EVALUATION OF GROWTH AND YIELD OF DIFFERENT VARIETIES OF COWPEA (*Vigna unguiculata* [L.] Walp) IN SOUTHERN GUINEA SAVANNAH

Abdulkareem, K. A. & Mustapha, O. T.
Department of Plant Biology,
University of Ilorin, Ilorin. Nigeria
E-mail: otiem787@yahoo.com
Phone No: +234-803-372-5024

Abstract
Eleven early maturing varieties of cowpea obtained from IITA Ibadan were planted in a randomized complete block design with three replications in the Biological garden of the University of Ilorin permanent site .Growth and yield parameters such as number of leaves per plant, plant height at maturity, number of days to 50% flowering , days to pod maturity and grain yield were evaluated. The result showed that IT 98K-131-2 produced highest number of leaves and this could be recommended as fodder for livestock while IT 97K-499-35 was found to have the highest yield in terms of seeds as compared to other varieties after the evaluation of growth and yield parameters. Variety IT 00K-961-5 had the tallest height at maturity while variety IT 98K-205-8 had the least height .Most of the varieties flowered between 40-42 days after planting. Early maturing varieties took between 60-70 days to mature.

Keywords: Cowpea, Varieties, Evaluation, Growth and Yield

Introduction
Cowpea, *Vigna unguiculata* (L.) Walp, is an important food legume and a versatile crop cultivated in the tropics for its dry seeds, green leaves, green pods and dry fodder, green manure and as a cover crop (Steele,1972; Duke,1990). It is an important staple food and cheap source of protein for rural and urban dwellers with the demand for the commodity increasing in the nation. However, the domestic production of the crop is in the hand of small scale farmers who obtain average yield of 200-350 kg ha^{-1} and in some cases extremely low yield due to lack of improved varieties. Early maturing varieties of cowpea and varieties resistant to pest and diseases are produced continuously to meet the demand of farmers (Fatokun, 2002). It is therefore, important to evaluate these new varieties in the Southern Guinea savannah agro-ecological zone for the varieties suited for cultivation in the area. In Nigeria, cowpea is grown mainly by subsistence farmers in traditional farming systems of mixed cropping, intercropping or relay cropping of cowpea with sorghum (Olufajo and Singh, 2002). Research works has been established on various aspects of cowpea in view of its human utility values and importance in livestock breeding. This research work was therefore intended to evaluate the performance of the early maturing varieties developed by the IITA. This was done with the intention of establishing which of the varieties is best suited to the Southern Guinea Savannah with a view to introducing the varieties to the area.

Materials and Methods
Eleven cowpea varieties collected from the International Institute of Tropical Agriculture (IITA), Ibadan, were used for this study. The origins, growth habit, seed type of the varieties are presented in Table 1.

The experiment was conducted on a piece of land in the Biological garden of the University of Ilorin Permanent Site, Ilorin, Nigeria .This falls within the Southern guinea savannah agro-ecological zone with Latitude 8 30N and Long 4 33E. Eleven cowpea varieties were sown on a plot of land in mid July 2008 (the rainfall was heavy during this period) and early September 2009 consisting of eight rows which measured 2.5m x 1.2m apart with a plant to plant spacing

of 18cm within row with each variety been replicated three times in a randomised complete block design for both seasons.

Three seeds were sown per hole. No fertilizer was used and weeding was done manually as at when due. At flowering (between 7-8 weeks), the cowpea were sprayed with Dimethiote EC 40% at 2 litres/ha.
At maturity, agronomic data were taken from the plants in the middle row of each plot to reduce border effect. The data collected included number of leaves per plant, plant height, Days to 50% flowering, number of days to pod maturity and grain yield per hectare. All the data collected were subjected to analysis of variance (ANOVA) using SAS (SAS, 2003). Significant mean differences were determined with least significant difference (LSD) at 0.05 level of probability.

Results and Discussion

Table 1 shows that all the cowpea varieties had similar growth habit except IT 95K-207-22, IT 98K-962 , IT 98K-560-1 that are late spreading types and variety IT 98K-205-8 which is an early spreading type. However the colour and texture of the seed coat varied. Singh and Ishiyaku (2002) reported that seed coat and texture are inherent genetic constituents.

The effect of year, variety and year x variety interactions as expressed by mean square values are presented in Table 2. The effect due to year was significant for plant height, days to pod maturity and grain yield but not significant for growth parameters such as number of leaves and days to 50% flowering. There was no significant difference in year x variety interaction except number of leaves and days to 50% flowering.

Growth and yield performances of cowpea varieties for the two years are shown in Table 3. The number of leaves per plant was not significant in 2008 but was significant at 2009 experiment, the mean value for number of leaves per plant ranged from 15.0cm to 20.0cm in 2008 while in 2009 it ranged from 19.0cm to 31.0cm. Average number of leaves throughout the years ranged between 17.0cm and 25.2cm with varieties IT 98K-131-2 producing highest number of leaves. IT-99K-316-2 had the lowest number of leaves. The early maturing cultivars planted in the month of July 2008 when the rain was heavy had low number of leaves due to water logging. Cowpea is less tolerant of water logging (Duke, 1981). Due to the excessive water in the soil, the temperature of the soil was reduced and this affected the crop. Cowpea is better cultivated in light soils that have good aeration and drainage (Duke, 1990). In 2008 due to low temperature caused by heavy rain, less seed germination was observed on the beds. This reduction in plant density gave rise to less number of leaves on the plant. In 2009 the temperature was favourable and a high plant density was obtained and hence large number of leaves was recorded. Bitterbender et al. (1984) reported that high cowpea density sown produces more leaves.

It was observed in table 3 that the plant height at maturity differed significantly among the varieties. The plant height may be the means of variability. Plant height and number of leaves were used to evaluate the vegetative growth by Futuless and Baker (2010). Pfeiffer and Harris (1990) also observed that these measurements are good indicators of vegetative growth. The mean value for plant height varied between 17.4cm and 30.2cm with varieties IT 98K-560-1 and IT 98K-428-3 respectively . In 2008 it was observed that variety IT 00K-961-5 had the tallest height with 46.0cm while the least height was recorded in variety IT 98K-560-1 with 21.4cm. In 2009 the tallest plant height was 21.0cm in variety IT 98K-428-3 but the least plant height was IT 98K-205-8 with 11.3cm.

The number of days to 50% flowering did not differ significantly among the varieties in 2008 cropping season. However, most varieties had flowered between 40-42 days after planting

(Table 3). There were significant differences in number of days to 50% flowering in 2009 among the varieties. Most varieties flowered between 37-42 days. The result obtained on the number of days to 50% flowering in 2008 cropping season was higher than 2009 cropping season. This may be due to excessive water due to heavy rainfall in the month of July to September in 2008 which encouraged early flowering in early erect cultivars (Duke 1990). A difference of five days existed among the varietal means. IT-00K-961-5, took 42 days to attain 50% flowering after planting.

The number of days to pod maturity in 2008 cropping season did not differ significantly for the varieties (Table 3). The number of days to pod maturity was between 66-78 days in 2008 while in the 2009 experiment the highest number of days observed was approximately 62 days. This might not be unconnected with the moderate rainfall experienced in 2009 cropping seasons which increased the vegetative growth hence shortened the days to pod maturity. The result was in agreement with the findings of Sanusi (1996) who reported that short season cowpea which are mostly for introduction or improved cultivars mature between 65-70 days when grown as mono crop or as relay crops in cereals.

The average values of the grain yield and other characters evaluated in each year and combined are presented in Table 3. Significant higher yields were obtained in 2009 with an average value of 464.1kg/ha compared to 403.9kg/ha in 2008. This may be attributed to the favourable climate in 2009 in terms of moderate rainfall. Generally variety IT 97K-499-35 had produced higher grain yield for the two seasons (mean= 629.80kg/ha) making it the most preferred.

Conclusion

From this study it can be concluded that variety IT 97K-499-35 was found suitable for grain yield followed by IT 98K-560-1 had the mean yield of 629.8 kg/ha and 589.6 kg/ ha respectively. Therefore these two cowpea varieties are recommended for this ecological zone.

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Table 1: Description of varieties on seed type and growth habit of *vigna unguiculata* (L.) Walp] from IITA

Variety	Growth	Seed type
IT 99K-316-2	Early Erect	White rough
IT 00K-961-5	Early Erect	Green smooth
IT 98K-428-3	Early Erect	Green rough
IT 98K-131-2	Early Erect	Brown rough
IT 97K-461-4	Early Erect	Brown smooth
IT 98K-205-8	Early spreading	White rough
IT 97K-499-35	Early Erect	Cream smooth
IT 96D-610	Early Erect	Brown smooth
IT 95K-207-22	Late spreading	White rough
IT 98K-560-1	Late spreading	White rough
IT 98K-962	Late spreading	White smooth

Table 2: Mean square values of growth characters and yield of cowpea varieties evaluated for two years 2008-2009

Source of Variation	Numbers of Leaves per plant	Plant height (cm)	Days to 5o% flowering	Days to Pods at maturity	Yield Kg/ha
Year	15.09ns	23.30*	3.49ns	74.89*	22505.87*
Varieties	55.2*	177.85**	9.20*	14.3*	12549.2*
Year X Varieties	13.68*	11.24ns	3.48	40.15**	3432.24ns
Error	10.45	5.76	0.75	3.8	242.23

** = Significant at 0.01 * = Significant at 0.05 level of probability
ns = not significant

Table 3: Evaluation of Cowpea varieties on number of leaves, plant height, days to 50% flowering, days to pod maturity and yield in 2008, 2009 and Mean

	Numbers of leaves per plant			Plant height (cm)			Days to 50% flowering			Days to pod maturity			Yield Kg ha^{-1}		
Varieties	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean	2008	2009	Mean
IT99K-316-2	15	19	17	29.7	16.2	23	42.3	39	40.7	77.6	57	67.3	419.5	571.5	493.5
IT00K-961-5	16	29.3	22.7	46	14	30.1	42.6	38.3	40.5	78	59.3	68.7	414.4	450.6	432.5
IT98K-428-3	16.7	20.6	18.6	30.3	21	30.2	40.6	37.6	38.8	78.3	55	66.7	548.4	309.3	428.9
IT98K-131-2	19.3	31	25.2	38.4	18.3	28.4	40.3	42.6	41.5	77.6	61	69.3	391.2	622.1	506.8
IT97K-461-4	14	27	20.5	44.2	12.2	28.2	40.3	39	39.7	78	57.3	67.7	391.2	408	399.6
IT98K-205-8	20	23	21,5	24.6	11.6	18.1	42.6	41	41.8	66.6	61	63.8	176	176	176
IT97K-499-35	20	23.6	21.8	31.2	13.6	22.4	41	41	41	71.7	61.2	66.5	518.4	681.1	629.8
IT96D-610	16.7	23	19.8	32	16.7	24.4	40	40.7	40.4	76	61	68.5	380.7	433.6	407.1
IT95K-207-22	20	30.3	25.2	35.2	14.3	24.7	40	41	40.5	72.6	61.6	67.1	450.1	557.1	503.9
IT98K-560-1	20	28.6	24.3	21.4	13.6	17.4	42.3	42.3	42.3	66.3	60.2	63.2	568.2	610.2	589.6
IT98K-962	17	20.6	18.8	29.6	17	23.3	41.3	41.3	41.3	66.3	60.6	63.4	300.4	304	302
Mean	15.9	25	21.4	33.8	15.3	24.5	42.2	40.3	40.1	73	59.6	66.6	403.9	464.1	434
CV (%)	18.3	2.1	10	0.8	0.5	0.7	8.6	0.3	4.5	1.7	1	1.5	22.4	21.1	21.8
LSD (0.05)	5.7	0.6	2.2	1.94	6.3	4.1	1.2	0.5	1.1	3.7	1	2,9	133.8	158	146
Significance	ns	*	*	**	*	*	ns	*	*	ns	*	*	*	*	ns

** = Significant at 0.01 * = Significant at 0.05 level of probability ns = not significant

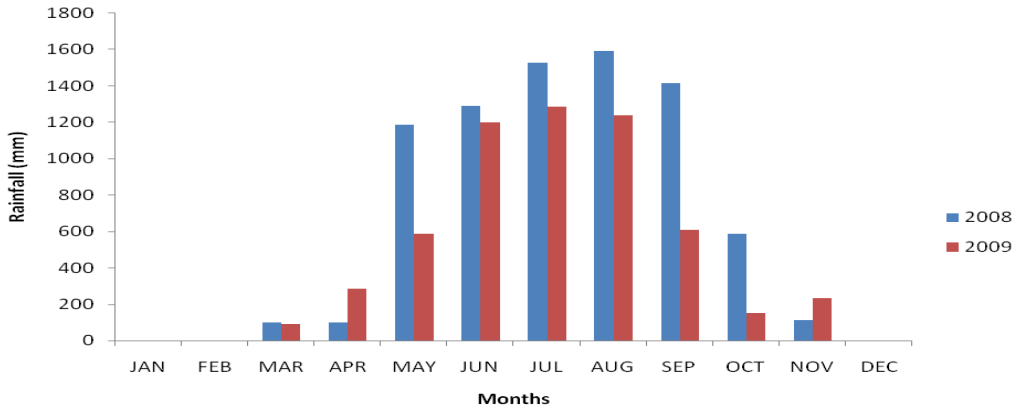

Fig 1: Distribution of Rainfall in the study area 2008 and 2009

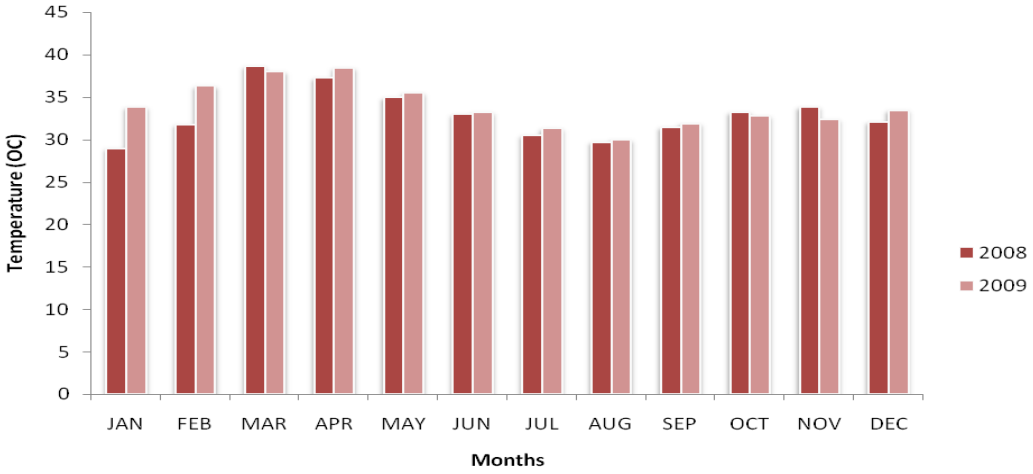

Fig 2: Mean temperature in the study area 2008 and 2009