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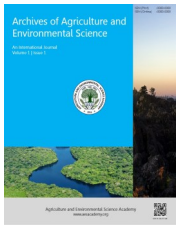

ORIGINAL RESEARCH ARTICLE

Growth and yield attributes of four varieties of cowpea (*Vigna unguiculata* L. Walp) in Anambra State, Nigeria

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ABSTRACT

Field experiments were conducted during the cropping season of the year 2014, to evaluate the growth and yield parameters of four varieties of cowpea (IT04K-223-1, IT04K-321-2, IT04K-332-1 and IT04K-217-5) at Nsugbe Anambra State, Southeastern rainforest zone of Nigeria. A randomized complete block design, replicated three times was used. The results were statistically analyzed using ANOVA. Results showed significant differences ($P<0.05$) among the varieties evaluated in both growth and yield. Variety IT04K-321-2 consistently yielded better than other varieties evaluated. It had the highest number of pods per plant, pod weight, number of seeds per pod and 1000-seeds weight and plant height with the values of 43.80, 3.01, 4.05, 16.30 and 43.92cm respectively. From the study, it is established that varietal differences exist in cowpea with respect to growth and yield attributes. Under proper management, the yield obtained from Nsugbe area of Anambra State could be compared with yields from other cowpea growing States. This study therefore recommended that variety IT04K-321-2, which had comparable higher yield and was adapted to Nsugbe area be integrated into the farming system for maximum yield and utilization. Farmers are therefore encouraged to integrate this variety into their farming system for maximum yield and utilization in the study area

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INTRODUCTION

Cowpea (*Vigna unguiculata* (L) WALP) is one of the world's most important food legumes. It is a crop of immense nutritive and agronomic potentials (Chopra *et al.,* 2011). It is used for food and animal feed and improves soil fertility thus it has become very valuable in areas where land use has become intensified (Srivastava *et al.,* 2015). Cowpea has outstanding features that have made it an important component of subsistence agriculture such as drought tolerance, shade tolerance, quick growth and rapid provision of ground cover (Singh *et al*., 2003; Srivastava *et al.,* 2017). The grain contains about 22% protein and constitutes a major source of protein for resource poor rural and urban people. The grain offers other benefits such as maintenance and improvement of soil physical properties, CEC, microbial activity and reduction in soil temperature and weed suppression (Abayomi *et al*., 2001). In spite of the tremendous benefits derivable from cowpea, it is still not widely cultivated and information on the varieties developed for high yield in Anambra State, south east Nigeria, where the crop is gaining its importance among the peasant farmers is rather scanty. Increasing the production of this beneficial leguminous crop would be of immense important to most Nigerians who currently feed on low protein diet. Choice of variety is one of the most crucial decisions a cowpea grower has to make. There are many variety characteristics such as maturity period, standability and lodging, yield potential etc. These characteristics need to be considered in adopting the best variety for a particular region (Ilodibia *et al*., 2013). Harvestable yield is one of the most important factors in selecting varieties. Cowpea production can be profitable if properly managed. To increase cowpea production farmers need the knowledge of adapted variety with high yielding and good performance and also, to cultivate it as a crop either as sole crop or intercropped with other arable crops in this zone. Hence, this study was conducted to select cowpea varieties with high yield potentials for recommendation to farmers in this zone.

MATERIALS AND METHODS

Study area: The experiment was carried out at the teaching and research farm of Department of Agricultural Education, Nwafor Orizu College of Education Nsugbe, Anambra State (6^0 25N', 6^0 82E') during the 2014-2015 cropping seasons. Nsugbe is located in the tropical rainforest zone with an annual rainfall ranging from 1,500mm to 2,000mm and are characterized by a bimodal rainfall pattern that peaks in July and September with a short dry spell in August.

Treatment and experimental design: The treatments, (IT04K-223-1, IT04K-321-2, IT04K-332-1 and IT04K-217 -5) were obtained from International Institute of Tropical Agriculture, Ibadan. The experiment was conducted in 2014 cropping season. The experiment was laid out in a randomized complete block design with four replications. A plot of 25m × 25m (0.0625ha) was used with 16 beds of 5m × 5m (sub plots) following standard methods (Achebe *et al*., 2011; Ilodibia *et al*., 2016).

Land preparation and sowing of seeds: Site for raising seedlings was cleared using matchet and trashes packed off and burned, a nursery bed of 5m × 5m was measured using measuring tape, measuring rope and pegs and prepared to a fine tilt. Farm yard manure at the rate of 30t/ha was incorporated during this exercise. Two seeds were sown per stand at spacing of 15cm × 60cm (10,110 plants /ha) and thinned to one plant per stand (Achebe *et al*., 2011; Ilodibia *et al*., 2016). The plots were weeded three times manually during the experiment. Data were collected from the three inner rows at two weekly intervals.

Data collection and statistical analysis: Data collected include plant height, number of leaves per plant, number of days to50% flowering number of pods, fresh pod weight, number of seeds per pod and 1000-seed weight. Data collected were subjected to the analysis of variance (ANOVA) using SAS (2003) and treatment means were separated using Duncan multiple range test at 5% level of probability.

RESULTS AND DISCUSSION

The results of the growth and yield parameters of four varieties of cowpea (IT04K-223-1, IT04K-321-2, IT04K-332-1 and IT04K-217-5) grown at Nsugbe Anambra State, Southeastern rainforest zone of Nigeria are shown in Tables 1- 4.

The results showed significant differences ($P< 0.05$) among the varieties in plant height, number of leaves and number of days to 50% flowering (Tables 1-3), respectively. Variety IT04K-321-2 had the highest plant height with the value of 43.92cm while IT04K-217-5 recorded the lowest value though was statistically at par with IT04K-223-1 (Table 1). There was progressive increase in number of leaves among the varieties from 2WAP with peak at 8 WAP, after which the number of leaves started declining. Variety IT04K-321-2 had the highest number of leaves at 2, 4, 6, 8 and 10WAP with the highest value of 99.03 recorded at 8WAP (Table 2). The findings are in agreement with Kumar and Chopra (2012, 2013, 2014), who reported that biomass, chlorophyll content and yield of Mung bean (*Vigna radiata* L.) were significantly affected after irrigation with paper mill, sugar mill and distillery effluent, respectively. They also concluded that the cropping seasons also showed significant effect on the vegetative growth, flowering, pod formation and crop yield of *V. radiata.*

Variety IT04K-321-2 was the first to attain 50% flowering (52.60 days). Variety IT04K- 217-5 was the last to attain 50% flowering (56.20 days) (Table 3). These differences in growth parameters shown by cowpea varieties were in conformity with the works of Ilodibia *et al*. (2013) and Adetiloye and Salau (2002) who reported that variation among cowpea and soybean varieties respectively may be due to differences in their genetic make-up.

The results revealed that significant differences in yield and yield components among cowpea varieties investigated (Table 4). Variety IT04K-321-2 had the highest number of pods per plant, pod weight, number of seeds per pod and 1000-seeds weight with the values of 43.80, 3.01, 4.05 and 16.30 respectively (Table 4). Result is in line with the works of Ilodibia *et al*. (2013) and Odeleye and Odeleye (2001) who reported that differences in yield of crop may be attributed to the varieties grown and genetic make-up. Kumar *et al.* (2014) reported that the distillery effluent irrigation significantly affected the flowering, number of pods and crop yield of *Vigna mungo* L. Hepper (Black gram) in different cropping seasons.

Table 1. Variability on plant height of cowpea varieties.

cowpea varieties	2WAP	4WAP	6WAP	8WAP	10WAP
IT04K- 321-2	11.80[a]	22.91[a]	36.85[a]	43.90[a]	43.92[a]
IT04K- 332-2	11.35[b]	22.36[b]	35.85[b]	42.61[b]	42.62[b]
IT04K- 223-1	10.44[c]	21.40[c]	35.78[c]	40.38[c]	40.38[c]
IT04K- 217-5	10.20[d]	21.36[c]	34.85[d]	40.36[c]	40.37[c]

WAP: Weeks after planting; Means in the same column followed by the same letters are not significantly different at $P=0.05$ using DMRT.

Table 2. Variability on number of leaves of cowpea varieties.

Cowpea varieties	2WAP	4WAP	6WAP	8WAP	10WAP
IT04K- 321-2	10.85[a]	28.41[a]	76.00[a]	99.03[a]	92.22[a]
IT04K- 332-2	10.05[b]	26.51[b]	74.55[b]	92.41[b]	90.00[b]
IT04K- 223-1	09.44[c]	24.30[c]	74.08[c]	88.88[c]	80.00[c]
IT04K- 217-5	08.50[d]	24.28[c]	73.75[d]	85.30[c]	80.08[c]

Means in the same column followed by the same letters are not significantly different at *p=0.05* using DMRT.

Table 3. Variability on number of days to 50% flowering of cowpea varieties.

Cowpea varieties	Days to 50% flowering
IT04K- 321-2	52.60[c]
IT04K- 332-2	50.05[d]
IT04K- 223-1	55.44[b]
IT04K- 217-5	56.20[a]

Means in the same column followed by the same letters are not significantly different at *P=0.05* using DMRT.

Table 4. Variability on number of pods, pod weight (g), number of seeds per pod and 1000-seed weight (g) of cowpea varieties.

Cowpea varieties	Pods per plant	Pod weight (g)	Seeds per pods	1000-seed weight (g)
IT04K- 321-2	43.80[a]	3.01[a]	4.05[a]	16.30[a]
IT04K- 332-2	40.90[b]	29.56[b]	3.60[b]	14.82[b]
IT04K- 223-1	40.94[c]	29.55[c]	3.50[c]	13.88[c]
IT04K- 217-5	39.80[d]	28.86[c]	2.95[d]	12.90[c]

Means in the same column followed by the same letters are not significantly different at *P=0.05* using DMRT.

Conclusions

Based on the results of the study, the present study concluded that varietal differences exist in cowpea with respect to growth and yield attributes. Under proper management, the yield obtained from Nsugbe area of Anambra State could be compared with yields from other cowpea growing States. This study therefore, recommended that variety IT04K-321-2, which had comparable higher yield and was adapted to Nsugbe area be integrated into the farming system for maximum yield and utilization. Farmers are therefore encouraged to integrate this variety IT04K-321-2 into their farming system for maximum yield and utilization in the study area.

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