

## COMPARATIVE SCREENING OF SOME VARIETIES OF AFRICAN YAM BEAN (*SPHENOSTYLIS STENOCARPA*) GROWN IN BENUE STATE FOR GROWTH AND YIELD PERFORMANCE

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### Abstract

The field study was carried out to screen five varieties of African yam bean (AYB) grown in Benue State for their growth and yield performance. Five different varieties of African Yam Bean including Makurdi (brown), Oju (light grey), Adoka (black), Gboko (red) and Ado (golden stripe) were obtained from five different locations in Benue State. Experimental design was randomized completed block design (RCBD) with three replications. Each of the five varieties was replicated five times on three ridges. Results showed that varietal differences were not observed in the mean number of leaves per plant at 2, 4, 6 and 8 weeks after planting ( $p > 0.05$ ). However, varietal differences were observed for mean number of pods per plant, mean number of flowers per plant, mean length of pods per in (cm) and mean number of seeds per plant ( $p < 0.05$ ). Makurdi (brown) and Oju (light grey) varieties grew faster and had the best seed yield in kg/ha. Makurdi and Oju varieties are therefore recommended to the farmers in Makurdi because of their high mean yield.

### Introduction

Nigeria is one of the African countries that are endowed with varieties of grain leguminous plants that are required for sustainable food security. Unfortunately, one major cause of food insecurity experienced in many African countries and Nigeria in particular is the underutilization of some potential food security crops in the continent (Saka *et al.*, 2007). Amongst the underutilized crops with high food potential in Nigeria is African yam bean (*Sphenostylis stenocarpa*. Hochst. Ex. A. Rich) African yam bean (AYB) is one of the most important grain and tuberous legumes of tropical Africa. It is cultivated as a secondary crop with yam (*Dioscorea* spp) and other crops in many parts of Africa mainly by subsistence farmers despite its nutritional values (Potter *et al.*, 1992). The seed and tubers are the two major organs of immense economic importance as food for Africa with regional preferences (Adewale and Dumet, 2010) While the seeds are preferred in the West African countries, the tubers are preferred both in the East and Central Africa. AYB has huge potential for food security in Africa. According to (Uguru and Madukaife, 2001), AYB is well balanced in essential amino acids and has higher amino acid content than *Cajanus cajan*, *Vigna unguiculata* and *Vigna subterranea*. The grain is a good source of proteins, fibre and carbohydrate. It is rich in minerals such as phosphorus, iron and potassium. However, the under-exploitation of the crop has subjected it to be classified as minor grain legume (Saka *et al.*, 2007). AYB is one of the endangered species that has immense nutritional advantages required in human diet. It has dual crop advantage as it produces both seed and tubers. Seed and tuber yield are inversely related (Ene-obong and Okoye, 1992).

Nigeria, like many third world countries is a food deficit country especially with increasing population growth. Most rural communities cannot afford animal proteins and over three million children lack sufficient proteins within the last decade, and therefore suffer grossly retarded physical growth and development, (Klu *et al.*, 2001). Protein deficiencies also directly or indirectly affect the health and economic productivity of adult population. The potentials of African yam bean cannot be over emphasized, therefore, there is need to explore the possibilities of exploiting new plant resources to meet the growing needs of the human society, which incidentally has depended only a small fraction of plant resources (Potter, 1992). Hence the objective of this study was to screen all the cultivated AYB varieties in Benue State and recommend the best variety to the farmer for cultivation in order to rapidly meet their protein needs.

### Materials and Methods

The experiment was conducted at Makurdi in 2013 cropping season Makurdi falls within the Southern Guinea Savanna zone of Nigeria at latitude  $7^{\circ}15' - 7^{\circ}40'$  and longitude  $8^{\circ}15' - 8^{\circ}40'E$  with an elevation of 97m. The average annual rainfall varies from 1000 to 1500mm. the dominant soil of the experimental site is sandy loam. Five different varieties of African yam beans were obtained from five different locations in Benue State (Makurdi, Oju, Adoka, Gboko and Ado). These towns are located in separate Local Government Areas of Benue State. The varieties selected were characterized based on seed colour into black, brown, light grey, red and golden stripe colour.

Land preparation was manual; the bush was cleared with cutlass and ridges of about 150cm were made by hoe. The experimental design was Randomized Complete Block Design with three replications. The varieties of AYB planted are red, brown, light grey, black and golden stripe. Planting was done on 20<sup>th</sup> May, 2013. Each of the five varieties was replicated five times on three ridges. Intra spacing on the field was 20cm and inter spacing was 1 meter as proposed by Okeleye *et al.* (1999). When seedlings attained 2-leaf stage (8-12cm long), they were thinned down to 2 seedlings per stand. Aphids and grasshoppers were noted at 2 weeks after planting (WAP) and 20-liter knap sacks sprayer was used to spray best action at the rate of 1.5litres of water per hectare for three times at two weekly intervals.

The number of leaves was counted at 2, 4, 6 and 8 weeks after planting (WAP). The days to 50% flowering was observed at 15 weeks after planting. Furthermore, the number of pods per plant was counted at 19 weeks after planting. After each harvest, pod length was measured based on the number of pods obtained in each variety. Thereafter, all harvested pods in a plot were threshed and seeds measured in a weighing balance.

Analysis of variance (ANOVA) was used to analyze all the data collected. Differences between treatment means were determined using Fishers Least Significant Difference (LSD) at 5% level of significance (Steel and Torrie, 1987).

### Results and Discussion

The results on the number of leaves at 2, 4, 6 and 8 weeks after planting in Table 1 showed that, there were no significance differences among the varieties of AYB. However, Makurdi variety had the highest mean number of leaves at 2, 4 and 8 weeks after planting of 12.80, 42.67 and 209.33 respectively, and Oju variety had the lowest mean number of leaves per plant at 4, 6 and 8 WAP and Adoka variety had the lowest mean number of leaves at 2 weeks after planting.

The results on the number of flowers per plant (Table 2) significant differences among the varieties of African Yam Bean; which indicated that Makurdi and Oju had the highest mean number of flowers per plant of 4.67 and 4.00 while Ado variety (golden stripe) had the lowest mean number of flowers per plant of 3.40. Similarly, there were significant differences among the varieties of AYB in the number of pods per plant (Table 3).

The results indicated that, Makurdi and Oju had the highest mean number of pods per plant of 6.00 and 5.20 while Adoka and Ado variety had the lowest mean number of 4.47 and 4.27 respectively. There were also significant differences among the varieties of AYB in their pod length (cm) (Table 4). Makurdi and Oju varieties had the highest mean pod length of 96.34cm and 74.23cm, respectively, while Adoka and Ado had the lowest mean pod length of 58.24cm and 57.64cm respectively. On seed yield (kg/ha), the Makurdi variety had the highest seed yield (75kg/ha) following by the Oju variety (53.13kg/ha) while the Adoka variety had the lowest seed yield (36.07kg/ha).

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**Table 1: Mean Number of Leaves Per Plant Among Different Varieties of African Yam Beans at 2, 4, 6 and 8 Weeks After Planting.**

S/N	Varieties	2WAP	4WAP	6WAP	8WAP
1.	Gboko (red)	10.33	40.27	142.67	185.60
2.	Makurdi (brown)	12.80	42.67	163.53	209.33
3.	Oju (light grey)	11.07	41.87	182.80	208.93
4.	Adoka (black)	9.00	40.87	178.87	208.67
5.	Ado (Golden stripe)	9.33	27.87	148.80	184.800
	<b>F-LSD (0.05)</b>	<b>14.54</b>	<b>17.56</b>	<b>20.34</b>	<b>24.27</b>

**Table 2: Mean Number of Flowers Plant at 50% Flowering among Different Varieties of African Yam Bean from Benue State.**

S/N	Varieties	Mean Number of Flowers/Plant)
1.	Gboko (red)	3.67
2.	Makurdi (brown)	4.67
3.	Oju (light grey)	4.00
4.	Adoka (black)	3.67
5.	Ado (Golden stripe)	3.40
	<b>F-LSD (0.05)</b>	<b>0.57</b>

**Table 3: Mean Number of Pods per Plant among Different Varieties of African Yam Bean from Benue State.**

S/N	Varieties	MEAN Number of Pods/Plant
1.	Gboko (red)	4.60
2.	Makurdi (brown)	6.00
3.	Oju (light grey)	5.20
4.	Adoka (black)	4.47
5.	Ado (Golden stripe)	4.27
	<b>F-LSD (0.05)</b>	<b>0.57</b>

**Table 4: Mean Pod Length (cm) per Plant among Different Varieties of African Yam Bean from Benue State.**

S/N	VARIETIES	MEAN (LENGTH OF PODS/PLANT)
1.	Gboko (red)	61.34
2.	Makurdi (brown)	96.34
3.	Oju (light grey)	74.23
4.	Adoka (black)	58.24
5.	Ado (Golden stripe)	57.64
	<b>F-LSD (0.05)</b>	<b>7.40</b>

**Table 5: Mean Seed Yield (kg/ha) among Different Varieties of African Yam Bean from Benue State.**

S/N	Varieties	Mean Number of Flowers/Plant
1.	Gboko (red)	42.00
2.	Makurdi (brown)	75.00
3.	Oju (light grey)	53.13
4.	Adoka (black)	36.07
5.	Ado (Golden stripe)	38.00
	<b>F-LSD (0.05)</b>	<b>4.90</b>