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Assessment of Varietal Growth of Plantain and Banana in South-western Nigeria

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ABSTRACT

Southwestern parts of Nigeria are located within savanna and forest agro-ecological zones in which the economy is agrarian in nature. The major crops intercropped with plantain and banana are cocoa (when young) and cocoyam. This research was therefore geared toward the collection of various types of plantains and bananas commonly grown in the south west in order to increase genetic lines in the gene bank of the National Horticultural Research Institute, Ibadan. Information was obtained from six states (Lagos, Ogun, Osun, Ondo, Ekiti and Edo). Data were collected from farmers in 50 farms from each state who had large and small farms using direct questioning, measuring tapes for plant height, stem girth, leaves length and breadth. Soil observations on each farm were carried out and soil characteristics such as texture, stoniness and colour were determined. The results of the survey indicate that farmers had given more attention to the cultivation of the crops either intercropped with cocoyam or cocoa (when young) or when planted as a sole crop. The majority of farmers had their plantain and banana farms in their backyards. Most of their cultural practices were rain-fed with uniform population variability. 'Saro' banana variety showed significant difference ($P < 0.05$) among the mean value in plant height and stem girth. 'Saro' banana in Owode Owena community recorded highest plant height and stem girth when compared with Owan and Aramoko. The major constraints to production were nematodes, weevil infestation and the lack of knowledge of cultural and maintenance practices.

Keywords: conservation, diversity, location, survey
Abbreviations: LSD, least significant difference

INTRODUCTION

Plantains and banana (*Musa* spp.) are one of the world's most important food crops. In west and central Africa about 70 million people are estimated to depend on *Musa* fruits for large production of their daily carbohydrate intake (Rowe 1998). In Nigeria, plantains and bananas are both important staples and as sources of income for subsistence farm families. There has been an increasing trend toward large-scale production of the crop (Obiefuna 1986) in the traditional humid rainforest production zone.

A decline in plantain and banana production over the years has been attributed to high susceptibility to pathogens (Persley and de Langhe 1987), weeds (Ndubizu 1983), drought and organic matter status of the soil (Rasheed 2003), poor suckering ability (Baiyeri and Aba 2005) pest and diseases, labour shortage, poor agronomic practices and postharvest constraints (Robinson 1996). All these are contributing factors to declining plantain and banana production and the worsening of poverty in Sub-Saharan Africa.

A common limiting factor to large-scale production of bananas and plantains and or expansion of existing plantation is the difficulty in obtaining planting material (Baiyeri and Ajayi 2000), due to poor suckering ability (Robinson 1986). Nevertheless, there are several types of planting materials (including the maiden sucker, water sucker, sword suckers, butt, pepper, and bits) used for the establishment of plantations, but they vary in their degree of suitability (Ndubizu and Obiefuna 1982; Baiyeri and Ndubizu 1994, Baiyeri *et al*. 1994). These conventional propagating materials are usually in short supply and may be inadequate to meet the needs of medium- to large-scale production at the recommended population of 1600-2500 plants ha^{-2} (Rasheed 2003).

This report presents an approach for the identification, selection, collection and evaluation of selected plantain and banana germplasm from southwestern parts of Nigeria. The major aims for collection and evaluation of plantain and banana germplasm were:

- To conserve much of the genetic diversity within *Musa* spp. in the Southwestern parts of Nigeria before any further genetic erosion takes place;
- To consider and integrate farmers' evaluation of different *Musa* spp.;
- To identify, collect and evaluate superior *Musa* spp. for mass propagation and fruit production.

MATERIALS AND METHODS

A combined trek approach of experts (Abington and Clinch 1992; Subedi *et al.* 1993, 1995; Pieber *et al.* 2009) involving an agronomist, a horticulturist and a geneticist was organized for the programme in order to identify major areas where different cultivars of plantain and banana were grown for domestic and commercial purposes. Various farms and villages in southwestern parts of Nigeria were visited. Selected *Musa* spp. plants were observed jointly by farmers and experts and assessed for final selection. Purchase of suckers from farmers was made during this period. Mature, bearing plants with good health were selected. Location of the plants, altitude, topography, vegetation zone and ownership were noted and the plant attributes such as height, stem girth, number of bunches and numbers of fingers were recorded using a meter rule, measuring tapes and visual counting. In addition, leaf area was calculated as: length × width × 0.80 (Obiefuna and Ndubizu 1979). Information collected for each sample was recorded in a logbook at the time of sampling, considering several other parameters such as cultivar name, village/town, state/country, colour, stations, frequency of occurrence, source of material collected, collected material, associated crop, population variety, agronomic score, cultural practices, disease and any other information pro-

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Table 1 Plantain production 'Agbagba' in Southwest Nigeria.

Location/State	Plant height (m)	Stem girth (cm)	Number of fingers	Number of bunches	Leaf area (m^2)
Lafenwa/Ogun	3.20	58	36.0	1.33	0.66
Ayetoro/Ogun	4.28	36	35.3	1.67	0.67
Abaotun/Oyo	2.53	49	37.0	1.33	0.68
Ojebiyi/Ogun	2.70	39	24.3	1.00	0.72
AyetoroIkire/ Osun	3.68	62	37.0	1.00	0.65
LSD ($P < 0.05$)	0.25	4	3.1	0.89	0.19
Significance	*	*	*	NS	NS

* = Significant, NS= Not significant; LSD = Least significant difference

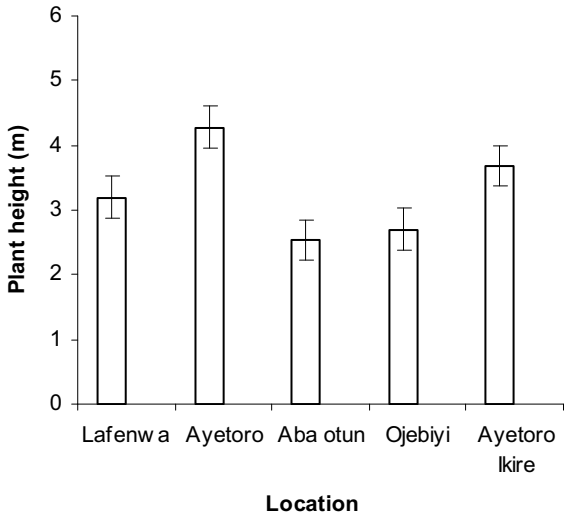

Fig. 1 Variation in plant height of 'Agbagba' plantain. Bar = SE (n = 0.34).

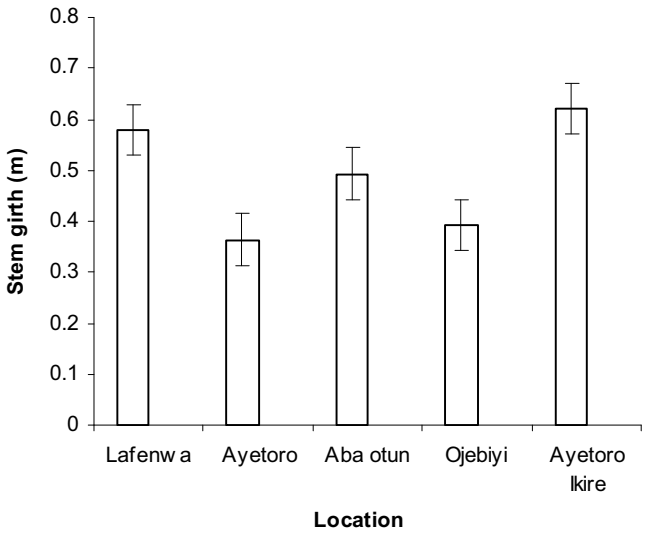

Fig. 2 Variation in stem girth of 'Agbagba' plantain. Bar = SE (n = 0.05).

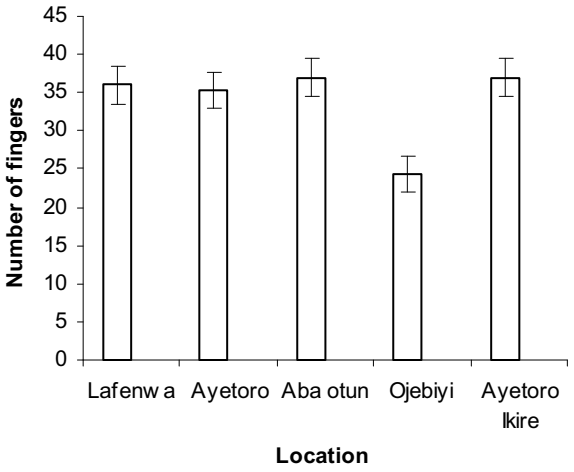

Fig. 3 Variation in number of fingers of 'Agbagba' plantain. Bar = SE (n = 3.79).

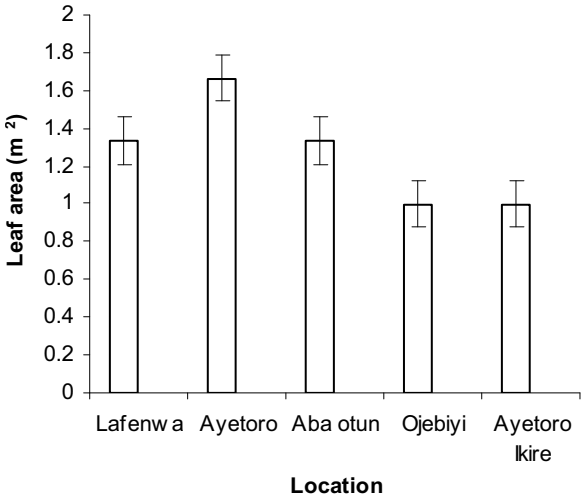

Fig. 4 Variation in leaf area of 'Agbagba' plantain. Bar = SE (n = 1.15).

vided by the farmers such as market opportunity.

Data collected on plant height, stem girth, number of fingers, number of bunch and leaf area were subjected to analysis of variance using General Linear Model (GLM) procedure of Statistical Analysis System (SAS Inst. 2003). Means were separated using the Least Significant Different (LSD) at $P < 0.05$.

RESULTS AND DISCUSSION

There were significant differences ($P < 0.05$) in plant height, stem girth and number of fingers in 'Agbagba' in the five locations assessed, as shown in **Table 1** and **Figs. 1-3**. 'Agbagba' in Ayetoro, Ogun state was significantly taller than plants from other locations. The shortest 'Agbagba' was found in Aba Otun, Oyo state (**Fig. 1**). An increase in stem girth of the same variety was observed in Ayetoro Ikire Osun. The highest values of stem girth recorded in Ayetoro Ikire, Osun state were due to the fact that 'Agbagba' plantain was planted solely without any food crop competing with it. The root system of plantains and bananas consists mainly of laterally spreading shallow roots with a limited number growing downward, as observed by Blomme *et al.* (2008). The lowest value observed in stem girth in Ayetoro Ogun state (**Fig. 2**) was due to competing ability of other crops planted with plantain in this location. The result suggests that intercropping plantain with other crops in Ayetoro Ogun state is responsible for the higher plant height and reduced stem girth. There was no significant effect on number of bunches and leaf area for all locations (**Table 1; Fig. 4**).

Table 2 shows the production of 'Alaba' plantain in the two locations assessed. There was no significant difference

Table 2 Plantain production 'Alaba' in Southwest Nigeria.

Location/State	Plant height (m)	Stem girth (m)	Number of fingers	Number of bunches	Leaf area (m^2)
Ayetoro Ikire/Osun	3.27	0.55	19.0	1.0	0.56
Owode Owena/Ondo	3.40	0.56	20.0	1.0	0.59
LSD ($P < 0.05$)	0.28	0.03	3.6	0.1	0.06
Significance	NS	NS	*	NS	NS

* = Significant, NS= Not significant; LSD = Least significant difference

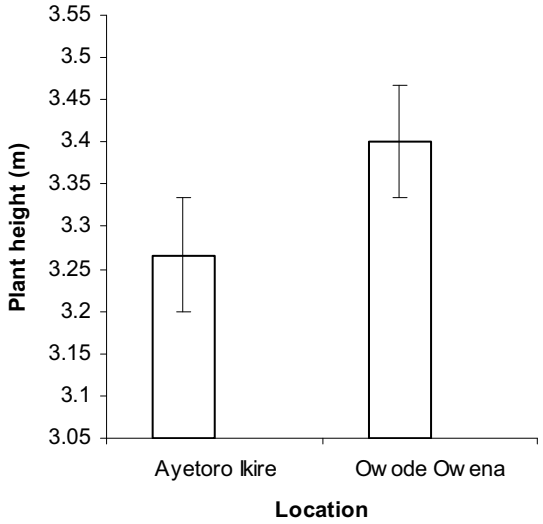

Fig. 5 Variation in plant height of 'Alaba' plantain. Bar = SE (n = 0.19).

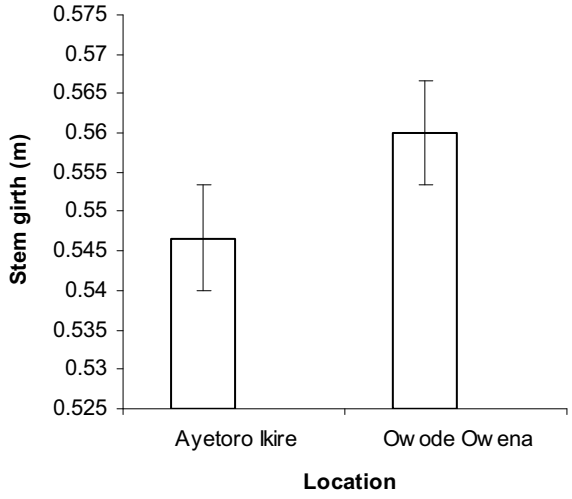

Fig. 6 Variation in stem girth of 'Alaba' plantain. Bar = SE (n = 0.02).

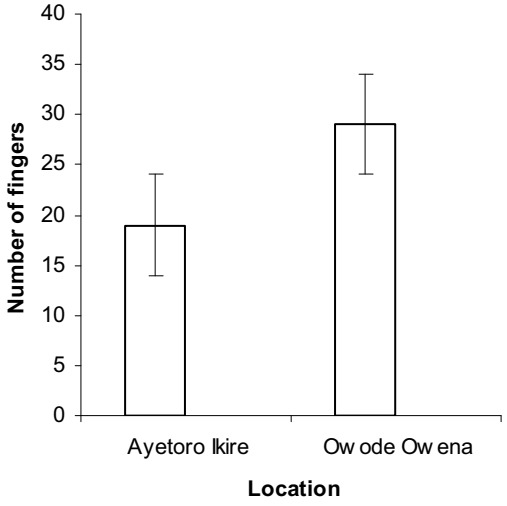

Fig. 7 Variation in number of fingers of 'Alaba' plantain. Bar = SE (n = 2.27).

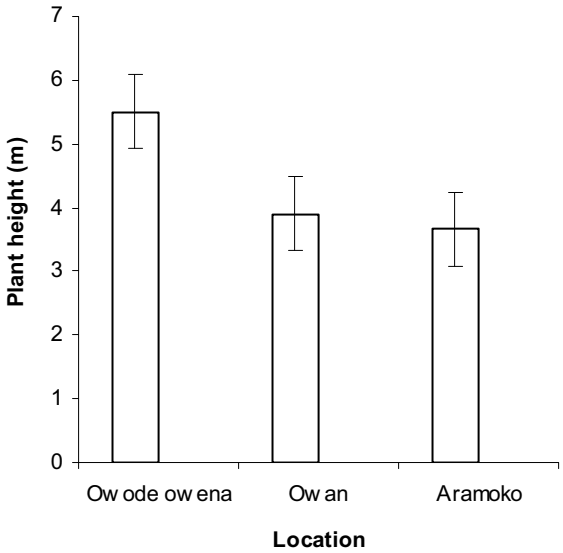

Fig. 8 Variation in plant height of 'Saro' banana. Bar = SE (n = 0.41).

($P < 0.05$) in plant height, stem girth, number of bunches and leaf area in all the locations although the number of fingers in 'Alaba' was significantly higher in Owode Owena, Ondo state compare to Ayetoro, Osun state (**Figs. 5-7**).

Table 3 shows an assessment of the production of 'Saro' banana in relation to the location. There were signifi-cant differences ($P < 0.05$) among the mean values of plant height (**Fig. 8**). 'Saro' banana in Owode Owena were significantly taller than 'Saro' banana from other two locations while shortest 'Saro' banana were found in Aramoko, Ekiti state. This same trend occurred for stem girth (**Fig. 9**). 'Saro' banana with higher stem girth were also observed in Owode Owena while the least value of stem girth were recorded in Owan, Edo state. The results are attributed to limiting factors like flooding, weevils and nematodes, which attack the roots of banana plants, as observed in soils in Owan community. Nematodes are recognized as severe production to bananas and plantains (Gowen and Queneherve 1990), with losses due to nematodes estimated at

Table 3 Banana production 'Saro' in Southwest Nigeria.

Location	State	Plant height (m)	Stem girth (cm)	Number of fingers
Owode Owena	Ondo	5.50	94.0	77.0
Owan	Edo	3.90	71.0	74.0
Aramoko	Ekiti	3.67	74.0	74.3
LSD ($P < 0.05$)		0.44	6.4	5.6
Significance		*	*	NS

* = Significant, NS= Not significant; LSD = Least significant difference

about 20% worldwide (Sasser and Freckman 1987). Locally however, losses of 40% or greater can frequently occur, particularly in areas prone to tropical storms due to toppling as a result of wind damage on affected plants (Tripathi 2003). The distribution of the root system of plantains and bananas is, among other factors, related to the physical properties of the soil (Irizarry *et al.* 1981). For example, increased soil

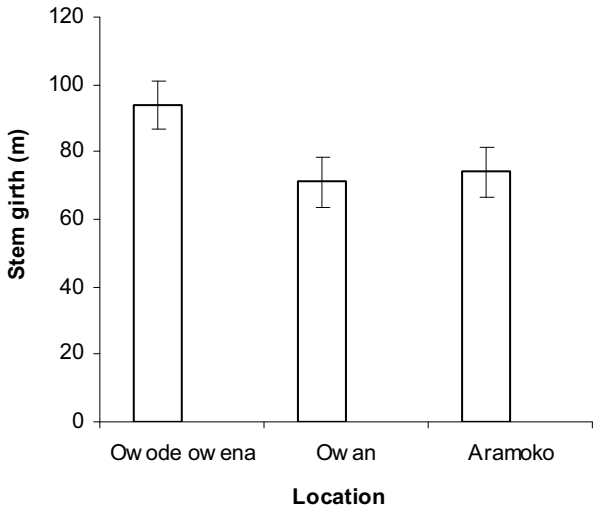

Fig. 9 Variation in stem girth of 'Saro' banana. Bar = SE (n = 5.99).

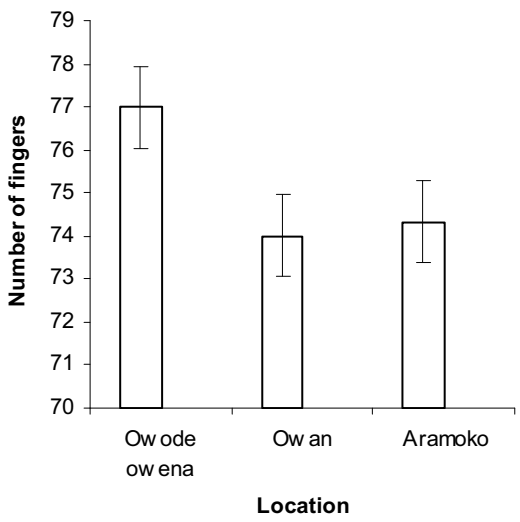

Fig. 10 Variation in number of fingers of 'Saro' banana. Bar = SE (n = 5.92).

porosity will enhance banana root growth (Delvaux and Guyot 1989). Soil structure and porosity are enhanced under mulch (Salau *et al.* 1992) and may affect *Musa* root distribution. The results obtained in Aramoko Ekiti are liable to poor weeding and spacing management as the plants are left to compete for survival with *Chromolena odonrata* and other destructive weeds. Persley and de Langhe (1987) and Ndubizu (1983) reported, in plantain, that a progressive decline in plantain and banana production over the years has been attributed to high susceptibility to pathogens and weeds.

There was no significant difference in the number of fingers between the three locations (**Fig. 10**).

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