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## Sensory Evaluation of Four FHIA Tetraploid Hybrids for *Kaakle* (a Local Dish) in Ghana

B.M. Dzomeku, S.K. Darkey, R.K. Bam and A.A. Ankomah  
Crops Research Institute, Council for Scientific and Industrial Research,  
P.O. Box 3785, Kumasi, Ghana, West Africa

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**Abstract:** The success of the introduction of any new *Musa* hybrid hinges on the acceptance of common dishes prepared from these hybrids by the local people. A study was conducted to assess the consumer acceptability of four FHIA hybrids (FHIA-21, FHIA-01, FHIA-03 and FHIA-25) for a popular food preparation called *kaakle* with local *Apantu* (local False Horn plantain) as control. *Kaakle* is prepared by blending the pulp of over-ripened pulp of plantain or banana fruits. The paste produced is mixed with 20% corn flour. Salt and spices are added to the composite paste produced to taste. The composite paste is then packaged and wrapped in green plantain leaves and boiled for 1 h. In some localities it is boiled for 1 h especially in the evening and left on fire overnight. It is eaten without sauce after peeling off the plantain leaves. An untrained panel reflecting the range of social class of consumers within the ethnic group was presented with coded samples of the food preparation. All the varieties were accepted for use in preparing *kaakle* with overall acceptance ranging from 70% (FHIA-25) to 100% (FHIA-21 and FHIA-01). The local *Apantu* and FHIA-21 were highly accepted compared to the other hybrids. In the processed form the tetraploid hybrids compare favourably with the triploids. There was a significant difference in the overall acceptance between cooking bananas (FHIA-25 and FHIA-03) and plantains (FHIA-21) and dessert banana (FHIA-01). This is not surprising since in the raw ripe state the cooking bananas have low sugar content. FHIA-25 in the raw ripe state lack the banana aroma associated with bananas. The results indicated that considering the food habit of the ethnic group, the new varieties that may be rejected in some localities may receive favourable responses from others. It is therefore relevant to allow various ethnic groups to evaluate new hybrids according to the food habits and if possible release these varieties as ecotypes.

**Key words:** Plantain, hybrid, cooking banana, sensory evaluation

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### INTRODUCTION

Plantains (*Musa* sp., AAB group) are grown mainly by smallholders in sub-Saharan Africa and tropical America, who sell their fruits to local urban and rural markets (Stover and Simmonds, 1987). Their cultivation has become a feature of great socioeconomic importance in sub-Saharan Africa from the point of view of food security and job creation.

Plantain and banana (*Musa* sp.) are very important starchy staples in the West and Central African sub-region (Stover and Simmonds, 1987). They are consumed both as energy yielding food and as dessert. Plantain and banana are also very important sources of rural income (Ortiz and Vuylsteke, 1996). Because they are unpalatable when raw, plantain fruits are usually cooked, roasted, fried, steamed, boiled, or pounded before consumption.

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**Corresponding Author:** B.M. Dzomeku, Crops Research Institute, Council for Scientific and Industrial Research,  
P.O. Box 3785, Kumasi, Ghana, West Africa

Plantains are relatively high in calories at 125/200 g. It is an excellent source of potassium, a good source of vitamin C, contains no cholesterol and is low in sodium. Two hundred gram of cooked plantain yields a trace of fat, 2.3 g dietary fiber, 465 mg potassium, 26 mcg folate, 10.9 mg vitamin C, 909 IU vitamin A, 32 mg magnesium and 31.1 g carbohydrates (King, 2007). Green plantains, which are very hard and starchy, have little banana flavor and no sweetness. They may be boiled or fried or added to soups and stews. Yellow-ripe plantains are more tender but can be used in these same ways and will have a creamier texture. They can also be mashed, grilled or baked. Among other popular plantain snacks are tostones (Dadzie, 1998). Plantains and bananas are used as *fufu*, *ampesi* and as snack. They could also be processed into *tatale*, *kakro*, *kaakle*, or *apiti*, chips, pastries, flour and *abetie*. Recently bananas are being used for fruit juice. In Ghana like in other West and Central African countries, the names of some of the local dishes vary according to the ethnic group and the local language spoken.

Despite the high value of plantain and banana, growing pest and disease pressures have adversely affected production (IITA, 1992; Stover and Simmonds, 1987; Swennen, 1990). Yield losses due to the pests and diseases are highly significant ranging from 20-50%. As a long term solution to address these problems, new hybrids, resistant/tolerant to these pests and diseases have been introduced from Honduran Agricultural Foundation (FHIA), Honduras for evaluation for their agronomic performance and consumer acceptability. Most of the introduced hybrids have been studied to be agronomically stable, high-yielding and disease and pest resistant or tolerant. However, their food quality and consumer acceptability is important if any meaningful achievement could be made with the hybrids. The food habits differ from one ethnic group to the other. Nevertheless scientists often evaluate new varieties across locations to substantiate the performance and acceptability of the variety across locations before their release. It is sometimes obvious that a variety that may perform well at a location may not be accepted by some ethnic groups as a result of their food habit. Most often these varieties are discarded due to their rejection across selected locations. It is therefore relevant to consider the food characteristics of the various ethnic groups and if possible release some varieties as ecotypes. This study was therefore conducted to evaluate the food qualities and consumer acceptability of four hybrids (FHIA-21, FHIA-03, FHIA-25 and FHIA-01) when used for *kaakle* in one community in the Ho district of the Volta region of Ghana.

## MATERIALS AND METHODS

Physiologically matured unripe bunches of the hybrids, FHIA-21, FHIA-01, FHIA-03, FHIA-25 and standard cultivars, *apantu* were harvested from the backyard of a farmer at Sokode in the Ho district in the Volta region of Ghana. The samples were given to a local food vendor in the community to prepare *kaakle*. Consumer acceptability test was held on the four hybrids to compare the quality of the dish. A total of 20 panelists selected from the community comprising civil servants, students, plantain farmers and plantain sellers.

*Kaakle* is prepared by blending the over-ripe pulp of plantain or banana fruits. The paste produced is mixed with twenty percent corn flour, salt and spices are added to taste. The composite paste is then packaged and wrapped in green plantain leaves and boiled for 1 h. In some localities it is boiled for 1 h especially in the evening and left on fire overnight. It is eaten without sauce after peeling off the plantain leaves.

### Sensory Evaluation

Untrained panelists from a community comprising both males and females were used in the study. Assessors were not trained to produce a panel showing definite preference but rather one which consistently reflected the range of preferences likely to be typical of ethnic consumers. At each time, panelists were presented with two coded samples (A and B) of *kaakle* comprising *apantu* and plantain

hybrids, FHIA-21, FHIA-25, FHIA-01 and FHIA-03. Assessors were asked to compare the two coded samples on the bases of texture, taste, colour and overall acceptability, using the hedonic descriptive scale of 1-5 (Table 1) (Dadzie, 1998). In addition, panelists were asked to state which of the two samples they preferred most. All assessors were instructed in basic taste panel procedures: to make their own individual judgments after a moderate amount of consideration. They were instructed to take a sip of water and pause briefly before tasting each sample and to re-taste if they are not sure of their decisions.

## RESULTS AND DISCUSSION

The textural quality of *kaakle* is an important factor for consumers. The texture of *kaakle* made from all the four hybrids compared favourably with that made from *apantu*. Of the 20 panelists who participated in the sensory evaluation studies 100% indicated their acceptance of the texture (Table 2). In similar sensory evaluation study in Ghana (Dzomeku *et al.*, 2006a, b) FHIA-21, FHIA-03 and FHIA-25 were accepted when processed into various food recipes.

The taste of the *kaakle* is also an important feature for consumers. Of the 20 panelists 80% express their reservation about the taste of FHIA-25 compared to 20% who accepted the taste as good. There was no significant difference between the taste of FHIA-25 and FHIA-03. The taste of FHIA-21 and FHIA-01 compared favourably with the local *apantu* (Table 3). The colour of *kaakle* is just as important for consumers as texture and taste. In the comparative sensory studies, all the panelist indicated that the colour was good compared to *kaakle* from *apantu*. In a similar study in Nigeria and Ghana, the hybrids were most preferred when processed (Ferris *et al.*, 1996; Dzomeku *et al.*, 2006a). However FHIA-21 compared favourable with local triploid when boiled as slice (Dzomeku *et al.*, 2006b).

The sweetness is important to consumers. The panelists were thus asked to compare the sweetness based on the hedonic scoring scale of 1-5 (Table 1). A total of 70% indicated that *kaakle*

Table 1: Hedonic scoring for the assessment of consumer acceptability of unripe plantain

Scale	Texture	Taste	Colour	Sweetness	Overall acceptability
1	Too hard	Excellent	Excellent	Too sweet	Excellent
2	Very hard	Very acceptable	Like very much	Very sweet	Very good
3	Good	Good	Good	Sweet	Good
4	Fair	Fair	Fair	Slightly sweet	Fair
5	Poor	Poor	Poor	Not sweet	Poor

Table 2: Percentage score on comparative sensory evaluation of *kaakle* of hybrid FHIA-21, FHIA-01, FHIA-03, FHIA-25 and *Apantu* plantain

Hybrid/cultivar	Sensory quality features				
	Texture	Taste	Colour	Sweetness	Overall acceptability
FHIA-21	100	100	100	100	100
FHIA-01	100	90	100	80	90
FHIA-03	80	90	80	80	90
FHIA-25	70	70	70	20	70
<i>Apantu</i>	100	100	100	100	100

Table 3: Comparative sensory evaluation of *kaakle* of hybrid FHIA-21, FHIA-01, FHIA-03, FHIA-25 and *Apantu* plantain

Hybrid/cultivar	Sensory quality features				
	Texture	Taste	Colour	Sweetness	Overall acceptability
FHIA-21	4.62a	4.62a	4.24a	3.67a	4.54a
FHIA-01	4.43a	4.62a	4.01a	3.67a	4.32a
FHIA-03	4.43a	3.98b	3.89b	3.06a	3.89b
FHIA-25	4.31a	3.84b	3.67b	2.01b	3.31b
<i>Apantu</i>	4.62a	4.62a	4.24a	3.67a	4.51a

Letter(s) in common within columns were not significantly different at the 1% level

from FHIA-25 were not sweet compared to FHIA-21, FHIA-01, FHIA-03 and *Apantu*. Based on the overall acceptability, results indicated that FHIA-21 and FHIA-01 were excellent, FHIA-03, was very good and FHIA-25 was good when used for *kaakle*. Correlation analysis of the results showed that though sweetness ( $R = 0.046$ ;  $p < 0.0001$ ) and colour ( $R = 0.23$ ;  $p < 0.0001$ ) were important for consumers, texture ( $R = 0.56$ ;  $p < 0.0001$ ) and taste ( $R = 0.63$ ;  $p < 0.0001$ ) were the most important factors for the overall acceptance of the dish. The results of this study confirmed similar studies conducted by Dadzie (1998) to compare FHIA hybrids with Cuerno plantain in Honduras. FHIA-01, like other dessert bananas could also be used for *kaakle*.

## CONCLUSION

The success of the introduction of any new *Musa* hybrid hinges on the acceptance of common dishes prepared from these hybrids by the local people. The four FHIA hybrids were all accepted when processed into *kaakle* (a local dish) in the Volta region of Ghana. The food habit of the various ethnic groups must be considered when sensory evaluation of introduced crops is being conducted. The farmers must be allowed to determine the possible food preparations that can be made out of new varieties. The new varieties that may be rejected by an ethnic group may receive acceptance from others. It is therefore relevant to allow various ethnic groups to evaluate new hybrids according to their food habits and if possible release these varieties as ecotypes.

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