Registration of Adu and Barkume: Improved Sweet Potato (*Ipomoea batatas*) Varieties for Eastern Ethiopia

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Abstract: Two improved sweet potato (*Ipomoea batatas*) varieties, namely, Adu (Cuba-2) and Barkume (TIS-8250-2) were developed by Root and Tuber Crops Improvement Program and approved by the National Variety Releasing Committee in 2007. The performances of the varieties were evaluated at four locations in the eastern part of Ethiopia from 2003 to 2006. Adu and Barkume produced 49% and 89% more fresh root yield, respectively than Becule (local check). Although both of them were stable for fresh root yield, they exhibited high sensitivity to environmental changes and adaptation to environments favoring high yields. Adu is an early maturing and has a yellowish cream flesh colour indicating that it is a variety rich in beta carotene and the taste of its cooked tubers was classed as very good by farmers. Barkume is medium maturing and with uniform medium sized roots preferred by farmers. The taste of its cooked tubers was classed as good by farmers. Both varieties are recommended for production in eastern Ethiopia with altitudes ranging from 1650-2000 meters above sea level.

1. Introduction

Sweet potato (*Ipomoea batatas*) is native to South America and belongs to the family of convolvulaceae. It plays an essential role in Ethiopia in general and in the eastern part of the country in particular as a food security crop because of its tolerance to water stress and marginal soils. It is also valued for its nutritional importance as it has high content of carbohydrates, protein, minerals, and vitamins particularly vitamin A. It is also used as animal feed. It is grown under a wider range of environmental conditions and performs well on marginal land with low inputs.

The Root and Tuber Crops Improvement Program of Haramaya University has been introducing sweet potato germplasm with a wider genetic base from the Asian Vegetable Research and Development Center (AVRDC), International Potato Center (CIP), and International Institute of Tropical Agriculture (IITA) and has been undertaking multi-locational yield trials to identify high yielding, widely adaptable variety (ies) with good resistance to biotic and abiotc stresses. Special emphasis was given to yellowish and orange-fleshed sweet potato varieties which are rich in beta carotene to address Vitamin A deficiency, a serious health problem in the eastern part of the country. After a number of trials, for many years the program managed to release two high-yielding sweet potato varieties (Adu and Barkume) with the consent of the National Varity Releasing Committee.

2. Origin and Pedigree

The varieies Adu (Cuba-2) and Barkume (TIS-8250-2) were introduced from Cuba and the Asian Vegetable Research and Development Center (AVRDC, Taiwan), respectively in the 1980s and they were subjected to multi-locational trials in the eastern part of the country.

3. Yield Performance and Stability

Both varieties including local check (Becule) were tested at Babile, Haramaya, Hirna and Alberekete from 2003 to 2006. Disease free terminal vine cuttings of the varieties were used as a planting material throughout the trials and they were planted at a spacing of 80 cm by 50 cm on ridges. At all sites, the trials were conducted without fertilizer and supplemental irrigation to simulate farmers practice. No major disease and insect pest were observed during the trials. Adu and Barkume had 49% and 89% more fresh root yield, respectively over Becule which is a widely cultivated local variety (Table 1).

Table 1. Fresh root yield (t/ha) of three sweet potato varieties tested at four locations.

	Locations					
Variety	Babile	Haramaya	Hirna	Arbarakate	Mean*	Over the check
Adu (Cuba-2)	10.64	12.03	27.54	13.37	15.90	49%
Barkume(TIS-8250-2)	11.02	14.84	35.68	16.34	19.47	89%
Bercule (check)	6.91	12.40	14.73	8.65	10.66	

** Mean yield of 2003, 2004 and 2005*

Eberhart and Russell (1966) defined a stable variety has a mean higher than the mean of a group, unity regression coefficient ($\beta_i = 1$) and deviation from regression as small as possible ($S^2d_i = 0$). Both of the varieties exhibited regression coefficients significantly higher than one suggesting high sensitivity to environmental change and adaptation to high-yielding environments (Table 2). The G x E interaction study indicated that both varieties are not stable for root yield.

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Table 2. Estimates of stability parameters for root yield (t ha^{-1}) of Adu and Barkume sweet potato varieties.

Genotype	Mean root yield (ton/ha)	Regression coefficient (β_i)	Deviation from regression (S^2d_i)
1. Adu (Cuba-2)	15.90	1.120**	2.828×
2. Barkume (TIS-8250-2)	19.47	1.514**	27.855××

** = *Significantly different from unity at 1 % probability levels.*
×× = *Significantly different from zero at 1 % probability levels.*

4. Quality Attributes

Taste and physical characteristics of boiled roots of Adu and Barkume are presented in Table 3. Adu is an early maturing and high yielding variety having root size and shape favored by farmers. It has yellowish cream flesh colour indicating that it is a variety rich in beta carotene which is a precursor of vitamin A. Thus, it could play a significant role in reducing Vitamin A deficiency, a serious problem in the region. The taste of the cooked tubers was classed as very good by farmers around Haramaya area. Barkume is medium maturing and high yielding with uniform medium sized roots often preferred by farmers. The taste of cooked tubers was classed as good by farmers.

Table 3. Taste and physical characteristics of boiled root.

			Flesh			
Variety	Cooking Ability	Peeling Ability	Color	Texture	Test	Palatability
Adu (Cuba-2)	Quick	Easy	Yellowish cream	Dry	Very sweet	Very good
Barkume (TIS-8250-2)	Quick	Easy	Cream	Slightly moist	Sweet	Very good

5. Adaptation

Both of the varieties are recommended for lowlands, mid and high altitude area of eastern and Western Hararghe with altitudes ranging from 1650-2000 meters above sea levels.

6. Acknowledgment

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7. Reference

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Appendix I. Vine characteristics, leaf characters and storage root characteristics of Adu and Barkume.

Characteristic	**Adu (Cuba-2)**	**Barkume (**TIS-8250-2)
1. Vine characters		
Twining habit	Moderately twining	Moderately twining
Plant type	Semi-compact (75-150 cm)	Semi-compact (75-150 cm)
Vine internode diameter	Thin (4-6 mm)	Very thick (> 12 mm)
Vine internode Length	Very short (< 3cm)	Very short (< 3cm)
Vine Pigmentation		
Predominant colour	Green with few purple spots	Green with few purple spots
Secondary colour	Purple nodes	Purple nodes
Vine tip pubescence	Sparse	Sparse
2. Leaf characters		
Mature leaf Shape		
General outline	Lobed	Lobed
Type of leaf lobe	Deep	Slight
Number of lobe	Five	Three
Shape of central lobe	Elliptic	Semi-elliptic
Mature leaf size	Medium (8-15 cm)	Medium (8-15 cm)
Abaxial vein pigmentation	Main rib partially purple	All veins partially purple
Mature leaf colour	Green with purple edge	Green
Immature leaf colour	Light green	Light green
Petiole Pigmentation	Green with purple near leaf	Green with purple near leaf
Petiole length	Short (10-20 cm)	Short (10-20 cm)
3. Storage root characters		
Storage root Shape	Ovate	Irregular elliptic slightly cured
Storage defects	Shallow longitudinal grooves	Shallow longitudinal grooves
Storage root cortex thickness	Very thin (1 mm or less)	Very thin (1 mm or less)
Storage root skin colour		
Predominant colour	White	Pink
Intensity	Dark	Pale
Secondary colour	Cream	Absence
Storage root flesh colour		
Predominant colour	Cream	White
Secondary colour	Absence	Absence
Distribution of colour	Absence	Absence
Storage roots arrangement:	Disperse	Disperse
Mean storage root number per hill	3.7	10.6