

Tanzanian sweetpotato varieties and their associated acceptable qualities by end-users

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Abstract

Tanzania has a diverse collection of sweetpotato varieties but the majority are low yielding and vulnerable to diseases and pests. The few improved varieties developed through breeding programmes have not reached farmers because of shortage of planting materials. This has affected the production of sweetpotato hence, its minimum utilisation. Farmers, traders and consumers have their own selection criteria for sweetpotato. Information was collected from the above groups to identify key priorities as perceived by farmers, traders, and urban consumers. Evaluation of varieties by research breeding programmes provided insight on the pre-harvest qualities desired by producers. Desirable varieties, namely, SPN/O (Simama), Sinia, SP/93/34 (Juhudi), SP/93/2 (Mavuno), SP/93/23 (Vumilia) have been selected and officially released by the National Variety Release Committee of Tanzania. Major criteria mentioned by almost all categories are: high yield, good taste, good root shape, storability, starchiness and less or no fibre. Dissemination of these varieties is continuing with support by NGO's and community-based groups.

Key words: *Ipomoea batatas*, pre-harvest qualities, Tanzania, varietal preference

Résumé

Des variétés de patate douce au pays sont très diversifiées. La majorité sont à faible rendement et sensible aux maladies et pestes. Le très peu de variétés améliorées développées par le programme d'amélioration n'ont pas atteint les agriculteurs suite à l'insuffisance de matériel de plantation. Ceci a affecté la production de la patate douce où son minimum utilisation. Les agriculteurs, les vendeurs et les consommateurs ont leur critères de sélection. Des informations ont été collectées chez les groupes ci-haut cités pour identifier les priorités-clés comme perçues par les agriculteurs, vendeurs et consommateurs urbains. L'évaluation des variétés par les chercheurs du programme d'amélioration ont fourni des idées sur la qualité pré-recolte désirée par les producteurs. Les variétés recherchées: SPN/O (Simama), Sinia, SP/93/94 (Juhudi); SP/93/2 (Mavuno), SP/93/23 (Vumilia) ont été sélectionnées et diffusées par le Comité National de Libération des Variétés de la Tanzanie. Les critères principaux mentionnés par presque toutes les catégories sont les suivants: haut rendement, bon goût, bonne forme du tubercule, storabilité, teneur élevée en amidon et moindre ou pas de fibres. La dissémination de ces variétés est supportée par des ONG et des groupes communautaires.

Mots clés: *Ipomoea batatas*, qualités d'avant récolte, Tanzanie, préférence variétale

Introduction

Sweetpotato (*Ipomoea batatas* Lam.) is an important source of dietary carbohydrates in Tanzania. Several varieties are grown in semi-arid areas of the country (Kapinga *et al.*, 1995). Of recent, the importance of sweetpotato has increased due to the expanded commercialisation of fresh roots mainly in urban areas for low to medium income earners. Also, sale of planting materials at the on-set of first rains has become an important economic activity especially in drought prone areas.

The variety preferred by farmers, urban traders, and consumers is SPN/O. This variety has been with farmers for the last two decades. Due to its wide adaptability to different agroecologies and high consumer acceptance, this variety has been adopted by neighbouring countries in South and East Africa region. In Kenya, Uganda, Zambia, Malawi and Botswana, variety SPN/O has been released under names: Kemb 10, Tanzania, Chingowva, Kenya and SPN/O respectively. In farmers fields SPN/O has been given several names. This is also true of the variety Sinia.

Varieties SP 93/2, SP 93/23 and SP 93/34 were recently evaluated by farmers and consumers for acceptability in the Lake Zone (Rees *et al.*, 1998b). The major attributes desired by farmers are: high yielding ability, good root qualities for human consumption, early maturity and potential to produce leaves for relish and livestock feed. Keeping qualities of fresh storage roots up to at least 14 days after harvesting is another attribute desired by farmers and consumers in peri-urban areas. This paper summarises some key pre and post-harvest attributes associated with the preferred varieties as perceived by end-users. Performance data both on-station and on-farm are also presented. Acceptability studies of cooked roots and storage qualities of proposed varieties for release as compared to others have been presented.

Materials and methods

The yield information reported in this paper was collected from on-station trials conducted at Agricultural research stations based in different agricultural zones of Tanzania, Ukiriguru (Lake Zone), Tengeru (Northern zone), Dakawa and Kibaha (Eastern

zone) and Uyole (Southern Highlands zone). Assessment of varieties for consumer acceptance was done by farmers by subjective ranking. Details of the methodology is explained by Kapinga et al. (1998). Surveys were done as a follow up on the distributed varieties. This in turn assisted to provide a feedback on the performance of selected varieties.

Results and discussion

Yield and yield components on-station

Yields of varieties SPN/O and Sinia for the seasons 1996/97 and 1997/98 across five agro-ecological zones are presented in Table 1. Low yields in 1997/98 were observed in all sites except Ukiriguru due to extended drought.

Farmers assessment on-station and on-farm

Varieties SP 93/2, SP 93/23 and SP 93/34 were recently evaluated by farmers and consumers for acceptability in the Lake zone. The major attributes desired by farmers are: high yielding ability, early maturity and potential to produce leaves for relish and livestock feed. For some varieties, flexible recommendations have been established showing desired attributes associated with a particular variety (Table 2). Keeping qualities of fresh storage roots up to 21 days after harvesting is another attribute desired by farmers and consumers in peri-urban areas. Assessment of varieties by farmers on-station showed that varieties SPN/O, SP 93/23, SP93/2 and SP93/34 were ranked highly in root yield, acceptability of cooked roots, and weed smothering (Table 3). Also varieties SP 93/23 and SPN/O were ranked highly for production of leaves for leaf relish. Dry matter contents of all candidate varieties were high as shown in Table 3.

Post-harvest assessment of varieties

In roots/tuber crops research, post-harvest deterioration of storage roots is always emphasised because of the perishable nature of the crop (Picha, 1986). One determining factor of root deterioration is the weight loss (Rees et al., 1998a). Fresh storage roots of candidate varieties SPN/O and Sinia were therefore subjected to storage for a period of 28 days under room temperature at Uyole, Tengeru, Dakawa, Ukiriguru and Kibaha sites. Regardless of location, the percentage weight loss of storage roots of varieties SPN/O and Sinia at 14 days at different locations was found to be moderate as compared to other varieties such as Budagala. For variety SPN/O, the trend was almost consistent across locations indicating that its keeping quality did not change significantly with variations in environment. Root qualities of all candidate varieties as assessed by trained panelists at ARI-Ukiriguru showed that all varieties had acceptable levels in terms of appearance, root consistency, sugar content, flouriness, etc. This confirms results obtained from the consumers/farmers. It was also noted that for root and tuber crops, acceptability of root qualities by consumers is more important than yield (Prakash & He, 1996; Belinda et al., 1998; Crossman et al., 1998).

Table 1. Yield performance of sweetpotato candidate varieties across zones in Tanzania (1996/97 and 1997/98).

Variety	Total yield (t/ha)					Foliage yield (t/ha)				
	UKG	KBH	TENG	UYL	DAK	UKG	KBH	TENG	UYL	CHL
SPN/O+	7.19	14.08	12.88	23.57	9.04	5.28	10.69	11.12	13.80	32.17
Sinia+	6.42	5.56	7.74	12.65	0.72	7.00	15.83	28.49	14.21	21.76
Trial mean (5 cultivars)	6.60	9.38	8.67	14.12	3.18	6.61	12.36	16.67	19.18	29.70
					1997/98**					
SPN/O+	9.91	1.98	4.24	7.51	na	11.56	-	-	-	na
Sinia+	13.17	2.74	3.31	4.40	na	8.45	-	-	-	na
Trial mean (5 cultivars)	11.39	2.42	4.48	4.26	na	11.09	-	-	-	na

UKG- Ukiriguru, KBH- Kibaha, TENG- Tengeru, UYL- Uyole, DAK- Dakawa., ** Low yields due to extended drought that led to poor establishment, hence no foliage was obtained.
+ Recommended by farmers for production across agro-ecological zones. The other varieties tested were SP93/2, SP93/34 and SP93/23.

Table 2. Assessment of sweetpotato varieties by farmers for suitability in diverse production systems and objectives at farm-level in Bukoba district, Lake Zone of Tanzania (1995/96-1996/97).

Do you.....??	Then grow...!!!		But do not grow.....!!!	
Have a sandy field with low soil fertility	Sinia-B* SPN/O*		Iboja Biganana	Mwanamonde
Want high yield	SPN/O*, Iboja	Sinia-B *	Biganana	
Want to harvest by piece-meal	Mwanamonde, Iboja	Sinia-B*, Biganana	SPN/O*	
Have problems with weevils in your field	Biganana, Sinia-B*	Iboja	SPN/O *	Mwanamonde
Want vines for livestock	Biganana Sinia-B*		Iboja	
Want to process	Biganana, Sinia-B*	Iboja	SPN/O*	
Want leaves for vegetable	Biganana,	SPN/O*	Iboja	
Want roots for selling	Sinia-B*,	SPN/O*	Iboja	

* Selected varieties.

Table 3. Farmers assessment of sweetpotato varieties under Advanced Yield Trial at Ukiriguru, Lake Zone of Tanzania (1995/96).

Varieties	Root yield assessment ¹	Acceptability of cooked roots	Acceptability of leaf for relish	Acceptability for weed smothering	Dry matter content (%)	Storage root yield (t/ha)
SPN/O*	3.90	4.20	4.10	4.20	39.40	5.20
SP/93/30	3.20	3.80	4.00	4.40	38.30	6.00
SP/93/23*	4.60	3.30	3.90	3.50	38.50	6.90
SP/93/2*	3.40	3.50	3.20	3.40	41.00	10.30
SP/93/13	3.4	2.80	3.80	3.10	41.30	6.70
SP/93/17	2.90	3.90	2.50	3.70	39.30	9.10
SP/93/5	3.60	4.00	2.20	3.70	39.70	9.30
SP/93/34*	3.50	4.40	2.00	3.50	39.70	10.90
Mwanamonde	2.80	3.60	2.90	4.50	40.10	6.90

¹Subjective ranking by farmers : 1 = very bad, 2 = bad, 3, = moderate, 4 = good, and 5 = very good

²* = selected varieties.

Preferences of varieties

Surveys conducted in the country by several groups showed that some varieties such as SPN/O and Sinia were preferred for growing in more than one agricultural zone. The desirable attributes of the two and other varieties are indicated in Table 4. For the Lake zone, Sinia and SPN/O (Suguti/Simama) were preferred because of starchiness, good taste, good cooking qualities, good root flesh colour and storability. Varieties prepared by urban consumers and traders are described by Rees *et al.* (1998b) and the attributes desired by these groups do match well with those of farmers.

In general, however, varieties SPN/O, Sinia, SP93/2, SP93/34, and SP93/23 have wide acceptability by farmers in terms of root yield and yield components, adaptability; they also have high consumer acceptance. Varieties Sinia-B (*Sinia*) and SPN/O (*Simama*) have been officially released in all sweetpotato producing zones. Local names for these varieties as approved during the National Sweetpotato Stakeholders

Workshop held in December, 1999 are: *Mavuno*, meaning high yield for variety SP93/2; *Juhudi* (determined to perform) for variety SP93/34; and *Vumilia* (tolerate/ resist) for variety SP93/23. The later resists sweetpotato weevil attack.

Varieties *Mavuno*, *Juhudi*, and *Vumilia* have been extensively tested in the Lake Zone and have been recommended for the Lake Zone. It is expected that the released varieties will form a base for future selections and releases in the country.

Acknowledgments

We thank the extension agents of the Ministry of Agriculture and Cooperatives for the input and cooperation. Financial support and technical backstopping was provided by the Client-oriented Research Project of the Netherlands Government, the International Potato Centre (CIP) Sub-Saharan Region, and the Department for International Development (DFID) through the Natural Resources Institute, United Kingdom.

Table 4. Popular sweetpotato varieties preferred for growing by farmers and their desirable characteristics in Tanzania.

Local name(s)	Zone where grown	Desirable characteristics
Suguti, Songea Simama, Tulwawima (SPN/O)*	Eastern, Southern Highlands Lake	White skin, yellow flesh, high yielding, floury, early maturing, large root size, moderate sweet, very firm/floury, no fibre
Mayai	Western, Eastern	White skinned, orange flesh, high yielding, good underground storability
Mwezigumo	Western, Lake between major harvests	Very early maturing to bridge a famine gap
Karoti	Eastern, Southern	Early maturing, red skin, yellow flesh, medium fibre content, moderate sweet, medium root size, firm and moderate drought tolerant
Sinia Kasinia (SINIA)*	Southern Highlands, Lake	Early maturing, large root size, red skin/yellow root flesh, very sweet, very firm, no fibre
Kinahaha	Western, Southern Highlands	Very early maturing, good as vegetable, sweet, firm, white flesh, no fibre
Kandoro	Western, Southern Highlands	Medium maturity, large root size, white skin, white flesh, sweet, firm, not fibrous

Source: Kapinga *et al.* (1995).

* selected varieties.

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