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The use of sensory evaluation and consumer acceptability for the selection of sweetpotato cultivars in East Africa

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Introduction

Sweetpotato is among the most under-exploited of the developing world's major crops (Walker and Crissman 1996), so that breeding initiatives for sweetpotato are at a relatively early stage compared to other staple crops. Varieties grown in many regions are low yielding, and the potential for improvements through breeding are high. While the main objectives of breeding programmes have traditionally been an increase in yield and improvement of other production characteristics, the importance of post-harvest characteristics for the acceptance of new varieties is being increasingly recognised (Kapinga *et al.*, 1995).

The majority of sweetpotato varieties presently grown in Tanzania are low-yielding compared to average world yields. Introduction of improved varieties from other regions is limited by local virus pressure. However, there is an enormous diversity of sweetpotato germplasm in East Africa, and hence great potential for rapid improvements in varietal characteristics through breeding within the region.

The success of any newly introduced variety will depend not only on production characteristics, but also on its acceptability to consumers in terms of both sensory and utilisation characteristics. Consumer preferences appear to differ greatly between regions; for example, in North America and in South Africa low dry matter varieties are grown while in East Africa only higher dry matter varieties are acceptable. From recent surveys of preferences of consumers and traders conducted in Lake Zone of Tanzania a fairly consistent picture has emerged. Both consumers and traders considered that high dry matter content (also expressed as starchy or floury) and good taste were the most important criteria (Kapinga *et al.*, 1995, Kapinga *et al.*, 1997a, Kapinga *et al.*, 1997b). This was followed by cooking quality (referring to the time needed for cooking) and the colour of the flesh and skin. Other criteria mentioned were low fibre content, good storability after purchase and root size. The criteria used by traders fit closely to those of the consumers, except that appearance is relatively more important, ranking equally with good taste.

Many of the sensory criteria mentioned above are very complex and subjective, and therefore practically difficult to measure instrumentally. Direct consumer testing of new varieties is very expensive and time consuming involving the interviewing of at least 100 consumers. Sensory taste panels can be used to produce sensory profiles of varieties. The study presented here was carried out using Tanzania as a test case, to investigate whether such panels could be used as a means of screening new sweetpotato varieties for consumer acceptability for markets in Tanzania. The procedure would depend upon the identification of a sensory profile that accurately represented the preferences of consumers. Key questions are: how consistent are consumer preferences between locations in Tanzania, how do regional differences influence the sensory characteristics of a cultivar and how do preferences differ from year to year.

MATERIALS AND METHODS

The study was carried out at three locations in Lake zone of Tanzania in 1998 and 2000.

Sweetpotato samples

Locally grown sweetpotato cultivars were obtained from each region in the study as follows:

1998 season
Mwanza District – Polista, Sinia B, SPN/0, Mzondwa and Bilagala;
Meatu District – Polista, Sinia B, SPN/0, Ngosha, Serena and Ipembe;
Misungwi District – Polista, Sinia B, SPN/0, Ngikuru A, Toniki and Nguruka.

2000 season
Mwanza District – Polista, Sinia B, SPN/0, Mzondwa and Bilagala;
Meatu District – Polista, Sinia B, SPN/0, Serena;
Misungwi District – Polista, Sinia B, SPN/0, Ngikuru A, Bukoli, Hudi Shinyanga.

Consumer testing and questionnaire

Consumers (100) were interviewed in each of three districts (Mwanza, Meatu and Misungwi), in the 1998 and 2000 seasons, using the method of central location testing (Meilgaard *et al.*, 1987). The total number of consumers interviewed over the two seasons was 600. Consumers tasted portions of cooked sweetpotato (presented in random order and coded with three figure random numbers). In 1998 each consumer ranked (Anon 1988) all samples, while in 2000, due to time constraints, each consumer indicated the most preferred sample.

During testing, fresh samples were prepared hourly. Roots were peeled and cut into roughly equal sized portions (3–5 cm), which were placed into plastic bags with holes, and boiled until the texture, assessed by a fork, was considered correct for eating.

Interviews, lasting approximately 30 minutes, were conducted using a simple questionnaire containing 16 questions. This elicited information on the following issues: gender, age, preferences for sweetpotato, frequency and location of consumption, preparation method, family member who prepares it, whether the

sweetpotato is grown at home or bought, how much is spent on food, how much is spent on sweetpotato and income status.

Sensory Analysis

The sensory panel consisted of ten trained assessors at the Lake Zone Agricultural Research and Development Institute (LZARDI), Ukiriguru Tanzania. The panel generated ten descriptive terms for the cooked product using a range of sweetpotato cultivars. These were starch, taste, sweetness, odour, appearance, internal colour, external colour, chewiness, texture, stickiness and fibre.

At each sensory panel session, three cooked sweetpotato samples were coded with three figure random numbers and served in random order using an incomplete block design. Intensity ratings were scored on a 100 mm unstructured scale, anchored with the terms 'not very' at the low end and 'very' at the high end. Panel sessions were repeated until all samples were scored in duplicate (Meilgaard *et al.*, 1987; Bainbridge *et al.*, 1996). Cooked samples were prepared using the same method as for the consumer testing.

Data analysis

Analysis of variance, correlation analysis, cluster analysis (agglomerative hierarchical cluster, Euclidean distance, Wards method), principal component analysis (covariance matrix) and discriminant analysis were carried out using SPSS (V 10.0.5) and XLSTAT (V 5.2, Addinsoft).

Results and Discussion

Consumer profiles

There was a reasonably even mix of male and female consumers at each location, although there was a bias towards male consumers in Mwanza and Meatu in 2000 (Table 1). Most were aged between 20 and 49 years and were of medium income status. Overall, the mode for frequency of eating sweetpotato was 3-5 times a week in 1998 and 1-2 times a week in 2000. Most of this variation was because of different consumption patterns at Meatu, where many more reported eating sweetpotato in 1998 than in 2000. A similar but smaller change was observed in Misungwi. The amount of money spent on food each week increased from 1998 to 2000 and the increase was uniform across the regions. The sum spent on sweetpotato, however, was generally less in 2000. This, however, may simply reflect seasonal differences in price as a result of supply and demand (Ndunguru *et al.*, 2000).

Table 1
Profile of consumers interviewed at Mwanza, Misungwi and Meatu in 1998 and 2000

	Total		Mwanza		Misungwi		Meatu	
	1998	2000	1998	2000	1998	2000	1998	2000
Gender								
Male	49	57	44	60	56	53	48	57
Female	51	43	56	40	44	47	52	43
Age								
10 to 19	5	7	2	11	6	6	8	4

20 to 29	32	33	37	39	26	37	32	22
30 to 39	27	35	28	36	27	33	26	37
40 to 49	17	20	20	11	15	19	15	29
50 to 59	16	5	10	3	19	6	17	7
60+	4	0	3	0	7	0	1	1
Income status								
Low	35	22	30	26	33	20	42	21
Medium	64	75	69	72	70	76	54	76
high	0	1	0	1	0	1	0	0
Not known	2	2	0	1	0	2	6	3
Frequency of eating sweetpotato								
Every day	19	9	14	8	11	13	31	7
3 to 5 times a week	47	39	49	47	43	29	48	42
1 to 2 times a week	30	46	32	43	40	49	19	45
Once a week	3	6	5	2	3	9	2	6
never	1	0	1	0	2	0	0	0
Money spent on food each week (Tsh)								
0 to 3,999	32	20	18	12	27	9	51	39
4,000 to 7,999	46	53	56	55	48	51	34	53
8.000 to 11,999	13	23	19	29	15	34	6	5
12,000 +	5	1	7	1	6	3	1	0
Do not know	4	3	1	3	3	2	7	3
Money spent on sweetpotato each week								
0 to 499	18	56	31	41	23	31	1	95
500 to 999	11	25	20	26	10	47	3	2
1.000 to 1,499	8	12	19	24	2	12	3	0
1.500 +	4	4	8	7	2	6	3	0
Do not know / grown own	58	3	22	2	63	3	90	3

Where: £1 = Tsh1,050 = US$1.5

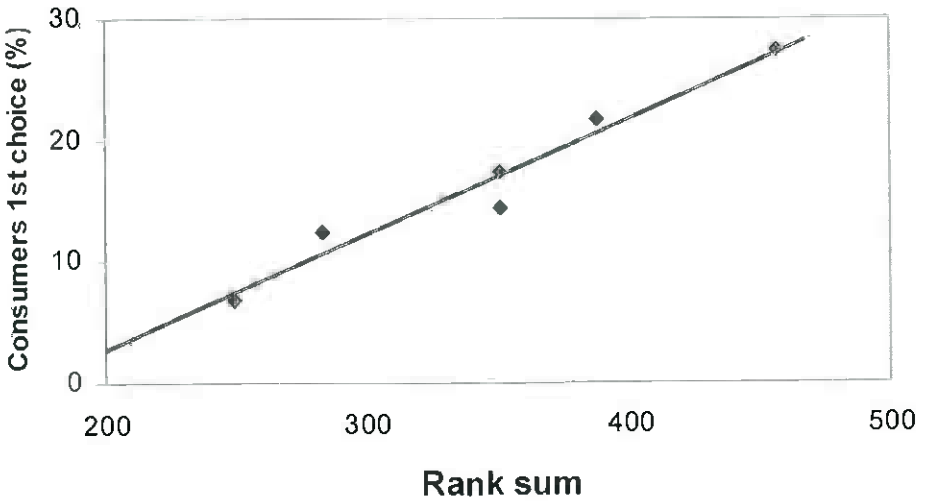
Consumer acceptability

The cultivars tested in 1998 and 2000 were locally grown and those available in the markets at the time of sampling. This meant that the varieties available differed from year to year although certain 'core' varieties (Polista, Sinia B and SPN/0) were consistently available.

It is generally accepted that a hedonic scale provides data with low bias, however, in this study the method of ranking was used because many of the consumers had minimal education, and it was considered to be easier for them to understand. In 1998 consumers ranked the samples, while in the second trial (2000) consumers were only asked to say which was their most preferred cultivar. Comparison of the rank sums and the percent of consumers who preferred each cultivar was generally highly correlated with correlation coefficients of 0.872, 0.954 and 0.953 for studies in Mwanza, Meatu and Misungwi respectively. The order of preference for each cultivar, based either on ranks or on the most preferred cultivar was the same. The correlation between consumer's first preference choice and rank sums is illustrated in

figure 1 using cultivars tested at Meatu. The ranking of the cultivars and percent consumers preferring each cultivar is given in Table 2.

Fig 1
Correlation between consumers first preference choice (%) and rank sum for cultivars evaluated at Meatu



Analysis of the 1998 results showed that consumers found significant differences ($P<0.05$) in rank preference of the cultivars at each location. Polista and SPN/O cultivars performed consistently well, appearing within the top three preferred cultivars at each location. With respect to socio-economic factors, at Meatu and Misungwi, women liked SPN/0 ($P=0.004$) and Ipembe ($P=0.004$) and Sinia B ($P=0.013$) more than men respectively. At Mwanza, there were no significant differences in preference with gender. How often consumer ate sweetpotato influenced preference. Consumers at Meatu and Misungwi who consumed sweetpotato most often liked SPN/0 and Sinia B and disliked Ngikuru (in particular at Misungwi). There were no significant trends for consumers in Mwanza. Other factors such as age had no effect on preference. Although the data from 2000 could not be as fully analysed, it was consistent with the 1998 data, in that SPN/0, Polista and Sinia B were the three most preferred cultivars in all locations.

In summary, considering both years (1998 and 2000), the most consistently preferred cultivars were Polista and SPN/0. Other cultivars, such at Sinia B were not liked in 1998 but were liked consistently in 2000. The cultivars that were consistently disliked were Mzondwa, Bilagala and Serena.

Table 2: Consumer acceptability (based on first choice preference) of sweetpotato cultivars evaluated at Mwanza, Meatu and Misungwi

	Mwanza		Meatu		Misungwi	
Liking	**1998**	**2000**	**1998**	**2000**	**1998**	**2000**
1 (most)	Polista (54)	SPN/0 (56)	SPN/0 (77)	Polista (79)	Ngikuru (57)	SPN/0 (57)
2	Sinia B (52)	Sinia B (47)	Ngosha (51)	Sinia B (67)	SPN/0 (45)	Sinia B (52)
3	SPN/0 (42)	Polista (39)	Polista (42)	SPN/0 (47)	Polista (36)	Polista (50)
4	Mzondwa (28)	Mzondwa (8)	Serena (19)	Serena (5)	Toniki (30)	Bukolu (14)
5	Bilagala (18)	Bilagala (6)	Sinia B (6)		Sinia B (26)	Hudi Shinyanga (6)

6 (least) Ipembe (3) Nguruka (14) Ngikuru (3)

Sensory evaluation of sweetpotato cultivars

The sensory panels in 1998 and 2000 were comprised of the same panel members, thus enabling the comparison of all the cultivars for both years. The sensory panel assessed all the sweetpotato cultivars from each region and gave a more detailed sensory assessment of the samples.

Table 3 shows the mean panel scores of the sensory attributes for each cultivar at the three locations for each year. The sensory attributes appearance, external colour, internal colour, starch, stickiness. sweet and taste significantly ($P<0.05$) differed with respect to the cultivars tested for both years. Of these attributes, the dominant ones, as indicated by the large F-statistic, were starch, taste and sweet. For other attributes (chewiness and odour in the 1998 season), the cultivars only differed for one year but not for the other. The cultivars did not differ with respect to fibre and texture.

Table 3
Sensory scores for sweetpotato cultivars evaluated in the 1998 and 2000 seasons

1998 Season

Location	Cultivar	Appearance	Chewiness	external colour	fibre	Internal colour	odour	Starch	Stickiness	Sweet	taste	texture
Mwanza	SPN/0	90	66	89	13	94	88	90	13	84	95	48
	Polista	74	63	75	14	80	81	92	17	78	77	46
	Bilagala	71	68	68	24	75	79	60	27	90	82	62
	Mzondwa	64	75	71	21	66	78	27	34	84	74	64
	Sinia B	77	52	74	20	78	69	41	22	32	35	47
Misungwi	SPN/0	90	65	90	20	92	85	90	10	83	93	52
	Toniki	92	67	95	21	96	85	85	22	82	87	57
	Ngikulu	83	74	87	11	88	87	82	20	86	91	61
	Polista	81	46	79	13	82	80	94	9	82	85	44
	Nguraka	78	69	86	11	89	76	25	27	48	41	56
	Sinia B	67	59	67	18	70	71	45	14	19	31	52
Meatu	SPN/0	78	52	76	17	81	75	81	10	68	82	51
	Polista	69	56	67	11	77	71	86	11	71	82	38
	Ngosha	53	51	53	17	58	57	30	26	65	59	42
	Serena	51	41	52	37	65	56	36	24	41	42	38
	Sinia B	60	25	59	19	63	53	56	13	21	27	24
	Ipembe	60	52	54	12	55	54	13	34	41	28	52
	df	16	16	16	16	16	16	16	16	16	16	16
	F	1.852	1.331	2.043	1.355	1.860	1.126	14.686	1.756	7.265	10.671	0.631
	Probability	**0.033**	0.192	**0.016**	0.178	**0.032**	0.341	**<0.001**	**0.047**	**<0.001**	**<0.001**	0.853

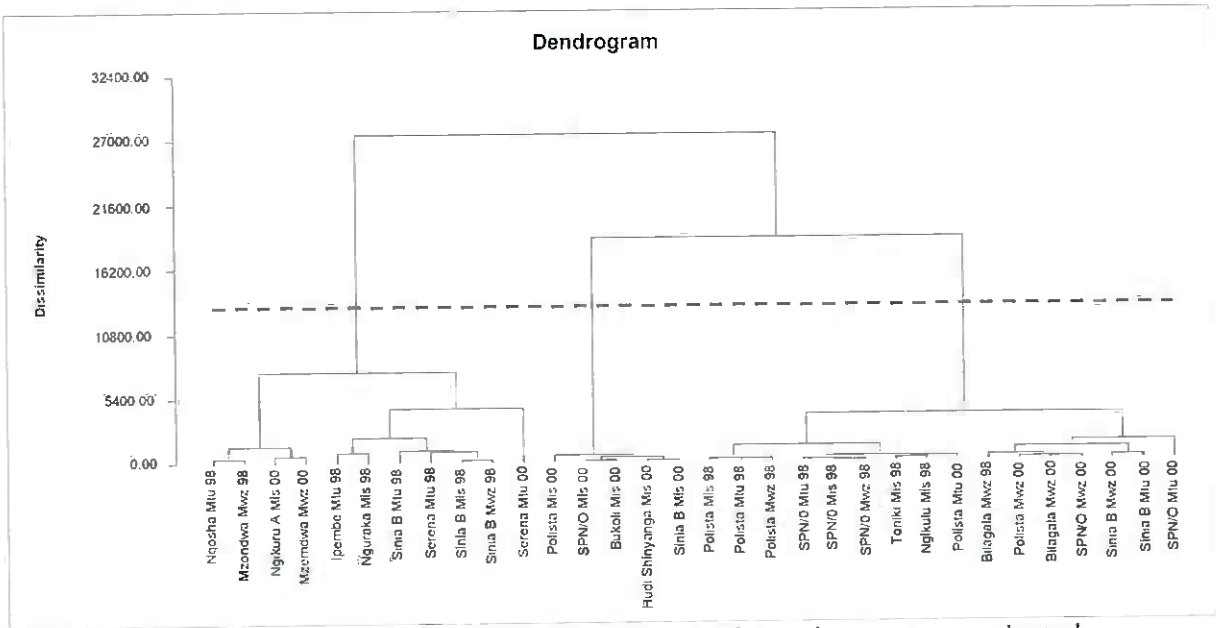
2000 Season

Location	Cultivar	Appearance	Chewiness	external colour	fibre	Internal colour	odour	Starch	Stickiness	Sweet	taste	texture
Mwanza	Bilagala	68	61	67	16	78	66	56	27	66	69	57
	Mzemdwa	53	61	44	27	55	66	38	46	60	54	57
	Polista	73	52	72	19	77	66	65	24	70	71	48
	Sinia B	64	68	67	24	76	66	77	23	57	67	64
	SPN/O	67	59	67	23	72	68	69	35	68	71	56
Misungwi	SPN/O	83	81	81	21	84	77	72	75	64	61	79
	Bukoli	80	83	80	20	81	76	71	82	74	71	77
	Polista	74	79	75	20	82	57	63	79	52	53	80
	Hudi	78	72	75	23	84	80	65	77	64	60	76
	Shinyang Sinia B	74	72	74	19	82	74	57	83	60	62	74
	Ngikuru A	47	59	49	37	53	79	60	49	73	66	57
Meatu	Polista	79	63	75	12	87	85	78	16	69	85	63
	Serena	64	89	62	29	67	60	20	52	17	32	86
	Sinia B	63	58	64	28	75	66	67	17	48	55	57
	SPN/O	83	76	82	22	85	80	57	38	75	75	74
	df	14	14	14	14	14	14	14	14	14	14	14
	F	3.049	2.313	3.626	1.144	4.411	2.116	6.591	3.303	5.149	5.162	1.674
	Probability	**<0.001**	**0.007**	**<0.001**	0.324	**<0.001**	**0.014**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	0.066

Where: probabilities of less than P = 0.05 are in bold, values of means of between 10 and 11 panellists, F = F-statistic, df = degrees of freedom

To distinguish between the samples and to classify into groups, cluster analysis (Hierarchical Cluster Analysis. Wards Method, Euclidean distance) of the combined years was applied. The dendrogram, illustrating the make-up of the clusters is shown in figure 2. The data fell into three groups (table 4). Cluster 1 was comprised of cultivars that were generally not liked by consumers (on average only 19% preferred these the most). The cultivars within this cluster were predominantly Mzondwa (98 and 00), Serena (98 and 00) and Sinia (98). Cluster 2 was comprised entirely of the cultivars from Misungwi (00) and suggests a locational effect . Cluster 3, the group most liked by the consumers (on average 47% consumers preferred these the most), was mostly comprised of Polista and SPN/0 from both years and Sinia B for year 2000.

Fig 2
Dendrogram illustrating the hierarchy of the three selected clusters



Where: dotted horizontal line shows the dissimilarity where clusters were selected

Table 4: Hierarchical cluster analysis - Classification of sweetpotato cultivars with respect to sensory attributes

	Cluster 1	Cluster 2	Cluster 3
	Ipembe Mtu 98 (3)	Bukoli Mis 00 (14)	Bilagala Mwz 00 (6)
	Mzondwa Mwz 00(8)	Hudi Shinyanga Mis 00 (6)	Bilagala Mwz 98 (28)
	Mzondwa Mwz 98 (18)	Polista Mis 00 (50)	Ngikulu A Mis 98 (57)
	Ngikuru A Mis 00 (3)	Sinia B Mis 00 (52)	Polista Mis 98 (36)
	Ngosha Mtu 98(51)	SPN/O Mis 00 (57)	Polista Mtu 00 (79)
	Nguraka Mis 98 (14)		Polista Mtu 98 (42)
	Serena Mtu 00 (5)		Polista Mwz 00 (39)
	Serena Mtu 98 (19)		Polista Mwz 98 (54)
	Sinia B Mis 98 (26)		Sinia B Mtu 00 (67)
	Sinia B Mtu 98 (6)		Sinia B Mwz 00 (47)
	Sinia B Mwz 98 (52)		SPN/0 Mis 98 (45)
			SPN/0 Mtu 98 (77)
			SPN/0 Mwz 98 (42)
			SPN/O Mtu 00 (47)
			SPN/O Mwz 00 (56)
			Toniki Mis 98 (30)
Mean per cent of consumer saying most liked	19	36	47

Where: Mwz = Mwanza, Mis = Misungwi and Mtu = Meatu; figures in bracket are the percent consumers who had a first preference for that cultivar

Some cultivars, Polista and SPN/0, were consistently in the most liked group (cluster 3) in both years. Other cultivars, Mzondwa and Serena, were consistently in the least liked group (cluster 1). However, certain cultivars appear to differ in acceptability from year to year, for example Sinia B was in cluster 3 in 1998 but generally in cluster 1 in 2000. Similarly, the same was noted for Ngikuru A. For some cultivars

(Ipembe, Ngosha, Bukoli, and Hudi Shinyanga), it was not possible to draw conclusions because they were only tested once.

The mean sensory scores for each cluster are given in table 5. The clusters differed significantly with respect to the sensory attributes ($P<0.05$) apart from the sensory term fibre (Table 5). Cluster 3, the most preferred group had the highest scores for taste, sweetness and starch and the lowest scores for stickiness and texture. Cluster 2 had the highest scores for appearance. external colour, internal colour, odour, texture, chewiness and stickiness.. Cluster 1. the least preferred, generally had the lowest scores for all the sensory attributes apart from stickiness.

Table 5
Means of sweetpotato clusters that had similar sensory properties

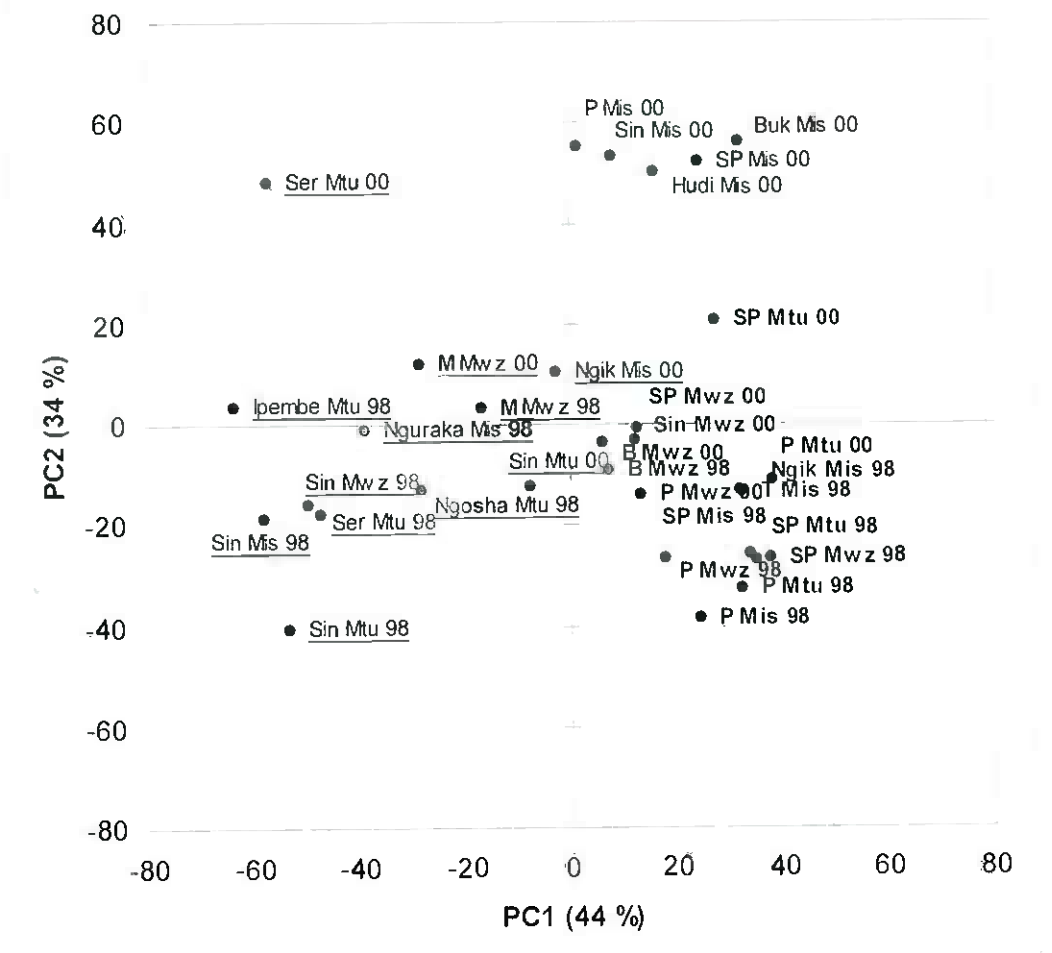
	appearance	external colour	internal colour	Odour	texture	taste	chewiness	sweetness	Starch	Stickiness	Fibre
Cluster 1	60	59	63	61	50	40	54	41	32	28	21
Cluster 2	73	73	78	74	74	62	74	65	65	74	23
Cluster 3	73	72	78	73	52	75	59	69	73	19	17
Df	2	2	2	2	2	2	2	2	2	2	2
F	8.968	8.463	12.373	13.571	9.044	35.635	5.907	14.909	48.495	55.955	1.963
Probability	**0.001**	**0.001**	**<0.001**	**<0.001**	**0.001**	**<0.001**	**0.007**	**<0.001**	**<0.001**	**<0.001**	0.159

Where: probabilities of less than P = 0.05 are in bold, clusters 1, 2 and 3 are the means of 10, 6 and 16 cultivars respectively.

The relationship of these samples with respect to the sensory attributes is summarised by principal component analysis that accounts for 78% of the variability (figures 3 and 4). The clusters are clearly divided into three groups with cluster 2 being the most distinct (figure 3). Cluster 1 is predominantly in the left-hand quadrants, cluster 2 in the upper right-hand quadrant and cluster 3 in the lower left-hand quadrant. Comparison with Figure 4 confirms the findings described above. Thus, cluster 1 is mostly associated with cultivars that score low for the majority of the sensory attributes while Serena (Meatu 2000) was also fibrous. Cluster 2 is associated with sweetpotatoes that score higher for sticky, texture, chewiness, internal colour, external colour, appearance and odour. Cluster 3 is related to sweetpotato that scores highly for internal and external colour, appearance, odour, sweetness, taste and starch.

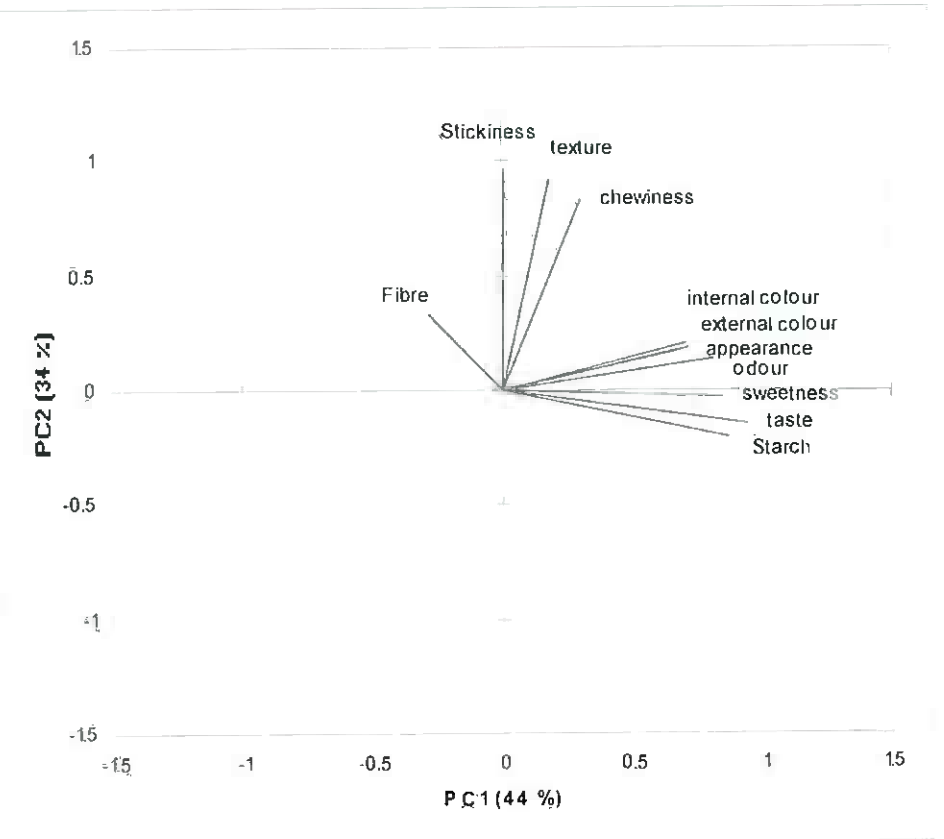
Samples of the same cultivar tended to be clustered together. SPN/0 and Polista were in the right hand quadrants in both years while Mzondwa and Serena were consistently in the left-hand quadrants. This implies that for these cultivars, the sensory characteristics are broadly similar from year to year and not influenced by location where they were grown. Sinia B, however, was in the lower left-hand quadrant in 1998 but in the right hand quadrant in 2000. The cultivars from Misungwi in 2000 were generally more sticky, chewy and scored higher for texture. It is not clear why these cultivars differed, although climatic differences and differences in storage by the traders are likely to have contributed.

Fig 3
Principal component plot showing spacing of sweetpotato cultivars with respect to the sensory attributes.



Where:
M = Mzondwa, SP = SPN/0, Sin = Sinia B, Ser = Serena, B = Bilagala, P = Polista, Ngik = Ngikuru, Mwz = Mwanza, Mis = Misungwi, Mtu = Meatu

Fig 4
Principal component plot showing relationship with respect to the sensory attributes



Developing a model for selecting optimum sensory characteristics for selection for clusters

The PCA illustrated that many of the sensory attributes were correlated. For example, stickiness, texture and chewiness were correlated, while internal colour, external colour, appearance, odour, sweetness, taste, starch and fibre were correlated. This suggests that the number of sensory attributes for discriminating the cultivars might be reduced, while still retaining most of the important information. Screening programmes often consider a large number of cultivars, so that any method for simplifying assessments would be advantageous. We therefore wished to determine what was the minimum number of sensory characteristics that we could consider while still being able to distinguish between the clusters of cultivars.

Considering the F statistic (ANOVA for discriminating between the clusters, table 5), highest values (indicating greatest differences among cultivars) were for stickiness (56.0), starch (48.5), taste (35.6) and sweetness (14.9). Of these, correlation analysis indicated that starch, taste and sweetness were significantly correlated; hence only starch was retained. Starch did not significantly correlate with stickiness and therefore both were retained as suitable sensory attributes for predicting the cultivar sensory characteristics. Discriminant analysis models on all the sensory attributes and on starch and stickiness only were very similar in distinguishing between the clusters. The discriminant model developed on all the attributes correctly classified 17 out of

18 cultivars; Ngikuru A (Misungwi, 2000) was incorrectly classified as cluster 1 instead of cluster 2. In comparison, a simpler discriminant model (table 6) based on starch and stickiness was almost as good in correctly classifying 16 out of 20 cultivars (original and cross-validated); Ngikuru A (Misungwi, 2000, cluster 2) and Sinia B (Meatu, 1998, cluster 1) were incorrectly classified as cluster 3. The discriminant function coefficients are given in table 7.

Table 6
Classification function coefficients determined from the scores for stickiness and starch sensory attributes

	Cluster		
	1	**2**	**3**
Starch	0.585	1.307	1.050
Stickiness	0.533	1.285	0.695
Constant	-17.844	-91.412	-45.352

Where classification is based on allocating an unknown to the cluster with the highest value

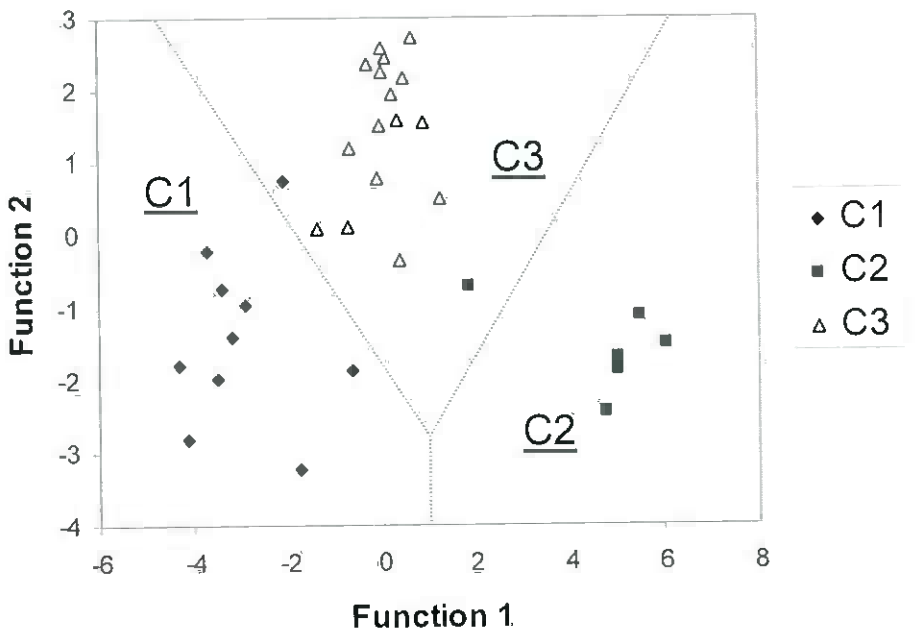
Table 7
Canonical discriminant function coefficients for stickiness and starch scores

	Function 1	Function 2
Stickiness	0.098	-0.046
Starch	0.096	0.060
Constant	-8.698	-2.015

Where functions 1 and 2 = 76% and 24% of the variance respectively

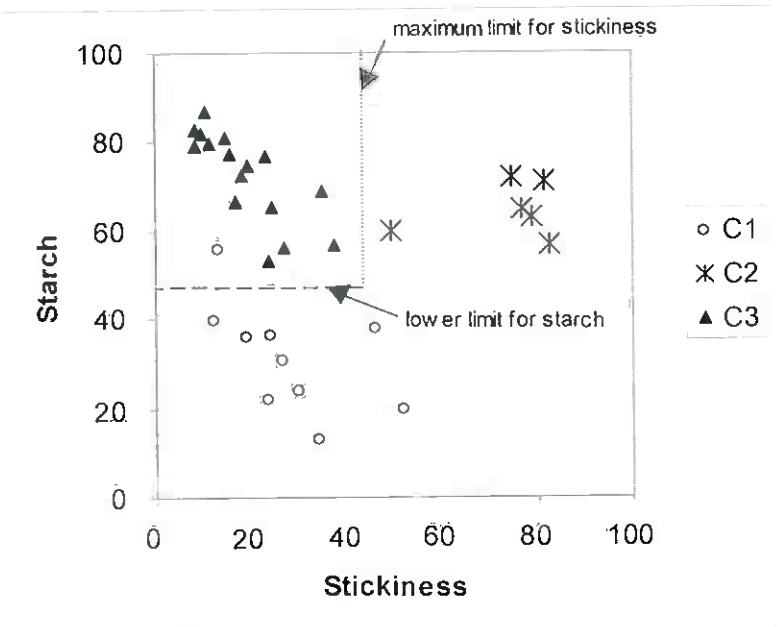
The discriminant plot (figure 5) shows the scatter of the cultivars along with boundaries (dotted lines) which indicate the areas of decision. However, since only two sensory attributes were used in the model and sensory testing is fairly subjective, a simple scatter plot (figure 6) would easier to use and interpret for cultivar selection purposes. Cluster 3 (most preferred cultivars) is in the top left-hand quadrant, cluster 1 (least liked cultivars) is in the bottom left-hand quadrant and cluster 2 is in the top-right quadrant. The dotted lines (arbitrarily drawn by the authors) represent the lower and maximum limits for starch and stickiness respectively. Hence, cultivars would be considered acceptable if the score for starch is 48 or greater and the score for stickiness is 42 or less.

Fig 5
Discriminant plot for sweetpotato cultivar (starch and stickiness)



Where: C1, C2 and C3 are clusters 1, 2, and 3, dotted lines are the boundaries of decision for each cluster (underlined)

Fig 6
Scatter plot of starch and stickiness to illustrate limits for starch and stickiness when selecting sweetpotato cultivars that are acceptable to consumers.



Where C1 = cluster 1, C2 = cluster 2 and C3 = cluster 3, dotted lines illustrate boundaries for cluster 3 (most liked cultivars).

Conclusions

A combination of consumer acceptability and sensory evaluation is a useful tool for selecting cultivars that are acceptable to consumers in Tanzania. Consumer acceptability studies over a two-year period indicated the most acceptable cultivars. Cluster analysis, based on the sensory panel attributes, segmented the cultivars into three groups of which cluster 3 was comprised of the most acceptable cultivars and cluster 1 the least acceptable. While many sensory attributes were measured, the most important were starch and stickiness. Action levels, based on the mean intensity scores of these attributes are suggested.

Some cultivars were consistently liked (SPN/0 and Polista) or disliked (Mzondwa and Serena) over the two year period and the location where the cultivars were grown did not influence acceptability. Other cultivars varied in acceptability (Sinia B). More research is necessary to understand why some cultivars are not consistently liked from one year to another because this can influence breeding trials. This also implied that results based on one year only are insufficient. Ideally trials should be conducted over several seasons.

Consumer acceptability appears to be influenced by gender with women tending to like SPN/0 and Sinia B more than men. Other socio-economic factors such as age, income and how often they consumer sweetpotato did not influence consumer acceptability.

This study has focused on consumer preference in the selection of sweetpotato cultivars. Other factors, however, are also important and could be incorporated in future models. These could be yield, disease resistance, storability, cookability, susceptibility to damage during transport etc (Tomlins *et al.*, 2000, Kapinga *et al.*, 2000, Van Oirschot 2000ab)

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