantages occur in sweet potato intercropped with such other crops as maize and okra (Udealor *et al*., 2006; Njoku *et al*., 2007) and in pigeonpea intercropping with maize and sorghum (Egbe and Adeyemo, 2006; Egbe, 2005), documented information on yield advantages derivable from sweet potato + pigeonpea intercropping are lacking. The work reported here sought to determine the suitability of Sweet potato varieties for intercropping with pigeonpea and to assess the productivity of the intercropping systems with the aim of enhancing food security in the region. The work also aimed at popularizing new sweet potato varieties suitable for intercropping in the Southern Guinea Savanna of Nigeria.

MATERIALS AND METHODS

The study was conducted at the National Root Crops Research Institute Sub-Station, Otobi [07^{0}10'N, 08^{0}39'E, elevation 105.1m] in Benue State, located in the Southern Guinea Savanna of Nigeria (Kowal and Knabe, 1972). The texture of the top soil (0-30 cm) of the experimental site was sandy loam. The soil at the experimental site was classified as Typic Paleustalf (USDA). Eight core samples of soil were collected from different parts of the experimental field and bulked into a composite sample and used for the determination of the chemical and physical properties of the soil before planting. The level of total nitrogen (N) was 0.52%, phosphorus and potassium averaged 68.20 and 43.50 mg kg^{-1} soil, respectively. The rainfalls at the site were 1250.8 mm and 1301.1 mm in 2006 and 2007, respectively, between the months of July and November of each year. The experimental field was ploughed, harrowed and ridged before planting in each year of experimentation. The experiment was a 2 x 6 x 2 factorial set out in split-split plot in a randomized complete block design with three replications. The main-plot treatments were two cropping systems (i) sole cropping (sweet potato, pigeonpea) and (ii) intercropping (sweet potato plus pigeonpea). The sub-plot treatments comprised of five improved sweet potato varieties obtained from the National Root Crops Research Institute, Umudike and a local check (TIS 87/0087, CIP Tanzania, WA Gabolige, TIS 2532.OP.I.13, TIS 86/00356 and *Ogege*-local check). The sub-sub-plot treatments were made up of two planting patterns of pigeonpea + sweet potato intercropping [mixture (top) and row-intercropping (side)]. The gross plot comprised of 5 ridges each of 4m long ($20m^2$), while the net plot had 3 ridges each of 3m long ($9m^2$), entrimmed. Planting were done on the 20^{th} and 24^{th} July, 2006 and 2007, respectively. Sweet potato vine cuttings measuring 20 cm with four nodes were planted at the crest of ridges at a spacing of 1m x 0.3m (33,000 plants per hectare). Pigeonpea seeds obtained from the local market in Otobi were simultaneously planted at the same spacing with two seeds per hole and at two different positions: (i) planting by side of ridge (row-intercropping) and (ii) at the top in between the sweet potato (mixture). The pigeonpea was thinned to one plant per stand at 10 days after planting to give a plant population of 33,000 plants per hectare (ha). Weeding was done at three weeks after planting (WAP). No fertilizer was applied. In addition to the on-station experiment, in 2007, ten farmers were randomly selected from five villages around Otobi for on-farm evaluation of TIS 87/0087 mixed or row-intercropped with pigeonpea. TIS 87/0087 was picked because it gave the highest yield in both cropping systems in 2006. Harvesting of sweet potato was done as reported by Njoku *et a*l. (2007). At harvest the following parameters were measured from the net plot:

(i) **Sweet potato component**

Total fresh root yield (comprised of the weight of all tuberous roots) and saleable root yield (weight of tuberous roots $\geq$ 200g, devoid of insect and disease attack as well as harvest injuries).

(ii) **Pigeonpea component**

Number of pods per plant (average of five plants per plot) and total grain yield.

All data collected were analysed using GENSTAT 4.23 (Copyright 2003, Lowes Agricultural Trust Rothamsted Experimental Station) following Standard analysis of variance procedures (Gomez and Gomez, 1984). Whenever difference between treatment means were significant, means were separated by F-LSD at P = 0.05 (Obi, 1990). The land equivalent ratio (LER) (Anders *et al*., 1996) and competitive ratio (CR) (Putnam *et al.,* 1984), calculated from total fresh root yield of sweet potato and grain yield of pigeonpea, were used to determine the productivity of the intercropping systems.

RESULTS

The result showed that cropping system x variety x planting position interaction effects on the total fresh root yield of intercropped Sweet potato with pigeonpea was significant (Table-1). Intercropped sweet potato varieties had decreased total fresh root yield when compared to the sole crop and at both planting positions, except CIP Tanzania, which had an opposite response. In both cropping systems and at both planting positions, TIS 87/0087 produced the highest fresh root yield, while CIP Tanzania had the least. Under intercropping, the response of most sweet potato varieties to the position of planting pigeonpea was inconsistent in both years, except for CIP Tanzania, which had increased fresh root yield when planted on top with pigeonpea (Table-1).

Table-2 indicated that cropping system x variety x position of planting interaction effects on the saleable root yield of sweet potato intercropped with pigeonpea were significant. Saleable root yield of all sweet potato varieties was depressed by intercropping at both planting positions in both years when compared to sole cropping. TIS 87/0087, TIS 2532.OP.1.13 and TIS 86/00356 produced significantly higher saleable root yields than the other varieties tested under both sole and intercrop situations irrespective of the planting positions. WA Gabolige produced the least saleable root yield under both cropping systems at both planting positions (Table-2). Under intercropping, saleable root yield was increased when sweet potato varieties were planted on top with pigeonpea as compared to when planted with pigeonpea by the side in both years (Table-2).

The interaction effects of cropping system x variety x planting position on the number of tuberous roots per plant of sweet potato intercropped with pigeonpea was significant (Table-3). Under intercropping systems, the number of roots produced per plant of sweet potato varied with the planting position of pigeonpea. While TIS 2532.OP.1.13 and TIS 86/00356 produced significantly higher number of roots per plant when planted with pigeonpea by the side, WA Gabolige gave higher number of roots per plant when planted with pigeonpea on top. The responses of *Ogege*, TIS 87/0087 and CIP Tanzania at both planting positions were either inconsistent or insignificant (Table-3).

In 2006, sole pigeonpea planted on top of the ridge produced significantly higher number of pods than intercropped pigeonpea with TIS 87/0087 planted on top of ridge, which in turn gave higher number of pods than pigeonpea intercropped with TIS 86/00356 and planted by the side and sole pigeonpea planted also by side (Table-4). All the other combinations gave lower number of pods per plant than the sole pigeonpea planted by the side of ridge. The trend in 2007 was similar to that obtained in 2006 (Table-4). The results further revealed that intercropped pigeonpea gave lower number of pods per plant than sole planted pigeonpea in 2006, unlike in 2007, when there was no significant difference between both cropping systems.

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DISCUSSIONS

The reduction observed in the total fresh and saleable root yields of sweet potato varieties intercropped with pigeonpea in this study might have resulted from depression of photosynthesis due to decrease in solar radiation by shading of the sweet potato by the taller pigeonpea component. Fujita and Ofosu-Budu (1996) had indicated that when component legume is taller than non-legume, the legume can grow well due to high photosynthetic and high biological nitrogen fixation activities with adequate solar radiation and that the non-legume growth is severely suppressed due to depression of photosynthesis through decreases in irradiance. The superior performance of TIS 87/0087 under both cropping systems in total fresh and saleable root yields over the other varieties was similar to the reports of earlier studies (Njoku *et al*., 2007; Onunka, 2006; Okorie and Okpala, 2000). This implied that TIS 87/0087 might be more tolerant of shading and therefore more suitable for intercropping with pigeonpea in either of the planting positions tested. The differential performance of the varieties of intercropped sweet potato at the two planting positions of pigeonpea indicated that no single planting position could be recommended for the varieties tested. However, such varieties as TIS 87/0087, *Ogege* and CIP Tanzania could be intercropped with pigeonpea, using either of the planting positions. The reasons for better performance of Sweet potato varieties at a particular planting position under intercropping with pigeonpea might need further investigation.

Although no consistent result was obtained for both years, the higher number of pods per plant and grain yield of sole pigeonpea over intercropped pigeonpea in 2006 might be due to interplant competition for natural growth resources such as soil nutrients, water, etc. by both intercrop components. It is known that competitive reactions reduce yields in intercropped crop species as compared to mono cropping (Egbe, 2007; Ekwoanya, 2002-unpublished). The non-significant result obtained in sole vs intercropping in 2007 for the number of pods per plant and grain yield of pigeonpea could be possible. Fujita and Ofosu-Budu (1996) had reported that when component legume was taller than non-legume, biomass production of intercropping approached that of mono cropping of legume.

The LER of Sweet potato varieties intercropped with pigeonpea at the two planting positions were all above 1.0, except the combination of WA Gabolige and pigeonpea, indicating that greater productivity per unit land area was achieved by growing the two crops together than by growing them separately. These results showed that genotypic compatibility might exist between these Sweet potato varieties and pigeonpea. Ali (1996) had stated that identification of suitable genotypes of the component crops was necessary for complementarity. Njoku *et al*. (2007) obtained similar results in sweet potato + Okro intercropping in Southeastern Nigeria. The results further revealed that WA Gabolige and pigeonpea would give higher productivity when grown separately than when intercropped and might therefore not be compatible for intercropping. The LER figures in this intercropping study were high depicting high yield advantages derived. This was probably because sweet potato serving as cover crop conserved soil moisture reduced soil temperature and added organic matter to the soil, while pigeonpea similarly added organic matter through profuse leaf litter production and biologically fixed nitrogen for the benefit of the intercropping systems.

Competitive ratio (CR) could be useful in comparing the competitive ability of the different crops and it may help clarify the nature of competition between component crops (Egbe, 2005). Pigeonpea proved more competitive than the sweet potato varieties in this study, probably because it was taller. Generally, biomass production of shorter component crops is reduced by depression of photosynthesis due to decreases in solar radiation.

Snapp and Silim (2002) in their study on farmer preferences and legume intensification for low nutrient environment in Africa had insisted that research intended to translate benefit to smallholder farmers must keep farmer preferences and belief systems in the forefront. The results obtained in this study further assured the potential benefits to and sustainability of the Sweet potato + pigeonpea intercropping among farmers in Southern Guinea Savanna.

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Table-1. Effect of position of planting, variety and cropping system and their interactions on the total fresh root yield (t ha^{-1}) of sweet potato intercropped with pigeonpea in 2006 and 2007 at Otobi.

		Total fresh root yield											
Cropping System (CS)	**Variety (VAR)**	**Position of Planting (POP)**						**CS x VAR Mean**		**CS Mean**		**VAR Mean**	
		Side			**Top**								
		2006	**2007**	**Mean**	**2006**	**2007**	**Mean**	**2006**	**2007**	**2006**	**2007**	**2006**	**2007**
Intercropping	Ogege	9.77	9.40	9.59	9.62	6.12	7.87	9.69	7.76			11.12	7.70
	TIS 87/0087	13.52	16.70	15.11	19.78	16.28	18.03	16.65	16.49			18.31	14.85
	CIP Tanzania	8.24	1.72	4.98	9.95	6.45	8.20	9.09	4.08	11.00	10.12	7.03	3.63
	WA Gabolige	6.47	13.26	9.87	8.29	4.80	6.55	7.38	9.03			12.02	8.54
	TIS 2532.OP.1.13	8.85	14.66	11.76	11.01	7.51	9.26	9.93	11.09			14.05	10.49
	TIS 86/00356	11.93	13.50	12.72	14.60	11.10	12.85	13.27	12.30			15.13	11.61
CS x POP Mean		9.79	11.54	10.67	12.21	8.71	10.46	-	-				
Sole Cropping	Ogege	12.37	9.00	10.69	12.72	6.27	9.49	12.55	7.64				
	TIS 87/0087	19.75	16.40	18.08	20.19	10.02	15.11	19.98	13.21				
	CIP Tanzania	4.73	1.61	3.17	5.22	4.74	4.98	4.98	3.18	14.89	8.81		
	WA Gabolige	16.54	13.11	14.83	16.76	2.97	9.87	16.65	8.04				
	TIS 2532.OP.1.13	18.15	14.43	16.29	18.19	5.35	11.77	18.17	9.89				
	TIS 86/00356	16.95	13.41	15.18	17.03	8.43	12.73	16.99	10.92				
	CS x POP Mean	14.75	11.33	13.04	15.02	6.29	10.66	-	-				
	POP Mean		11.44	11.86	13.61	7.50	10.56	-	-				
	FLSD (0.05)												
	CS	3.57	0.21										
	VAR	1.99	0.87										
	POP	0.21	0.69										
	CS x VAR	2.71	1.12										
	CS x POP	3.49	0.70										
	VAR x POP	1.24	1.44										
	CS x VAR x POP	2.72	1.99										

CS: Cropping System
VAR: Variety
POP: Position of planting pigeonpea

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Table-2. Effect of position of planting, variety and cropping system and their interactions on the saleable root yield (t ha^{-1}) of sweet potato intercropped with pigeonpea in 2006 and 2007 at Otobi.

Cropping System (CS)	Variety (VAR)	Saleable root yield											
		Position of Planting (POP)						CS x VAR Mean		CS Mean		VAR Mean	
		Side			Top								
		2006	2007	Mean	2006	2007	Mean	2006	2007	2006	2007	2006	2007
Intercropping	Ogege	8.45	4.49	6.47	8.81	4.63	6.72	8.63	4.56			10.10	6.23
	TIS 87/0087	12.03	8.35	10.19	18.41	14.39	16.40	15.22	11.37			16.59	13.06
	CIP Tanzania	5.09	1.10	3.10	5.91	2.01	3.96	5.50	1.56	9.47	5.50	5.04	1.53
	WA Gabolige	3.79	0.32	2.06	4.19	0.47	2.33	3.99	0.39			8.10	4.49
	TIS 2532.OP.1.13	10.18	6.15	8.17	12.12	8.26	10.19	11.15	7.21			14.16	10.36
	TIS 86/00356	11.45	7.61	9.53	13.16	8.81	10.99	12.30	8.21			14.35	10.62
CS x POP Mean		8.49	4.67	6.58	10.43	6.43	8.43	-	-			-	-
Sole Cropping	Ogege	11.72	8.13	9.93	11.42	7.67	9.55	11.57	7.90				
	TIS 87/0087	17.82	14.19	16.01	18.12	15.28	16.70	17.97	14.74				
	CIP Tanzania	4.50	1.33	2.92	4.65	1.68	3.17	4.57	1.49	13.31	9.88		
	WA Gabolige	11.99	8.65	10.32	12.43	8.55	10.49	12.21	8.60				
	TIS 2532.OP.1.13	17.65	14.52	16.09	16.68	12.52	14.29	17.16	13.52				
	TIS 86/00356	16.64	13.59	15.12	16.14	12.44	14.29	16.39	13.02				
CS x POP Mean		13.39	10.07	11.73	13.24	9.69	11.47	-	-				
POP Mean		10.94	7.37	9.16	11.84	8.06	9.95	-	-				
	FLSD (0.05)												
	CS	1.69	0.94										
	VAR	0.82	0.75										
	POP	0.30	0.30										
	CS x VAR	1.41	1.08										
	CS x POP	1.46	0.73										
	VAR x POP	0.95	0.89										
	CS x VAR x POP	1.54	1.27										

CS: Cropping System
VAR: Variety
POP: Position of planting pigeonpea

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Table-3. Effect of position of planting, variety and cropping system and their interactions on the number of tuberous roots per plant of sweet potato intercropped with pigeonpea in 2006 and 2007 at Otobi.

		Number of tuberous roots per plant											
Cropping System (CS)	**Variety (VAR)**	**Position of Planting (POP)**						**CS x VAR Mean**		**CS Mean**		**VAR Mean**	
		Side			**Top**								
		2006	**2007**	**Mean**	**2006**	**2007**	**Mean**	**2006**	**2007**	**2006**	**2007**	**2006**	**2007**
Intercropping	Ogege	0.85	0.94	0.89	0.84	0.92	0.88	0.85	0.93			0.89	0.95
	TIS 87/0087	1.14	1,25	1.19	1.21	1.15	1.18	1.18	1.20			1.25	1.33
	CIP Tanzania	1.44	1.48	1.46	1.28	1.33	1.31	1.36	1.41	1.17	1.21	1.38	1.41
	WA Gabolige	0.92	0.87	0.89	1.50	1.44	1.47	1.21	1.15			1.71	1.74
	TIS 2532.OP.1.13	0.88	1.00	0.94	0.63	0.70	0.67	0.75	0.85			1.15	1.23
	TIS 86/00356	2.02	2.02	2.02	1.29	1.44	1.37	1.66	1.73			2.36	2.51
CS x POP Mean		1.21	1.26	1.23	1.13	1.16	1.15	-	-				
Sole Cropping	Ogege	0.95	0.94	0.94	0.90	1.01	0.96	0.93	0.98				
	TIS 87/0087	1.26	1.46	1.36	1.37	1.48	1.43	1.32	1.47				
	CIP Tanzania	1.37	1.33	1.35	1.42	1.48	1.45	1.40	1.41	1.75	1.85		
	WA Gabolige	2.13	2.31	2.22	2.30	2.35	2.33	2.21	2.33				
	TIS 2532.OP.1.13	1.55	1.58	1.56	1.54	1.65	1.60	1.55	1.62				
	TIS 86/00356	3.16	3.19	3.17	2.99	3.37	3.18	3.07	3.28				
CS x POP Mean		1.74	1.80	1.77	1.75	1.89	1.82	-	-				
POP Mean		1.47	1.53	1.50	1.44	1.53	1.49	-	-				
	FLSD (0.05)												
	CS	0.31	0.25										
	VAR	0.17	0.16										
	POP	0.08	0.07										
	CS x VAR	0.27	0.24										
	CS x POP	0.25	0.19										
	VAR x POP	0.21	0.19										
	CS x VAR x POP	0.32	0.29										

CS: Cropping System
VAR: Variety
POP: Position of planting pigeonpea

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Table-4. Number of pods per plant of pigeonpea intercropped with sweet potato and its grain yield in 2006 and 2007 at Otobi.

Cropping system/Position of planting	Number of pods per plant			Grain yield (t/ha^{-1})		
	2006	2007	Mean	2006	2007	Mean
Intercropping						
Pigeonpea by side of Ogege	43.50	57.00	50.25	0.97	1.27	1.12
Pigeonpea by side of TIS 87/0087	49.67	64.33	57.00	1.25	1.62	1.44
Pigeonpea by side of CIP Tanzania	37.50	48.67	43.09	0.70	0.95	0.83
Pigeonpea by side of WA Gobolige	39.33	51.50	45.42	0.52	0.70	0.61
Pigeonpea by side of TIS 2536 OP.1.13	36.83	48.50	42.67	1.33	1.73	1.53
Pigeonpea by side of TIS 86/00356	53.00	68.00	60.50	0.78	1.01	0.90
Mean	43.31	56.33	49.82	0.93	1.21	1.07
Pigeonpea on top with Ogege	47.00	61.00	54.00	0.87	1.16	1.02
Pigeonpea on top with TIS 87/0087	57.50	74.67	66.09	1.35	1.75	1.55
Pigeonpea on top with CIP Tanzania	41.67	54.17	47.92	0.92	1.22	1.07
Pigeonpea on top with WA Gobolige	31.83	41.83	36.83	0.67	0.89	0.78
Pigeonpea on top with TIS 2536 OP.1.13	36.67	48.00	42.34	1.04	1.37	1.21
Pigeonpea on top with TIS 86/00356	51.33	66.67	59.00	0.86	1.37	1.12
Mean	44.33	57.72	51.03	0.95	1.29	1.13
Sole cropping						
Pigeonpea planted by side of ridge	52.17	60.33	56.25	1.26	1.64	1.45
Pigeonpea on top of ridge	65.17	84.67	74.92	1.07	1.43	1.25
Mean	58.67	72.50	65.59	1.17	1.54	1.35
FLSD (0.5)	2.95	8.30		0.15	0.13	
Unpaired t-test (0.05)						
Sole Vs. intercropping	-2.35*	-1.80^{ns}		-1.13^{ns}	-10.12*	

* Significant at 5% probability level.
Ns = not significant.

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Table-5. Land equivalent ratio (LER) and Competitive ratio (CR) of sweet potato varieties intercropped with pigeonpea at Otobi in 2006 and 2007.

Cropping System/Position of planting	**LER**			**CR**			
				Sweet potato		**Pigeonpea**	
	2006	**2007**	**Mean**	**2006**	**2007**	**2006**	**2007**
Pigeonpea by side of Ogege	1.56	1.17	1.52	0.33	0.29	0.66	0.74
Pigeonpea by side of 87/0087	1.71	1.62	1.67	0.23	0.20	0.98	1.11
Pigeonpea by side of CIP Tanzania	2.34	2.99	2.67	1.05	1.37	0.21	0.16
Pigeonpea by side of WA Gobolige	0.81	0.67	0.74	0.31	0.17	0.70	1.28
Pigeonpea by side of TIS 2536 OP.1.13	1.57	1.45	1.58	0.31	0.18	1.43	1.89
Pigeonpea by side of TIS 86/00356	1.32	1.25	1.29	0.37	0.34	0.59	0.66
Mean	1.55	1.58	1.57	0.43	0.43	0.76	0.97
Pigeonpea on top with Ogege	1.59	1.47	1.53	0.30	0.26	0.73	0.85
Pigeonpea on top with TIS 87/0087	2.28	2.22	2.25	0.25	0.26	0.87	0.85
Pigeonpea on top with CIP Tanzania	2.81	2.33	2.57	0.74	0.57	0.30	0.39
Pigeonpea on top with WA Gobolige	1.13	1.00	1.07	0.26	0.19	0.84	1.14
Pigeonpea on top with TIS 2536 OP.1.13	1.62	1.50	1.56	0.21	0.18	1.08	1.23
Pigeonpea on top with TIS 86/00356	1.68	1.63	1.66	0.34	0.33	0.65	0.66
Mean	1.85	1.69	1.77	0.35	0.30	0.75	0.85
FLSD (0.5)	0.26	0.18	-	-	-	-	-
Paired t-test (0.05)							
Sweet potato Vs pigeonpea (2006)					2.20*		
Sweet potato Vs pigeonpea (2007)					2.47*		

* Significant at 5% probability level.
NS = not significant.

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Table-6. Yield of sweet potato Var. TIS 87/0087 intercropped with pigeonpea on ten farmers' fields in villages around Otobi in 2007.

Location	Yield (t ha^{-1})				Willingness to adopt practice by farmers	Remarks by farmers
	Top		Side			
	Sweet potato	Pigeonpea	Sweet potato	Pigeonpea		
Omebe	11.91	1.20	10.50	1.30	Yes	Top planting preferred
Omebe	14.22	1.00	11.34	1.22	Yes	Prefer top planting
Akwete	12.53	1.40	11.33	1.31	Yes	Prefer side planting
Allan	15.20	0.95	12.50	1.42	Yes	Top planting preferred
Allan	12.64	1.10	12.20	1.33	No	Practice is strange
Oko-Otobi	13.10	1.23	11.55	1.30	Yes	Top planting preferred
Oko-Otobi	14.10	1.10	13.00	0.95	Yes	Top planting preferred
Igbudu-eke	16.40	0.85	14.22	1.22	Yes	Top planting preferred.
Igbudu-eke	11.50	1.20	10.55	1.21	Yes	Side planting preferred.
Ijami-Otobi	13.60	1.00	12.22	1.22	No	Pigeonpea harvesting is tedious.
Paired t-test (0.05)						
Sweet potato (Top vs. Side)					6.40*	
Pigeonpea (Top vs. Side)					-2.34^{ns}	

* Significant at 5% probability level.
NS = not significant.