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## Field Performance of Improved Banana Cv. Fhia 17 and Fhia 23 in the Eastern Zone of Tanzania

<sup>1</sup>T.J. Msogoya, <sup>2</sup>A.P. Maerere, <sup>2</sup>P.M. Kusolwa and <sup>3</sup>L.T. Nsemwa

<sup>1</sup>Writtle College, Chelmsford Essex, CM1 3RR, UK

<sup>2</sup>Sokoine University of Agriculture, P.O. Box 3005, Morogoro, Tanzania

<sup>3</sup>Agricultural Research Institute, Uyole, P.O. Box 400 Mbeya, Tanzania

**Abstract:** This study was conducted to determine the performance of new improved banana cv. FHIA 17 and FHIA 23 (*Musa* AAAA hybrids) in the Eastern zone of Tanzania compared to popular local cooking banana cv. Bukoba, Uganda, Embwailuma, Malindi and Mshale and dessert banana cv. Kisukari, Mtwike and Jamaica. Results showed that cv. FHIA 23 and FHIA 17 were more ( $p < 0.05$ ) resistant to black sigatoka disease with infection index (II) of 16.0 and 18.7% compared to local banana cv. Jamaica, Uganda, Bukoba, Mshale, Mtwike, Embwailuma and Malindi with II of 23.3, 23.5, 24.4, 24.5, 27.1, 30.5 and 39.7%, respectively. Moreover, cv. FHIA 17 and FHIA 23 were earlier ( $p < 0.05$ ) maturing with bunches harvested at 360 and 375 days from the date of planting compared to cv. Jamaica, Malindi and Bukoba harvested at 405, 407 and 411 days, respectively. Conversely, the improved cultivars were later maturing than cv. Embwailuma, Uganda and Mshale harvested at 330, 334 and 345 days, respectively. Cultivars FHIA 17 produced bigger ( $p < 0.05$ ) bunch weighing 36.5 kg than all local cultivars while cv. FHIA 23 produced higher bunch yield of 25.0 kg than cv. Kisukari, Uganda, Embwailuma, Mshale and Jamaica with bunch weights of 13.7, 15.6, 16.1, 16.6 and 16.8 kg, respectively. On the contrary, cv. FHIA 23 produced as big ( $p < 0.05$ ) bunch as cv. Malindi with bunch weighing 22.9 kg, but smaller than that of cv. Mtwike of 31.3 kg. The dissemination of these cultivars to farmers in the Eastern zone of the country is highly recommended though further studies are required to determine their suitability for dessert and matoke consumption as perceived by consumers in this zone and urban markets.

**Key words:** Improved banana cultivars, yield, black sigatoka, Eastern zone of Tanzania

### INTRODUCTION

Tanzania produces about 3.9% of the world banana and plantain and is ranked second in East Africa after Uganda (FAO, 1995). The same author estimated banana and plantain production in Tanzania at 12, 12 and 10% of all bananas and plantains output in Africa for 1993, 1994 and 1995, respectively. The average national yield is estimated at 3000 kg ha<sup>-1</sup> while the total national production varies from 750,000 to 820,000 tonnes per year (URT, 1993). Bananas and plantains are major staple food for about 15-20% of the Tanzania's population (Masaki, 1995; Abdulwakil, 1995) and over 95% of the produce is consumed locally (Kusolwa, 2003). Cooking bananas account for about 70% of the total national banana and plantain output (URT, 1993). The consumption of cooking bananas, principally East African highland (EA) bananas is ranked number one followed by the dessert bananas and plantains (Mugogo, 1998).

In Tanzania, the Eastern zone is ranked fourth with 7% of the area under banana cultivation. The most important zones are the Lake, Northern and Southern highland with 52, 25 and 10% of the areas under

banana cultivation (FAO, 1995). The Eastern zone is relatively marginal for banana cultivation but its vicinity to urban major markets lowers the transport cost. The most popular cooking banana cultivars grown in the Eastern zone include cv. Bukoba (synonym: Enshakara, Musakala), Uganda (synonym: Enchoncho, Enyeru), Embwailuma (synonym: Mbwazirume), Malindi (synonym: Giant Cavendish) and Mshale (synonym: Pisane lilin) whereas the most important commercially grown dessert banana are cv. Mtwike (synonym: Grand nain), cv. Kisukari, (synonym: Ney Povon) and cv. Jamaica (synonym: Gros Michel) (TARP II, 2002). All these cultivars are susceptible to black sigatoka (*Mycosphaerella fijiensis* Morelet) and the disease can cause severe yield loss ranging from 30 to 70% (IPGRI, 1998).

Improved banana cv. FHIA 17 and FHIA 23 (AAAA Hybrids) have been introduced to Kagera region in Tanzania from K.U. Leuven in Belgium and are reported to be high yielding, resistant to diseases and suitable for dessert and matoke consumption (Pallez *et al.*, 2004). As the Eastern zone is relatively marginal for banana cultivation, farmers are looking for adaptive and

productive cultivars. The objective of this study was to evaluate the field performance of cv. FHIA 17 and FHIA 23 in the Eastern zone of Tanzania in comparison to local dessert and cooking banana cultivars.

### MATERIALS AND METHODS

**Crop establishment and management:** Suckers of banana cv. FHIA 17 and FHIA 23 (treatment) were collected from Kagera Community Development Project in Kagera region whereas suckers of cv. Bukoba, Uganda, Embwailuma, Mshale and Malindi (control for cooking banana), Mtwike, Kisukari and Jamaica (control for dessert banana) were collected at the Horticulture Unit of Sokoine University of Agriculture (SUA). In 2002, 10 suckers of each cultivar were planted at SUA in holes of 100×100×100 cm size each filled with 60 L of farmyard manure and spaced at 3×4 m between plants and rows. Sokoine University of Agriculture lies at an altitude of about 500 m above sea level and experiences average annual temperatures of 16-34°C and low rainfall of 700-900 mm. The crop received all cultural managerial practices including weeding, desuckering, irrigation during dry season and removal of old leaves.

**Data collection and analysis:** Data collection on plant size (pseudostem height and girth), black sigatoka disease incidence and yield (bunch weight, number of hands and fruits, fruit weight) was taken up to the third year from the date of planting. Data on plant height and girth were collected according to IBPGR (1984) and yield according to Swennen and De Langhe (1985). On the other hand, sigatoka disease incidence was assessed on a 0-6 disease severity scale as described by Gauhl *et al.* (1993). A score 0 was recorded when no disease symptoms were observed and 6 when the disease killed 51-100% of leaves. Disease infection index was calculated according to Orjeda (1998). Data analysis was performed using SPSS 12.0 for Windows based on Tukey test ( $p < 0.05$ ) according to Zar (1997).

### RESULTS AND DISCUSSION

**Plant size and black sigatoka disease incidence:**

Cultivars FHIA 23 and FHIA 17 had higher ( $p < 0.05$ ) pseudostem height to girth ratios of 3.96 and 3.76 compared to all local banana cultivars except cv. Embwailuma (Table 1). The lower pseudostem height to girth ratio indicates that the improved cultivars are adequately strong to support themselves against strong wind and during heavy bunch development compared to local banana cultivars. On the other hand, cv. FHIA 23 and FHIA 17 were less susceptible to black sigatoka with infection index (II) of 16.0 and 18.7% compared to cooking banana cv. Uganda, Bukoba, Mshale, Embwailuma and Malindi with II of 23.5, 24.4, 24.5, 30.5 and 39.7% and dessert banana cv. Jamaica and Mtwike with II of 23.3 and 27.1%, respectively (Table 1). Conversely, the improved cultivars were as less ( $p < 0.05$ ) susceptible to the disease as cv. Kisukari with II of 18.6%. The black sigatoka disease incidence is considered to be low, moderate and severe when the II is less than 20, 20-50 and 51-100%, respectively (Orjeda, 1998).

**Number of days to bunch harvest:** Cultivars FHIA 17 and FHIA 23 were harvested earlier ( $p < 0.05$ ) at 360 and 375 days from the date of planting compared to cv. Jamaica, Malindi and Bukoba harvested at 405, 407 and 411 days, respectively. On the contrary, cv. FHIA 17 was later by 15, 30, 34 days and cv. FHIA 23 by 30, 41 and 45 days later ( $p < 0.05$ ) compared to cv. Mshale, Embwailuma and Uganda, respectively. Similarly, cv. FHIA 23 was as early yielding as cv. Mtwike and Kisukari, whereas cv. FHIA 17 produced bunches earlier by 15 days compared to the same cultivars.

**Bunch and fruit weight:** Improved banana cv. FHIA 17 and FHIA 23 produced bigger ( $p < 0.05$ ) bunch weighing 36.5 and 25.0 kg than cooking banana cv. Uganda, Embwailuma and Mshale with bunch weight of 15.6, 16.1 and 16.8 kg and dessert banana cv. Kisukari and Jamaica with bunch weighing 13.7 and 16.6 kg,

Table 1: Plant strength and resistance to black sigatoka of improved banana cv. FHIA 17 and FHIA 23 compared to local banana cultivars in the Eastern zone of Tanzania

Cultivar	Plant height (cm)	Plant girth (cm)	Plant height to girth ratio	Average number of leaves/plant	Sigatoka infection index (%)
FHIA17	302.8 <sup>b</sup>	76.5 <sup>c</sup>	3.96 <sup>a</sup>	12.7 <sup>a</sup>	18.7 <sup>a</sup>
FHIA 23	303.7 <sup>b</sup>	80.7 <sup>d</sup>	3.76 <sup>a</sup>	12.3 <sup>a</sup>	16.0 <sup>a</sup>
Bukoba	343.0 <sup>f</sup>	57.7 <sup>b</sup>	5.94 <sup>b</sup>	11.9 <sup>a</sup>	24.4 <sup>b</sup>
Uganda	243.0 <sup>e</sup>	48.0 <sup>e</sup>	5.06 <sup>b</sup>	11.7 <sup>a</sup>	23.5 <sup>b</sup>
Embwailuma	231.9 <sup>e</sup>	71.5 <sup>c</sup>	3.24 <sup>a</sup>	11.6 <sup>a</sup>	30.5 <sup>c</sup>
Mshale	339.6 <sup>f</sup>	59.0 <sup>b</sup>	5.76 <sup>b</sup>	14.9 <sup>b</sup>	24.5 <sup>b</sup>
Malindi	299.0 <sup>b</sup>	58.8 <sup>b</sup>	5.09 <sup>b</sup>	12.6 <sup>a</sup>	39.7 <sup>d</sup>
Kisukari	327.0 <sup>bc</sup>	58.0 <sup>b</sup>	5.64 <sup>b</sup>	14.4 <sup>b</sup>	18.6 <sup>a</sup>
Mtwike	299.2 <sup>b</sup>	57.2 <sup>b</sup>	5.23 <sup>b</sup>	12.3 <sup>a</sup>	27.1 <sup>c</sup>
Jamaica	297.5 <sup>b</sup>	58.0 <sup>b</sup>	5.13 <sup>b</sup>	11.8	23.3 <sup>b</sup>

Numbers bearing the same letter(s) within the column insignificantly ( $p < 0.05$ ) different according to Tukey test

Table 2: Yield performance of improved banana cv. FHIA 17 and FHIA 23 compared to local cooking and dessert banana cultivars in the Eastern zone of Tanzania

Cultivar	No. of days to bunch harvest	Bunch weight (kg)	Number of hands/bunch	Number of fingers/hand	Fruit weight (g)
FHIA17	360 <sup>bc</sup>	36.5 <sup>d</sup>	13.6 <sup>c</sup>	16.6 <sup>a</sup>	161.8 <sup>d</sup>
FHIA 23	375 <sup>b</sup>	25.4 <sup>b</sup>	13.5 <sup>c</sup>	16.0 <sup>a</sup>	94.1 <sup>a</sup>
Bukoba	411 <sup>c</sup>	23.9 <sup>b</sup>	10.0 <sup>ab</sup>	18.2 <sup>a</sup>	133.9 <sup>c</sup>
Uganda	334 <sup>a</sup>	15.6 <sup>a</sup>	7.9 <sup>a</sup>	18.3 <sup>a</sup>	114.9 <sup>b</sup>
Embwayiluma	330 <sup>a</sup>	16.1 <sup>a</sup>	7.1 <sup>a</sup>	16.3 <sup>a</sup>	121.4 <sup>bc</sup>
Mshale	345 <sup>ab</sup>	16.8 <sup>a</sup>	9.4 <sup>ab</sup>	16.4 <sup>a</sup>	107.8 <sup>b</sup>
Malindi	407 <sup>c</sup>	22.9 <sup>b</sup>	10.2 <sup>b</sup>	17.0 <sup>a</sup>	135.0 <sup>c</sup>
Kisukari	375 <sup>b</sup>	13.7 <sup>a</sup>	9.2 <sup>ab</sup>	17.3 <sup>a</sup>	85.0 <sup>a</sup>
Mtwike	375 <sup>b</sup>	31.3 <sup>c</sup>	11.2 <sup>bc</sup>	17.0 <sup>a</sup>	149.3 <sup>cd</sup>
Jamaica	405 <sup>c</sup>	16.6 <sup>a</sup>	9.4 <sup>b</sup>	18.0 <sup>a</sup>	104.1 <sup>ab</sup>

Numbers bearing the same letter(s) within the column are insignificantly ( $p < 0.05$ ) different according to Tukey test

respectively (Table 2). However, cv. FHIA 23 produced as big bunch as cv. Malindi and Bukoba with bunch weight of 22.9 and 23.9 kg, but smaller ( $p < 0.05$ ) than that of cv. Mtwike of 31.3 kg.

Cultivars FHIA 17 and FHIA 23 produced bigger ( $p < 0.05$ ) number of hands per bunch of 14.6 and 13.5 compared to all cooking and dessert banana cultivars (Table 2). Similarly, cv. FHIA 17 produced bigger ( $p < 0.05$ ) fruits weighing 161.8 g compared to all local cooking and dessert banana cultivars (Table 2). On the contrary, cv. FHIA 23 produced smaller fruits of 94.1 g compared to those of the local cultivars cv. Uganda, Embwayiluma, Bukoba, Malindi and Mtwike.

### CONCLUSIONS

Improved banana cv. FHIA 17 and FHIA 23 can appreciably resist black sigatoka in the Eastern zone of the country than local cooking and dessert banana cultivars. Moreover, they mature earlier than most local banana including cv. Malindi, Jamaica and Bukoba but later than cv. Uganda, Embwayiluma and Mshale. The improved cultivars produce higher yield compared to the local cooking banana cv. Uganda, Embwayiluma, Mshale and Bukoba and dessert banana cv. Kisukari and Jamaica. The dissemination of these cultivars to farmers in the Eastern zone is recommended. Further studies are required to determine suitability of these cultivars for matoke and dessert banana consumption in this zone and urban markets.

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