Yield and agronomic characteristics of 30 pigeon pea genotypes at Otobi in Southern Guinea Savanna of Nigeria

Egbe OM, Vange T*

Department of Plant Breeding and Seed Science, University of Agriculture, Makurdi, Nigeria

Received January 24, 2008

Abstract

The yield of pigeon pea (*Cajanus cajan* (L.) Millsp.) has remained low on the farmers' fields in Southern Guinea Savanna agro-ecological environment of Nigeria, despite its agronomic potentials. In 2002 – 2004, twenty-nine improved pigeon pea genotypes from ICRISAT were evaluated along with a local check for grain yield and other agronomic characteristics with a view to further enhance pigeon pea productivity in the region. The experiment was a randomized complete block design with three replications located at the National Root Crops Research Institute sub-station, Otobi (07º10' N, 08º39' E, elevation 105.1 m), Benue State, Nigeria. All pigeon pea genotypes, including the local check, produced dry grain yield above 1.00 t/ha with a mean of 1.37 t/ha except ICP 00053. ICP 7343, ICP 7992 (both medium duration), ICP 12746, ICP 7991 and ICP 7186 (long duration) pigeon pea genotypes proved superior to the local check in number of pods produced per plant, dry pod weight and grain yield. However, when farmers' preferences for early-maturing and high-yielding genotypes are considered, ICP 6971 and ICP 88039 may be chosen. [Life Science Journal. 2008; 5(2): 70 – 80] (ISSN: 1097 – 8135).

Keywords: pigeon pea genotypes; yield; Southern Guinea Savanna

1 Introduction

Pigeon pea (*Cajanus cajan* (L.) millsp.) is now reported to be grown in 50 countries of Asia, Africa and the Caribbean, where its name "pigeon pea" is thought to have originated. During 2004, pigeon pea as a field crop was grown on 4.36 ha, with a production of 3.22 million tons and an average productivity of 0.74 t/ha. The current global estimate of its annual productivity is valued at more than US $1700 million. Pigeon pea is a multipurpose leguminous crop that can provide food, fuel wood and folder for the small-scale farmer in subsistence agriculture and is widely cultivated in Nigeria (Remanandan and Asiegbu, 1993; Egbe and Kalu, 2006). In most locations in the Southern Guinea Savanna (6º20' N to 8º10' W, and 6º42' E to 10º5' E) agro-ecological zone of Nigeria, where poverty level is high and income generation status low, resource-poor farmers have through evolutionary history incorporated pigeon pea production into their indigenous cropping systems as field crops, backyard or as field border crops (Egbe and Kalu, 2006). In a survey of pigeon pea farming systems in Southern Guinea Savanna, Egbe and Kalu (2006) found that farmers preferred high-yielding, early-maturing, pest and disease tolerant genotypes to medium or late maturing types. Egbe and Adeyemo (2006) reported that pigeon pea could be intercropped with maize without negative effects on the yield and yield components of maize. Farmers in Southern Guinea Savanna of Nigeria, however, maintain varying degrees of sole and mixed culture with such other crops as sorghum, millet, yam, cassava and sweet potatoes.

Pigeon pea should play an important role in developing new strategic approaches to ensure food security and sustainable increase in agricultural productivity in Southern Guinea Savanna environment of Nigeria. One possible means of doing this is through screening of elite pigeon pea genotypes, which will be discussed in this paper.

2 Materials and Methods

In 2002, 2003 and 2004 planting seasons, field experiments were carried out at the National Root Crops Re-

*Corresponding author. Email: t_vange@yahoo.com

search Institute Sub-station, Otobi (07º10' N, 08º39' E, 105.1 m elevation) located in Southern Guinea Savanna agro-ecological zone of Nigeria to evaluate 29 new pigeon pea genotypes recently obtained from ICRISAT along with a local check for yield and other agronomic characteristics. Rainfall at the site was 1712.00 mm, 1665.60 mm and 1675.40 mm in 2002, 2003 and 2004, respectively between the months of June and November of each year. The soil at the experimental site was classified as Typic Paleustalf.

The experiment was laid out in randomized complete block design with three replications. The gross plot size was 8 m^2, while the net plot measured 2 m^2, entrimmed. Each gross plot consisted of 4 rows spaced 50 cm apart and 4 m long. Two seeds were planted per hill and spaced 30 cm within rows. Thinning was done ten days after planting to one plant per hill. All plots received a basal application of 200 kg NPK 15 : 15 : 15 (30 kg N, 12.90 kg P and 24.90 kg K) per ha by broadcasting. All plots were hand-weeded twice (at 3 and 7 weeks after planting). The following data were collected: days to 50% flowering, days to maturity, plant height at harvest (m), number of primary branches, number of pods per plant, dry pod weight and dry grain yield (t/ha). All data collected were analyzed using GENSTAT Release 4.23 (Copyright 2003, Lawes 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 as $P = 0.05$ (Obi, 1990). It must be noted that data for each trait measured for the 3 years were pooled and analyzed to determine the year effect before being analyzed again for the respective years of 2002, 2003 and 2004.

3 Results

Year effects were highly significant for all the traits measured. For this reason, pea performance for the 3 years was discussed separately.

During each of the three years of experimentation, the short duration genotypes achieved 50% flowering earlier than the medium, which in turn flowered earlier than the long duration types (Table 1). Though classified as late maturity (>180 days), ICP 7193 flowered in 124.00, 121.00 and 119.00 days in 2002, 2003 and 2004 respectively, which were not statistically different from the means for the medium duration (151 – 180 days) genotypes which flowered in 120.71, 123.25 and 124.46 days for the same period. Similarly, the short duration (< 150 days) genotypes reached maturity earlier ($\bar{X}$ = 149.95 days) than medium ($\bar{X}$ = 175.00 days) and the medium matured significantly earlier than the long duration ($\bar{X}$ = 209.08 days) (Table 2). Although grouped as short duration ICP 6971 matured in 165.00 days (2002), 163.00 days (2003 and 2004), which were not significantly different from those of other genotypes as ICP 7992 and ICP 7338, which have been designated as medium duration. The local check reached maturity in 210.00 days (2002), 199.00 days (2003) and 205.00 days (2004).

Table 3 indicated that, as a group the long duration genotypes were significantly taller (3.58 m) than both the medium (3.15 m) and the short duration lines (2.98 m) in 2002, but not so in 2003 when all groups were equally tall. However, in 2004, both the medium and the long duration genotypes were significantly taller than the short duration types as a group. During the three years of experimentation, all pigeon pea genotypes had mean heights above 3 m at harvest, except ICP 88039 (short duration), ICP 6930 (medium) and ICP 6915 (long duration), which had mean heights of 2.54 m, 2.51 m and 2.89 m, respectively. The local check (farmer's variety) along with ICP 7992 and ICP 7991 had average plant heights above 4 m in 2002 and 2004, but no genotype reached the height of 4.0 m in 2003 (Table 3).

The 3-year average of the number of primary branches per plant of pigeon pea varied between 11.61 (ICP 8997) and 23.06 (ICP 6443) with a mean of 17.77. As a group, the short duration types significantly had higher number of primary branches per plant than the medium during the entire period of the study; and showed a similar superior response over the long duration genotype only in 2003 and 2004 (Table 4). As maturity groups, the short and the long duration genotypes had significantly higher number of branches per plant than the local check, but the medium lines were at par with the local check in the number of primary branches produced.

Table 5 showed that the medium and the long duration genotypes consistently had greater number of pods per plant than the short duration types. No significant difference was noticed between the medium and the long duration genotypes in the number of pod yield per plant. On individual genotype basis, ICP 7186 produced the highest number of pods per plant with a 3-year mean of 545.13, while ICP 00053 had the lowest with a mean of 58.40. The farmers' variety (local check) consistently produced greater number of pods per plant than the short, medium and the long duration genotypes as individual groups in all the years of the study. However, some individual genotypes in the medium and long duration categories produced significantly higher number of pods

per plant than the local check, e.g. ICP 7338 (medium), ICP 7343 (medium), and ICP 7186 (long duration).

Mean dry pod weight for the period 2002 – 2005 varied between 2.05 t/ha (ICP 00053) and 4.5 t/ha (ICP 7343)(Table 6). On group basis, the dry pod weights of the short, medium and long duration pigeon pea were very comparable in each of the years of the trial. However, these improved cultivars in the three groups produced significantly greater quantities of dry pod than the local check only in 2003. On individual genotype basis, ICP 7343 pigeon pea, along with three other genotypes [ICP 12746 (late maturing), ICP 440 (medium) and ICP 6971 (short duration)] gave higher dry pod weights than all other genotypes tested including the local (Table 6).

All pigeon pea genotypes, including the local check produced dry grain yield above 1.00 t/ha, with a mean of 1.37 t/ha in 2002 – 2004, except ICP 00053. The dry grain yield of the short, medium and long duration pigeon peas were at par during the entire course of the trials. The improved pigeon pea genotypes in the three different maturity groups proved superior to the local check in dry grain production only in 2003. However, ICP 7343 (medium) and ICP 12746 (long duration), consistently out-yielded the local check with mean yields above 2.00 t/ha (Table 7). ICP 7992 (medium), ICP 7186 (long) and ICP 7991 (long duration), which had mean yields of 1.93 t/ha, 1.82 t/ha, 1.76t/ha, respectively, also gave significantly higher dry grain yields than the local check in at least two of the three years of the study.

4 Discussion

Year effects were highly significant for all traits measured probably due to unequal amount of rainfall observed during the growing seasons in the different years. It is known that days to 50% flowering and maturity duration in pigeon pea are very highly and positively correlated. The mean days to physical maturity obtained in this study for the short duration (149.95), medium duration (175.00) and long duration (209.08) compared favourably with the broad maturity classification of early (< 150 days), medium (151 to 180 days) and late (> 180 days) adopted by Reddy (1990). ICP 6971, classified as short duration, may be re-classified as medium since in the Southern Guinea Savanna agro-ecological environment it reached maturity in 163.67 days. Upadhyaya *et al* (2006), however, found that days to flower was more reliable in arriving at the maturity duration in pigeon pea, because frequent and heavy pod borer damage triggers fresh flower production in pigeon pea, which delays the days to maturity.

Plant height in pigeon pea is affected by maturity duration, photoperiod, and environment. Pigeon pea genotypes in this work were generally tall, probably due to influence of exposure to long-day conditions of June and July. Reddy (1990) explained that plant height could be substantially increased through prolongation of the vegetative phase by exposure to the long-day situations. The taller plants observed in the long and medium duration types than the short duration genotypes in this study agreed with the findings of Egbe (2005), which stated that the short duration genotypes of pigeon pea had shorter plants than the medium- and late-maturing genotypes in both sole and inter-cropping systems. Reddy (1990) observed that late-maturing long-duration varieties are generally tall, because of their prolonged vegetative phase, while the short-duration or early-maturing varieties are comparatively short in stature due to their short vegetative growth phase.

The range of the number of primary branches observed in this study (11.61 – 23.06) with a mean of 17.17 was within the brackets of that recorded by Remanandan *et al* (1988) for over 8000 world germplasm accessions which had average number of primary branches per plant at harvest to be between 2 – 3 to 66 with a mean of 13.20. The reasons why the short duration genotypes had greater number of primary branches than the medium and the long duration types could not be easily deduced, but this observation seemed to contradict the earlier reports of Baldey (1988) that the semi-spreading types possessed higher branching-habit plasticity than the compact and spreading types.

The results of this work indicated that, although the local check had means of the number of pods per plant, dry pod weight and dry grain yields at par with the means generated by the individual maturity groups of improved pigeon pea genotypes, some individual pigeon pea genotypes proved superior to it. Such genotypes included two medium duration cultivars (ICP 7343 and ICP 7992) and three long duration genotypes, namely: ICP 12746, ICP 7991 and ICP 7186. Since pod number per plant is the component through which variations in seed yield due to growing conditions is predominantly expressed (Lawn and Troedson, 1990), these improved pigeon pea genotypes mainly in the medium and long duration groups proved superior to the others and the local check probably due to greater number of pods produced per plant. The higher dry grain yields recorded by these medium and long duration genotypes over the short duration types agreed with the findings of earlier workers (Sharma *et al*, 1981) in their work on international adaptation of pigeon pea in West Africa. The mean yield of 1.37 t/ha reported

Table 1. Days to 50% flowering of 30 pigeon pea genotypes at Otobi, Southern Guinea Savanna of Nigeria

Genotype	Maturity group	Days to 50% flowering			
		2002	2003	2004	Mean
ICP 6971	S	103.33	116.33	111.67	110.44
ICP 88039	S	70.00	118.33	115.00	101.11
Mean for short duration		86.67	117.33	113.34	105.78
ICP 6930	M	126.00	118.67	121.67	122.11
ICP 8997	M	126.00	128.00	132.33	128.78
ICP 7338	M	111.67	121.00	121.33	118.00
ICP 7400	M	111.67	121.00	122.67	118.45
ICP 440	M	108.33	121.00	121.00	116.78
ICP 1	M	128.00	123.33	125.67	125.67
ICP 7992	M	124.00	131.00	130.00	128.33
ICP 7343	M	130.00	122.00	121.00	124.33
Mean for medium duration		120.71	123.25	124.46	122.81
ICP 6443	L	177.67	129.33	129.33	145.44
ICP 6912	L	145.33	131.33	134.00	136.89
ICP 00053	L	197.67	131.67	134.33	154.56
ICP 7188	L	158.67	134.00	135.00	142.56
ICP 11916	L	183.00	135.00	135.00	151.00
ICP 6915	L	130.00	141.67	127.67	133.11
ICP 7613	L	199.00	145.00	146.00	163.33
ICP 7193	L	124.00	121.00	119.00	121.33
Farmers' variety (*Check*)	L	156.00	128.00	140.00	141.33
ICP 7186	L	130.00	122.33	120.33	124.22
ICP 8257	L	170.00	128.67	129.33	142.67
ICP 11953	L	171.33	140.67	145.33	152.44
ICP 11951	L	170.00	128.67	150.00	149.56
ICP 12746	L	156.00	146.67	144.67	149.11
ICP 7991	L	138.00	143.00	138.00	139.67
ICP 6907	L	172.00	128.00	125.67	141.89
ICP 13030	L	170.67	142.67	144.33	152.56
ICP 7315	L	138.00	131.00	131.00	133.33
ICP 8006	L	172.00	143.00	142.00	152.33
ICP 6967	L	172.00	140.00	142.00	151.33
Mean for long duration		161.57	134.58	135.65	143.93
Mean		145.80	130.40	131.20	135.80
CV (%)		3.22	3.58	3.09	
FLSD		3.54	3.53	3.29	

S = Short duration, M = Medium duration, L = Long duration.

Table 2. Days to maturity of 30 pigeon pea genotypes at Otobi, Southern Guinea Savanna of Nigeria

Genotype	Maturity group	Days to maturity			
		2002	2003	2004	Mean
ICP 6971	S	165.00	163.00	163.00	163.67
ICP 88039	S	134.00	136.67	138.00	136.22
Mean for short duration		149.50	149.84	150.50	149.95
ICP 6930	M	173.00	169.67	171.33	171.33
ICP 8997	M	178.33	174.00	172.67	175.00
ICP 7338	M	165.00	170.67	167.00	167.56
ICP 7400	M	172.33	174.00	170.00	172.11
ICP 440	M	166.67	141.67	173.00	170.45
ICP 1	M	195.00	179.33	190.67	188.33
ICP 7992	M	165.00	168.67	167.00	166.89
ICP 7343	M	193.33	186.67	185.00	188.33
Mean for medium duration		176.08	174.34	174.58	175.00
ICP 6443	L	253.33	221.67	223.33	232.78
ICP 6912	L	203.33	197.67	198.67	199.89
ICP 00053	L	255.00	225.00	240.00	240.00
ICP 7188	L	205.00	199.33	201.00	201.78
ICP 11916	L	236.67	225.00	228.33	230.00
ICP 6915	L	186.67	180.67	183.33	183.56
ICP 7613	L	255.00	243.33	248.33	248.89
ICP 7193	L	175.00	170.67	172.67	172.78
Farmers' variety (*Check*)	L	210.00	199.33	205.00	204.78
ICP 7186	L	190.00	186.00	187.67	187.89
ICP 8257	L	226.67	216.67	215.00	219.45
ICP 11953	L	213.33	211.67	210.00	211.67
ICP 11951	L	230.00	222.67	227.67	226.78
ICP 12746	L	208.33	203.33	200.00	203.89
ICP 7991	L	196.67	190.00	194.00	193.57
ICP 6907	L	205.00	199.33	199.00	201.11
ICP 13030	L	213.33	210.00	211.67	211.67
ICP 7315	L	195.00	188.67	190.00	191.22
ICP 8006	L	213.33	203.00	211.67	209.33
ICP 6967	L	210.00	208.33	213.33	210.55
Mean for long duration		214.08	205.12	208.03	209.08
Mean		199.64	193.20	195.28	196.04
CV (%)		3.02	6.40	6.16	
FLSD		4.02	5.75	5.67	

S = Short duration, M = Medium duration, L = Long duration.

Table 3. Plant height of 30 pigeon pea genotypes at Otobi, Southern Guinea Savanna of Nigeria

Genotype	Maturity group	Plant height (m)			
		2002	2003	2004	Mean
ICP 6971	S	4.12	3.40	3.17	3.56
ICP 88039	S	1.83	3.37	2.42	2.54
Mean for short duration		2.98	3.39	2.79	3.05
ICP 6930	M	1.43	3.11	2.99	2.51
ICP 8997	M	3.34	3.25	2.77	3.12
ICP 7338	M	3.42	3.23	3.19	3.28
ICP 7400	M	2.67	3.53	3.51	3.24
ICP 440	M	3.06	3.32	3.06	3.15
ICP 1	M	3.53	3.53	3.65	3.57
ICP 7992	M	4.41	3.41	4.23	4.02
ICP 7343	M	3.35	3.37	3.06	3.26
Mean for medium duration		3.15	3.34	3.31	3.27
ICP 6443	L	3.99	3.47	2.99	3.48
ICP 6912	L	3.02	3.49	3.73	3.41
ICP 00053	L	3.55	3.18	3.75	3.49
ICP 7188	L	3.99	3.37	3.72	3.69
ICP 11916	L	3.80	3.22	3.34	3.45
ICP 6915	L	2.37	3.23	3.07	2.89
ICP 7613	L	3.23	3.14	3.21	3.19
ICP 7193	L	3.33	3.34	2.86	3.18
Farmers' variety (*Check*)	L	4.00	3.33	4.09	3.81
ICP 7186	L	3.28	3.40	2.96	3.21
ICP 8257	L	4.26	3.43	3.68	3.79
ICP 11953	L	3.49	3.53	3.44	3.49
ICP 11951	L	3.55	3.50	3.63	3.56
ICP 12746	L	3.42	3.32	3.23	3.32
ICP 7991	L	4.19	3.39	4.00	3.86
ICP 6907	L	3.37	3.57	3.40	3.45
ICP 13030	L	3.63	3.43	3.44	3.50
ICP 7315	L	3.68	3.38	3.12	3.39
ICP 8006	L	3.79	3.34	3.73	3.62
ICP 6967	L	3.59	3.43	3.61	3.54
Mean for long duration		3.58	3.37	3.45	3.47
Mean		3.42	3.37	3.37	3.39
CV (%)		7.3	8.0	5.90	
FLSD		0.41	0.43	0.32	

S = Short duration, M = Medium duration, L = Long duration.

Table 4. Number of effective primary branches per plant of 30 pigeon pea genotypes at Otobi, Southern Guinea Savanna of Nigeria

Genotype	Maturity group	Number of effective primary branches per plant			
		2002	2003	2004	Mean
ICP 6971	S	22.55	21.17	22.33	22.02
ICP 88039	S	17.25	16.92	16.33	16.83
Mean for short duration		19.90	19.05	19.33	19.43
ICP 6930	M	14.25	14.25	13.58	14.03
ICP 8997	M	17.47	16.25	15.58	16.43
ICP 7338	M	12.92	11.33	10.58	11.61
ICP 7400	M	15.75	15.00	15.33	15.36
ICP 440	M	24.08	22.00	21.67	22.58
ICP 1	M	20.92	19.17	19.25	19.78
ICP 7992	M	15.00	15.33	16.17	15.50
ICP 7343	M	16.42	15.50	15.17	15.69
Mean for medium duration		17.10	16.10	15.92	16.37
ICP 6443	L	24.33	23.42	21.42	23.06
ICP 6912	L	15.75	18.17	18.08	17.33
ICP 00053	L	18.23	17.33	16.75	17.44
ICP 7188	L	16.00	14.33	13.50	14.61
ICP 11916	L	21.50	18.50	19.00	19.67
ICP 6915	L	25.17	22.75	21.00	22.97
ICP 7613	L	15.50	15.17	14.75	15.14
ICP 7193	L	20.67	10.33	11.17	14.06
Farmers' variety (*Check*)	L	15.80	15.33	15.58	15.57
ICP 7186	L	14.83	14.50	14.83	14.72
ICP 8257	L	19.50	20.00	19.63	19.71
ICP 11953	L	18.92	18.33	20.33	19.19
ICP 11951	L	23.17	20.17	22.25	21.86
ICP 12746	L	18.17	17.33	16.50	17.33
ICP 7991	L	15.33	13.75	13.50	14.19
ICP 6907	L	19.83	18.83	19.13	19.26
ICP 13030	L	19.83	20.33	23.33	19.94
ICP 7315	L	20.92	20.17	19.83	2.031
ICP 8006	L	14.42	13.50	13.42	13.78
ICP 6967	L	21.08	22.33	22.58	21.99
Mean for long duration		18.95	17.73	17.83	18.17
Mean		18.52	17.38	17.42	17.77
CV (%)		19.60	6.60	6.90	
FLSD		1.92	1.88	1.97	

S = Short duration, M = Medium duration, L = Long duration.

Table 5. Number of pods per plant of 30 pigeon pea genotypes at Otobi, Southern Guinea Savanna of Nigeria

Genotype	Maturity group	Number of pods per plant			
		2002	2003	2004	Mean
ICP 6971	S	174.00	154.00	170.00	166.00
ICP 88039	S	120.70	101.70	112.70	111.70
Mean for short duration		147.35	127.85	141.35	138.85
ICP 6930	M	161.50	164.70	165.00	163.73
ICP 8997	M	125.70	133.50	123.70	127.63
ICP 7338	M	363.70	306.20	303.30	324.40
ICP 7400	M	158.00	161.00	162.70	160.57
ICP 440	M	191.70	194.70	201.20	195.87
ICP 1	M	153.30	149.00	161.00	154.43
ICP 7992	M	186.00	172.70	181.70	180.13
ICP 7343	M	295.70	280.20	292.00	289.30
Mean for medium duration		204.45	195.25	198.83	199.51
ICP 6443	L	168.80	165.70	162.70	165.73
ICP 6912	L	87.80	82.00	91.00	86.93
ICP 00053	L	74.70	47.00	53.50	58.40
ICP 7188	L	180.00	170.80	173.80	174.87
ICP 11916	L	264.00	249.70	226.30	167.33
ICP 6915	L	203.30	189.80	185.20	192.77
ICP 7613	L	148.00	138.50	166.00	150.83
ICP 7193	L	199.50	186.50	175.80	187.27
Farmers' variety (*Check*)	L	293.30	242.30	233.30	256.30
ICP 7186	L	622.80	508.30	504.30	545.13
ICP 8257	L	243.30	239.20	236.80	239.77
ICP 11953	L	156.00	212.50	133.80	137.10
ICP 11951	L	273.00	253.80	262.30	263.03
ICP 12746	L	247.20	234.20	229.50	236.97
ICP 7991	L	184.80	155.80	152.50	164.37
ICP 6907	L	106.50	100.50	123.20	110.07
ICP 13030	L	217.00	217.70	223.20	219.30
ICP 7315	L	243.80	214.30	268.80	242.30
ICP 8006	L	151.30	128.50	152.50	144.10
ICP 6967	L	170.20	168.20	170.30	169.57
Mean for long duration		211.77	190.72	196.24	119.58
Mean		205.50	187.70	193.30	195.50
CV (%)		9.60	6.80	5.40	
FLSD		32.30	20.95	17.01	

S = Short duration, M = Medium duration, L = Long duration.

Table 6. Dry pod weigh of 30 pigeon pea genotypes at Otobi, Southern Guinea Savanna of Nigeria

Genotype	Maturity group	Dry pod weight (t/ha)			
		2002	2003	2004	Mean
ICP 6971	S	4.16	2.56	2.28	3.00
ICP 88039	S	3.36	2.56	2.60	2.84
Mean for short duration		3.76	2.56	2.44	2.92
ICP 6930	M	3.49	1.69	1.89	2.36
ICP 8997	M	3.58	2.94	2.72	3.08
ICP 7338	M	2.71	2.44	2.24	2.46
ICP 7400	M	2.00	2.91	2.92	2.61
ICP 440	M	5.12	2.79	3.16	3.69
ICP 1	M	2.23	2.87	1.94	2.35
ICP 7992	M	4.53	2.58	4.26	3.79
ICP 7343	M	4.69	4.05	4.77	4.50
Mean for medium duration		3.54	2.78	2.99	3.10
ICP 6443	L	2.47	2.73	2.45	2.55
ICP 6912	L	2.71	3.59	2.53	2.94
ICP 00053	L	1.66	3.03	1.47	2.05
ICP 7188	L	2.68	2.43	2.59	2.57
ICP 11916	L	2.31	2.26	2.19	2.25
ICP 6915	L	3.03	2.63	2.55	2.74
ICP 7613	L	1.78	3.12	1.77	2.22
ICP 7193	L	2.46	1.99	2.22	2.22
Farmers' variety (*Check*)	L	3.74	1.63	2.70	2.69
ICP 7186	L	3.90	3.26	3.52	3.56
ICP 8257	L	2.92	2.53	3.01	2.82
ICP 11953	L	4.15	0.93	4.03	3.04
ICP 11951	L	2.95	2.90	2.90	2.92
ICP 12746	L	5.27	2.48	4.77	4.17
ICP 7991	L	4.09	2.12	3.77	3.33
ICP 6907	L	2.33	2.49	2.92	2.58
ICP 13030	L	3.23	2.22	3.18	2.88
ICP 7315	L	3.08	2.53	2.92	2.84
ICP 8006	L	3.39	3.34	3.58	3.44
ICP 6967	L	2.45	1.34	2.56	2.12
Mean for long duration		3.03	2.48	2.88	2.79
Mean		3.22	2.56	2.88	2.89
CV (%)		10.30	17.30	10.10	
FLSD		0.54	0.73	0.48	

S = Short duration, M = Medium duration, L = Long duration.

Table 7. Dry grain yield of 30 pigeon pea genotypes at Otobi, Southern Guinea Savanna of Nigeria

Genotype	Maturity group	Dry grain yield (t/ha)			
		2002	2003	2004	Mean
ICP 6971	S	2.11	1.32	1.13	1.52
ICP 88039	S	1.82	1.40	1.42	1.55
Mean for short duration		1.97	1.36	1.28	1.54
ICP 6930	M	1.64	0.59	0.82	1.02
ICP 8997	M	1.88	1.13	1.26	1.42
ICP 7338	M	1.05	1.26	1.05	1.12
ICP 7400	M	1.11	1.93	1.73	1.59
ICP 440	M	1.47	1.34	1.64	1.48
ICP 1	M	1.21	1.63	0.77	1.20
ICP 7992	M	2.08	1.62	2.08	1.93
ICP 7343	M	2.71	1.92	2.19	2.27
Mean for medium duration		1.64	1.43	1.44	1.50
ICP 6443	L	0.96	1.16	1.11	1.08
ICP 6912	L	1.17	1.70	1.16	1.34
ICP 00053	L	0.84	0.84	0.66	0.78
ICP 7188	L	1.22	0.82	1.18	1.07
ICP 11916	L	1.25	1.08	0.91	1.08
ICP 6915	L	1.63	1.25	1.30	1.39
ICP 7613	L	0.85	1.60	0.98	1.14
ICP 7193	L	1.18	1.02	1.02	1.07
Farmers' variety (*Check*)	L	1.67	0.69	1.38	1.25
ICP 7186	L	1.88	1.75	1.82	1.82
ICP 8257	L	0.99	1.05	1.31	1.12
ICP 11953	L	1.94	0.28	1.59	1.27
ICP 11951	L	1.11	1.42	1.36	1.29
ICP 12746	L	3.06	1.23	2.13	2.14
ICP 7991	L	2.24	1.23	1.82	1.76
ICP 6907	L	1.03	1.05	1.38	1.15
ICP 13030	L	1.16	0.98	1.58	1.24
ICP 7315	L	1.46	1.21	1.41	1.36
ICP 8006	L	1.61	1.53	1.83	1.66
ICP 6967	L	1.09	0.69	1.23	1.00
Mean for long duration		1.42	1.13	1.36	1.30
Mean		1.51	1.22	1.37	1.37
CV (%)		4.60	18.10	12.90	
FLSD		0.41	0.36	0.29	

S = Short duration, M = Medium duration, L = Long duration.

in this study was higher than the mean of 1.0 t/ha obtained by farmers in Nigeria and the world productivity average of 0.74 t/ha.

5 Conclusion

From the foregoing, ICP 7343, ICP 12746, ICP 7991, ICP 7992 and ICP 7186 may be regarded as the best performing genotypes in Southern Guinea Savanna environment of Nigeria. However, when the farmers' preference for early-maturing and high-yielding genotypes are considered, ICP 6971 and ICP 88039 may be chosen, as these varieties gave mean yields of 1.54 t/ha, which is even higher than the farmers' average of 1.25 t/ha.

References

1. Baldey B. Origin, Distribution, Taxonomy and Morphology. In: Baldey B, Ramanujam S, Jain HK (Eds). Pulse Crops (Grain legumes). Oxford and IBH, New Delhi, 1988; 3 – 51.
2. Egbe OM. Evaluating some agronomic potentials of pigeon pea genotypes for intercropping with maize and sorghum in Southern Guinea Savanna. Ph D Thesis, University of Agriculture, Makurdi, Nigeria, 2005.
3. Egbe OM, Kalu BA. Farming systems study: Participatory rural appraisal of pigeon pea cropping systems in Southern Guinea Savanna of Nigeria. Abia State University Environmental Review (ASUER) 2006; 5(1): 37 – 47.
4. Egbe OM, Adeyemo MO. Estimation of the effect of intercropped pigeon pea on the yield and yield components of maize in Southern Guinea Savanna of Nigeria. Journal of Sustainable Development in Agriculture and Environment 2006; 2: 107 – 19.
5. GENSTAT. GENSTAT Release 4.23 (Copyright 2003) Lawes Agricultural Trust Rothamsted Experimental Station.
6. Gomez KA, Gomez AA. Statistical Procedures for Agricultural Research. 2nd. John Willey and Sons Inc., New York. 1984; 1 – 240.
7. Lawn RJ, Troedson RJ. Pigeon Pea: Physiology of Yield Formation. In: Nene YL, Hall SD, Sheila VK (Eds). The Pigeon Pea CAB International, Wallingford, UK. 1990; 179 – 258.
8. Obi IU. Statistical Method of Detecting Difference between Treatment Means, SNAAP Press (Nig.) Ltd; Enugu, Nigeria. 1990; 1 – 14.
9. Reddy LJ. Pigeon Pea: Morphology. In: Nene YL, Hall SD, Sheila VK (Eds). The Pigeon Pea. CAB International, Wallingford, UK. 1990; 47 – 86.
10. Remanandan P, Sastry DVSSR, Mengesha MH. ICRISAT Pigeon Pea Germplasm Catalog: Evaluation and Analysis. Pantacheru, AP, India, ICRISAT, 1988; 40.
11. Remanandan P, Asiegbu JE. Pigeon Pea Germplasm Collection in Nigeria. ICRISAT Genetic Resources Report No.79. ICRISAT, Pantacheru, AP, India. ICRISAT, 1993.
12. Sharma D, Reddy LJ, Green JM, Jain KC. International Adaptation of Pigeon Peas. In: Proceedings of the International Workshop on Pigeon peas. ICRISAT Centre, India. Pantacheru AP, India, ICRISAT. 1981; 71 – 81.
13. Upadhyaya HD, Reddy LJ, Gowda CLL, Reddy KN, Singh Sube. Development of a mini core subset for enhanced and diversified utilization of pigeon pea germplasm resources. Crop Sci 2006; 46: 2127 – 32.