CHAPTER 2

Farmer criteria for selection of sweetpotato varieties

R.E. Kapinga, S.C. Jeremiah, E.J. Rwiza and D. Rees

2.1 Background

In Tanzania, despite its importance in food systems there has been little expansion in the aggregate acreage of sweetpotato over several years. Although research has lead to many recommendations for practices to increase production of sweetpotato at the farm level, the rate of adoption of improved practices is low. In cases where 'improved' varieties have been introduced, a low rate of uptake may indicate that the variety is in some way unacceptable. This observation has led research scientists to revisit the approaches previously used, and to take more account of growers' and consumers' preferences when developing and selecting sweetpotato varieties for release.

This chapter describes two activities undertaken by the Tanzanian sweetpotato breeding programme. Firstly, surveys were undertaken between 1990 and 1995 to obtain information on practices and constraints relating to sweetpotato production and utilization, and to determine the main criteria by which farmers judge varieties. Secondly, the methods by which the breeding programme in Tanzania incorporated the opinions of farmers in the selection of new cultivars through the use of farmer groups and on-farm trials are described.

2.2 Surveys for the identification of farmers' selection criteria for sweetpotato varieties

Between 1990 and 1995 surveys were conducted in several important sweetpotato production areas of Tanzania (see Figure 2.1 for major sweetpotato production areas) to obtain information on the suitability of sweetpotato in farming and food systems. Details of the surveys are given in Hart (1991), Kapinga (1992) and Kapinga *et al.* (1995).

2.2.1 Methods

The methodology used in all the surveys was similar. The information was obtained by group interviews where a group consisted of 15–20 people. This information was supplemented by interviews with individual households, generally 4–6 per village per district.

Although checklists were used to aid the interviews, the survey depended very much on open discussion with the groups.

The general issues normally addressed included:

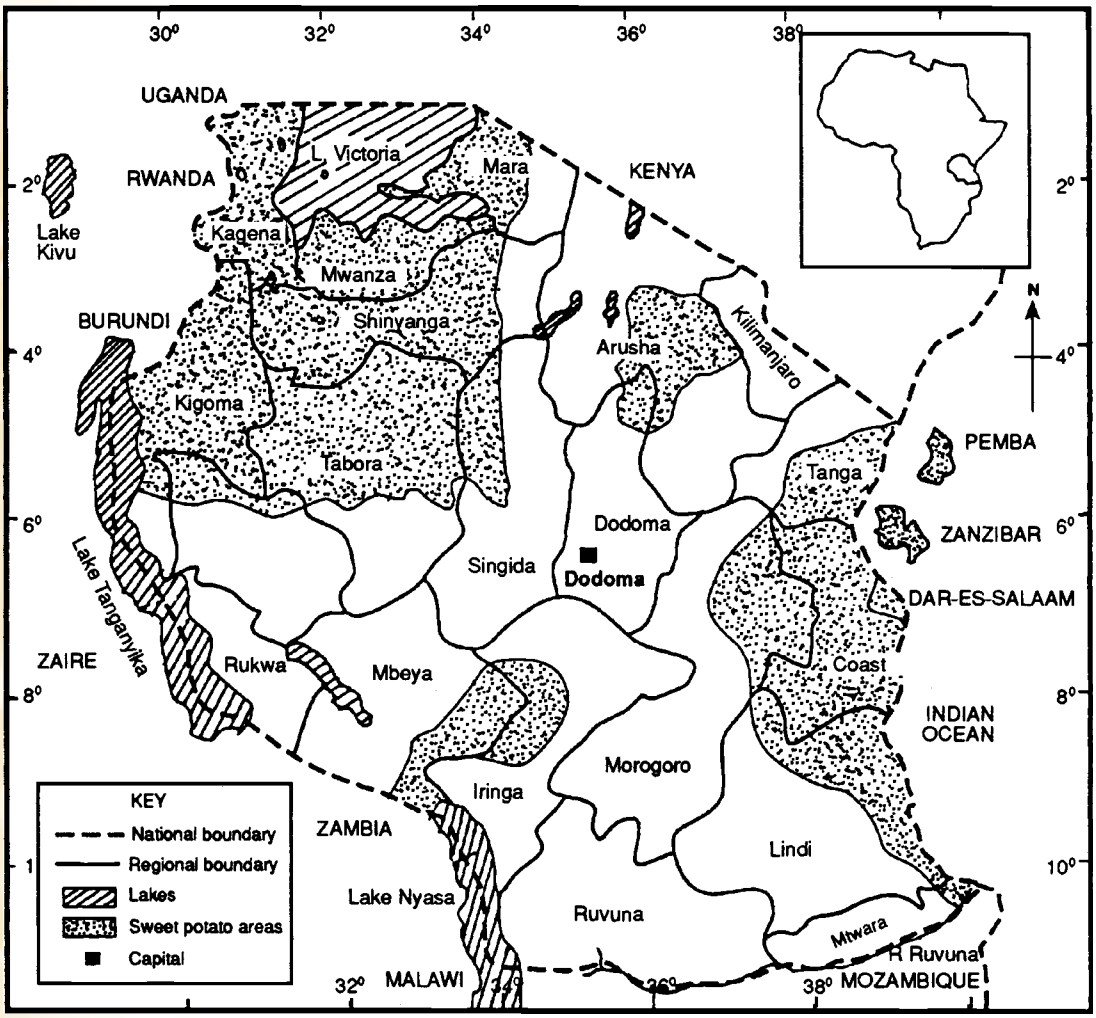
- identification of criteria used by farmers to abandon or select sweetpotato varieties
- identification of farmers' preference for sweetpotato varieties currently grown
- identification of utilization practices
- ranking of varieties in order of utilization practices
- desirable characteristics in sweetpotato varieties
- identification of research gaps for increased utilization of sweetpotato varieties.

2.2.2 Results

Criteria used by farmers to abandon or select sweetpotato varieties

Information was compiled from Kapinga *et al*. (1995) and the Farming Systems Research-National Co-ordination Unit (FSR-NCU) survey (1996).

Farmers in all the surveyed zones (Eastern, Southern, Western, Southern Highlands, Lake) confirmed that



Adapted from: Msabaha (1990).

Figure 2.1 Major sweetpotato producing areas in Tanzania

there are several important criteria which act as a basis for selection of sweetpotato varieties. The frequencies at which the various criteria were mentioned in the different zones are summarized in Table 2.1. The attributes considered most important by farmers are high root yield, early maturity, tolerance to pests and diseases and good root characteristics (low fibre, sweetness, high root firmness, etc.). The most important characteristics referring to qualities of the roots are described in more detail below.

These characteristics have been ranked in Table 2.1 on the basis of the percentage of farmers mentioning them as important selection criteria, averaged across zones. As this percentage is not weighted for the importance of each zone in total sweetpotato production, it can only be taken as a qualitative indication of the importance of that criterion. (**Note**: The five zones are considered to rank in the following way with respect to sweetpotato production: 1 Lake; 2 Western; 3 Eastern; 4 Southern Highlands; 5 Southern.)

(i) High root yield

This was the selection criterion most frequently mentioned. Farmers in all of the surveyed zones indicated that high yield is an important attribute in sweetpotato variety selection. The root yield in this case depends mainly on the number of storage roots per plant.

(ii) Early maturity (early bulking)

Early maturity was an important criterion in all zones, although the frequency with which it was mentioned varied. The overall percentage for all surveyed areas which mentioned this criterion was 88%, and it ranked second among all other criteria across zones. Farmers in the Southern, Western and Lake Zones were more

Table 2.1 Selection criteria by zone for sweetpotato varieties as mentioned by surveyed farmers (%)

Criterion	Zones						
	EST	SOUT	WEST	SHL	LAK	Mean	Rank
Ranking of zones by importance of sweetpotato production	3	5	2	4	1		
Pre-harvest							
High yielding	100	100	100	100	67	94	1
Early maturing	67	100	100	75	100	88	2
Disease tolerance	67	100	0	75	67	62	4
Insect tolerance	67	100	0	25	67	52	6
Good in-ground storability	0	100	0	75	0	35	8
Tender leaves	33	0	0	0	0	7	11
Tolerant to waterlogging	33	0	0	0	0	7	11
Potential to be grown all seasons	33	0	0	0	0	7	11
Post-harvest							
Sweetness	67	100	100	100	67	87	3
Low fibre content	0	100	100	100	0	60	5
High root firmness	67	0	0	25	100	38	7
Less starch for storage	0	0	100	0	0	20	9
Marketability	0	0	0	67	0	13	10
Large root size	33	0	0	0	33	13	10
Good root shape	0	0	0	0	33	7	11
Good chips	0	0	0	0	33	7	11

EST = Eastern Zone; SOUT = Southern Zone; WEST = Western Zone; SHL = Southern Highlands Zone; LAK = Lake Zone.

Source: Compiled from FSR-NCU data file (1996).

concerned with this criterion (100%) compared with those in the Southern Highlands and Eastern Zones (75% and 67%, respectively).

Farmers clarified their response by mentioning the ability of a variety to give a reasonable number of harvestable storage roots from 3 months after planting. The early maturing varieties were mostly preferred in areas where sweetpotato is a commercial crop. In addition, early maturing varieties can be particularly important when there is an extended dry spell and sweetpotato is a food security crop when other crops fail. In some zones, such as the Lake and Western Zones, early maturing varieties bridge the gap before the harvest of main crops.

(iii) Sweetness

The term 'sweet' applied to sweetpotato in Tanzania appears to be very subjective and refers to a desired taste rather than sugar levels. Thus root sweetness as explained by farmers indicated a taste for a root that is not very sweet, nor very 'flat' like that of yam. Any sweetpotato with that desired taste is considered very sweet. This post-harvest criterion ranked third in importance and was mentioned in all zones. The average percentage of surveyed farmers who mentioned sweetness as important was 87% (Table 2.1). The highest percentage was observed in the Southern, Western and Southern Highlands Zones, respectively.

(iv) Disease and pest tolerance

Farmers interviewed were able to identify some common pests and diseases of sweetpotato. They preferred sweetpotato varieties that tolerate diseases and also that are tolerant/resistance to sweetpotato pests. This criterion was mentioned by farmers in all surveyed zones with the exception of Western Zone (Table 2.1). Tolerance to insects (primarily the sweetpotato weevil, *Cylas* spp.) was mentioned on average in 52% of cases and ranked sixth in importance.

(v) Low fibre content

Low fibre content was another important selection criterion, which ranked fifth in importance (Table 2.1). On average 60% of the surveyed farmers indicated that low fibre content was of great value in selection of sweetpotato varieties. This may be an underestimate of its importance, since the survey results indicated that it was not mentioned in the Eastern and Lake Zones, although it was mentioned by all farmers in the other three zones. It appears that this quality may have been included with root 'sweetness' in these two cases.

Selection criteria for specific zones

Information was compiled from the FSR-NCU survey (1996).

Some selection criteria were very specific to zones, probably because they answer the specific needs of the particular environment.

One example is high root firmness which was only mentioned by farmers in the Lake, Eastern and Southern Highlands Zones. This is probably because storage roots with high dry matter content and, therefore, high starch content, are more suitable for secondary processed products such as starch and flour.

Other specific criteria were for varieties which make good chips, have good root shape and large root size. These criteria were mentioned specifically in the Lake Zone, and reflect the type of root utilization commonly practised in this zone.

Good in-ground storability was specifically mentioned in Southern and Southern Highlands Zones. There are two requirements related to this attribute. One is extended in-ground storability before harvesting; the other is the ability for the fresh roots to keep for prolonged periods in specific storage structures. Insufficient information was obtained to determine whether the same varieties are good in both cases.

Characteristics of sweetpotato varieties commonly grown by farmers

Information was obtained from the FSR-NCU survey (1996).

An indication of the characteristics of sweetpotato varieties presently grown in different zones of Tanzania is presented below. These data were obtained during FSR-NCU surveys on a wide range of crops. As a consequence, in some zones, especially those where sweetpotato is less important, only a small number of varieties were recorded which may not be a true indication of the real situation. Nevertheless, the overall results can be taken as an indication of the varieties grown nationally. In some cases the characteristics of varieties grown correspond quite closely with farmers' preferences, while in other cases there is clearly room for improvement.

(i) Maturity

Although farmers prefer early maturing varieties, most sweetpotato varieties grown by farmers are considered by farmers' definition to be late maturing (Table 2.2). Farmers considered the critical time to distinguish late and early maturing varieties is 4–5 months. Varieties that do not give mature roots within this period are considered to be late maturing. Early maturing often means that in the case of piecemeal harvesting, big

Table 2.2 Rate of maturing of commonly grown sweetpotato varieties

Zone	Number of varieties considered	Early maturing	Late maturing
Eastern	10	3	7
Western	11	3	8
Southern Highlands	35	19	16
Central	3	2	1
Lake	18	8	10
Total	77	35	42
Percentage		45%	55%

Source: Compiled from FSR-NCU data file (1996).

Varieties were categorized by the interviewed farmers as early maturing and late maturing. An early maturing variety produces mature storage roots within 4–5 months, whereas a late maturing variety takes longer.

The overall percentage has not been weighted to take into account the relative importance of varieties or zones.

roots can be obtained within 3–5 months, while others are left to bulk. Farmers also mentioned the advantage of early maturity for drought avoidance, particularly in areas with long dry spells. Analysis from all zones surveyed (Southern and Northern Zones were not included) showed that 55% of the total varieties grown by farmers were referred to as late maturing and 45% early/medium maturing varieties (Table 2.2). This overall percentage does not take into account the relative importance of varieties or zones, but gives an indication that research efforts for the development of early maturing varieties should be strengthened.

(ii) Root sweetness

As discussed above, root 'sweetness' is a very subjective quality, being an indication of good taste, rather than sweetness (sugar content) *per se*. In addition, a watery or fibrous root is never considered 'sweet', so that it is difficult to distinguish completely between taste and texture. It was observed that most sweetpotato varieties grown by farmers have medium 'sweet' to 'very sweet' taste (Table 2.3).

(iii) Root fibre content

Although ranked lower than 'sweetness', the texture of root flesh in terms of fibre content is an important criterion used by farmers in selecting sweetpotato varieties. Sweetpotato roots with no or low fibre content are preferred. The majority of sweetpotato varieties currently grown by farmers have no fibre or low fibre. It was noted from the study that for the four zones assessed, 55% of the total varieties grown were considered to have no fibre and only 15% of the total varieties mentioned were considered to be very fibrous (Table 2.4).

Table 2.3 Root sweetness of commonly grown sweetpotato varieties

Zone	Number of varieties	Very sweet	Sweet	Not/slightly sweet
Eastern	4	1	2	1
Southern	3	1	2	0
Western	4	2	0	2
Southern Highlands	36	12	21	3
Central	3	0	2	1
Lake	-	-	-	-
Total	50	16	27	7
Percentage		32	54	14

Source: Compiled from FSR-NCU data file (1996).

The overall percentage has been calculated without weighting the varieties with respect to their importance in each zone, nor weighting the zones with respect to their importance for sweetpotato production.

Table 2.4 Root texture of commonly grown sweetpotato varieties

Zone	Number of varieties	Texture		
		No fibre	Low fibre	Very fibrous
Eastern	-	-	-	-
Southern	3	0	3	0
Western	12	6	4	2
Southern Highlands	35	21	8	6
Central	3	2	1	0
Lake	-	-	-	-
Total	53	29	16	8
Percentage		55	30	15

Source: Compiled from FSR-NCU data file (1996).

The overall percentage has been calculated without weighting the varieties with respect to their importance in each zone, nor weighting the zones with respect to their importance for sweetpotato production.

(iv) Root firmness/hardness

Firmness is an indicator of high dry matter content, which is a preferred attribute in sweetpotato roots. However, farmers indicated that most sweetpotato varieties that they grew had 'medium' to 'slightly' firm roots. Of the total varieties assessed, only 26% were considered to have very firm roots (Table 2.5).

Table 2.5 Root firmness of commonly grown sweetpotato varieties

Zone	Number of varieties	Very firm	Medium firm	Slightly firm
Eastern	-	-	-	-
Southern	2	2	0	0
Western	-	-	-	-
Southern Highlands	36	8	22	6
Central	-	-	-	-
Lake	-	-	-	-
Total	38	10	22	6
Percentage		26	58	16

Source: Compiled from FSR-NCU data file (1996).

The overall percentage has been calculated without weighting the varieties with respect to their importance in each zone, nor weighting the zones with respect to their importance for sweetpotato production.

These findings suggest that more attention should be given in the breeding scheme to selecting varieties with firm roots. The chances are high that these varieties once selected by farmers will be adopted.

(v) Outer skin colour of roots

Although not mentioned as major selection criteria, skin and flesh colour are likely to be important for uptake of new varieties. Many of the varieties (45%) grown by farmers have a purple/red outer skin colour (Table 2.6). Next was a white/yellow outer skin colour (33%) and a brown/cream colour (22%).

The predominant skin colour appeared to differ between zones, although the results may be distorted by the fact that the number of varieties recorded varied greatly between zones. In the Lake Zone, the predominant colour was purple/red (51% recorded varieties). On the other hand in the Eastern Zone most of the varieties assessed (88%) had white/yellow skins, and the same was reported by farmers in the Central and Western Zones. If, as these data indicate, preference for skin colour varies from one zone to another, this must be taken into account by breeders.

(vi) Flesh colour of roots

Two main flesh colours were mentioned by farmers: white and yellow/orange (Table 2.7). Discussions with farmers indicated that white fleshed roots are preferred because they produce good chips – *michembe* – when processed and give good quality flour. In addition, farmers perceive that white flesh in a storage root is a good indicator of high starch/dry matter content. The overall percentage of varieties mentioned with each flesh colour is given in Table 2.7. It is consistent with the hypothesis that white fleshed roots are preferred to yellow/orange ones, as 63% of the total varieties assessed have white root flesh.

In some zones, such as the Western Zone, farmers mentioned varieties with purple or blue coloured roots, which had low dry matter.

Table 2.6 Outer skin colours of roots of commonly grown sweetpotato varieties

Zone	Number of varieties	Skin colour (roots)		
		White/ yellow	Purple/ red	Brown/ cream
Eastern	8	7	1	0
Southern	3	2	1	0
Western	2	2	0	0
Southern Highlands	21	8	9	4
Central	3	2	1	0
Lake	68	14	35	19
Total	105	35	47	23
Percentage		33	45	22

Source: Compiled from FSR-NCU data file (1996).

The overall percentage has been calculated without weighting the varieties with respect to their importance in each zone, nor weighting the zones with respect to their importance for sweetpotato production. The relative numbers of varieties with each skin colour may, therefore, not be a quantitative indication of the popularity of that colour.

Table 2.7 Colour of root flesh of commonly grown sweetpotato varieties

Zone	Number of varieties	Root flesh colour	
		White	Yellow/orange
Eastern	13	7	6
Southern	3	2	1
Western	3	0	3
Southern Highlands	-	-	-
Central	-	-	-
Lake	69	47	23
Total	88	56	33
Percentage		63	38

Source: Compiled from FSR-NCU data file (1996).

The overall percentage has been calculated without weighting the varieties with respect to their importance in each zone, nor weighting the zones with respect to their importance for sweetpotato production. The relative numbers of varieties with each flesh colour may, therefore, not be a quantitative indication of the popularity of that colour.

Table 2.8 A selection of the most popular sweetpotato varieties grown by farmers in Tanzania and their desirable characteristics

Local name	Characteristics
Suguti (L)* Songea (SHL) Simama (L, E) Tulwawima (L, SHL)	White skin/yellow flesh, high yielding, semi-erect, floury, early maturing, large root size, medium sweetness, very firm/floury, no fibre
Mayai (W, E)	White skin/orange flesh, high yielding, good underground storability
Mwezigumo (W, L)	Very early maturing to bridge a famine gap between major harvests
Karoti (E, S)	Early maturing, broad leaves, spreading, red skin/yellow flesh, medium fibre content, medium sweetness, medium root size, firm, moderately drought tolerant
Sinia (SHL, L)† Kasinia (L)	Early maturing, large root size, red skin/white flesh, very sweet, very firm, no fibre
Kinahanaha (W, SHL)	Very early maturing, fibrous, good as vegetable, white flesh, sweet, firm, no fibre
Kandoro (W, SHL)	Medium maturity, large root size, white skin/white flesh, sweet, firm, not fibrous

L = Lake Zone; SHL = Southern Highlands Zone; E = Eastern Zone; W = Western Zone; S = Southern Zone.

* Officially released as Simama.
† Officially released as Sinia.

Table 2.8 lists some of the most popular varieties grown in Tanzania together with a summary of their characteristics.

2.3 The use of farmer groups and on-farm cultivar testing

2.3.1 Background

From the previous sections, it is clear that farmers select suitable sweetpotato varieties by criteria that relate both to production and post-harvest issues. The breeding programme within Tanzania has found that the best way to incorporate the opinions of farmers in the selection of new cultivars is firstly, to use farmer groups to assess early trials on-station, and secondly, to carry out on-farm trials of the more advanced cultivars. On-farm trials are found to be essential in order to take into account the effects of actual farmer practices and conditions, which may differ substantially from on-station practices.

The rationale for on-farm cultivar testing

In Tanzania, sweetpotato is grown primarily by women in a range of land use systems. Within each system, sweetpotato fields differ greatly in biophysical properties (i.e. soil type, soil fertility, etc.) and management practices (i.e. ridges, hills, intercropping, etc.). This necessitates an approach to testing which includes the environment-genotype interaction. Therefore, testing sweetpotato varieties in a wide range of conditions, with many female farmers, is needed.
The methodology of testing is based on concepts of environment-technology interactions (Hildebrand and Russell, 1994), agroecosystem diversity (de Steenhuijsen Piters, 1995), and on the 'niche theory' in biology. The main idea is that a certain technology performs according to the environment into which it is introduced. Specific production environments ('niches') favour specific technologies. A production environment is composed of several variables, such as soil type, rainfall pattern, but also crop husbandry, such as timing of weeding. Understanding the performance of a new technology needs: (i) a description of the production environments; and (ii) an understanding of their relation to the newly introduced technology.

The approach consists of the following elements.

- Testing of several varieties over a wide range of production environments, which include different rainfall patterns, soil types and farmers' practices.
- Standardization of a few cropping practices, for example, planting date, plant spacing and cropping pattern; all other conditions and husbandry practices are not controlled.
- Recording and measurement of all important non-controlled variables at each field.
- Active participation of farmers as observers capable of monitoring the trial.
- Assessment by farmer groups of the varieties' performance at harvest time. Criteria of comparison are discussed, varieties are compared pair-wise and final priority ranking is performed. Accordingly, three types of trial fields are assessed, i.e. successful, moderately successful and failure. Sweetpotato is also subjected to tasting.
- Quantification of yields.

Statistical analysis includes simple, descriptive statistics, ANOVA (analysis of variance), multiple regression and environmental index analysis.

Advantages of farmer participation in variety testing

For those criteria, such as yield, which are routinely tested on-station, farmers' assessments are in strong agreement. However, farmers consider many other criteria which are not considered on-station. This explains why some varieties may be ranked low despite their good field performance. Multiple criteria selection of varieties leads to flexible recommendations which appreciate the diverse use of varieties depending on the producers production objectives.

Involvement of farmers in the planning and implementation stages appears to hasten the process of technology testing and dissemination. The feedback flow process obtained helps researchers to target research towards demand-driven priorities.

2.3.2 Procedure for conducting on-farm assessment of sweetpotato varieties

Selection of farmers

- Organize planning meetings in different villages to select farmers to participate in the trials.
- Participation of farmers should be voluntary although a good balance of farmers in different social strata should be attained.
- The number of farmers per village should be determined by the availability of planting materials. However, for a good assessment, 8–10 farmers per village should participate in a trial.

Selection of fields

- Land for a trial is provided by the selected farmers.
- Sweetpotato fields should differ in biophysical properties (i.e. soil types, soil fertility, slope, etc.).

Note

- Farmers in different social strata should be selected.
- Do not make the common mistake of conducting the trials under optimum conditions otherwise you may end up selecting breeding clones that perform poorly under less than optimum conditions.
- Assess the overall farmers' management practices, and use this as a base for field selection. For instance, if farmers grow most of their sweetpotato on low-fertility soil, then trials should be established in such fields,

Trial establishment and management

Plot size
Minimum plot size should be 6 m x 2 m.

Number of replications
One (i.e. each farmer's field trial should be considered as one replicate).

Spacing
Plant at a spacing of 30 cm between plants and 1 m between rows. This is mainly for low fertility sandy soils. However, spacing between plants can be increased to 40 cm in fertile soils, to avoid overcrowding of plants.

Size of cuttings
20–25 cm long vines should be used.

Source of cuttings
Vines aged 1.5 to 2 months should be sourced from a nursery. Very old fields produce materials that do not establish well and harbour pests (e.g. weevils) and diseases (e.g. viruses).

Plant parts
Vine tips are recommended for good establishment and reduced pest attack. If insufficient planting material is available, the middle parts can also be used; avoid the basal parts because they harbour sweetpotato weevils.

Number of new varieties
3–5 plus a popular local variety as a check.

Planting of a trial
This is a joint activity with the farmer to ensure uniformity.

Length of trial cycle
Normally trials are harvested 5 months after planting, but this can be adjusted to suit the normal harvesting time of sweetpotato in the area concerned.

Data collection

Before planting
Record rainfall status, soil type (sandy or loamy), soil colour, soil stoniness (fine or gravel), slope (gentle or step), age of the field and previous crops.

After planting
Record the number of weedings at each farm and weeding intervals. Assess the establishment, pest and disease incidences, etc.

Assessment by farmers
Advise the farmers to observe the following during trial execution:

- establishment rate of each variety
- vigour

- ability to control weeds
- maturity time
- leaf retention
- resistance to important diseases, drought and pests.

Harvesting
Record yields.

Farmers' assessment
At harvest, two contrasting fields should be selected for assessment by all farmers (i.e. those participating in the trial and invited villagers). Selection of contrasting fields for assessment could be based on the management practices of farmers (i.e one field that received the best management and the other that received worst or less management by farmers).

Ranking of varieties is carried out in terms of foliage vigour, resistance to diseases and pests, maturity time, number, shape and size of roots, and colour of skin and root flesh. General crop appreciation is rated on a scale of increasing appreciation from 1 to 5.

Figures 2.2 and 2.3 show example data sheets to be used by farmers for this assessment.

After assessment of samples by individuals (Figure 2.2), ranking of varieties through group discussion is carried out by pair-wise comparison of each variety. Assessors should agree on which is a preferred sample over the other until all samples are compared. A sample of the ranking score sheet used by the investigator is presented in Figure 2.3. Each space corresponds to the comparison of two varieties. For example, the space marked with * is used to record the comparison between variety B and variety D. The preferred variety of these two should be recorded in that space. An example of a completed form is given in Figure 2.4.

Name of the evaluator: **Sex:**

Date: **Village:**

Attribute	**Variety**				
	A	**B**	**C**	**D**	**E**
Foliage coverage					
Resistance to diseases					
Resistance to pests					
Drought tolerance					
Maturity/earliness					
Yield of roots					
Shape of roots					
Size of roots					
Appearance of root skin					
Appearance of root flesh					
General crop appreciation					

Subjective score:

1 = very bad; 2 = bad; 3 = moderate; 4 = good; 5 = very good.

Note

- Scoring should be done by everyone participating in the assessment.
- The number of evaluators should be between 15 and 20 for unbiased results.
- Do not disclose the names of varieties to the evaluators until the exercise is completed. This will reduce bias in the ranking of well known popular varieties.

Figure 2.2 Sample score sheet for field assessment of sweetpotato varieties tested on-farm

Variety	Variety				
	A	B	C	D	E
A	X				
B		X			
C			X		
D		*		X	
E					X
Total scores per variety					
Rank					

Reasons for high ranked varieties

Reasons for less ranked varieties

Figure 2.3 Sample ranking sheet of varieties for field performance compared pair-wise

Variety	Variety				
	A	B	C	D	E
A	X				
B	B	X			
C	A	B	X		
D	D	D	D	X	
E	A	B	C	D	X
Total scores per variety	2	3	1	4	0
Rank	3	2	4	1	5

Reasons for high ranked varieties
D has high yield and low susceptibility to weevils

Reasons for less ranked varieties
E has low yield and is late maturing

A typical set of results has been included for illustration.

Figure 2.4 Completed sample ranking sheet of varieties for field performance compared pair-wise

Example of results

Table 2.9 Farmers' field assessment of sweetpotato varieties in Mwagala village, Missungwi District, Lake Zone of Tanzania

	Attribute (N = 25)									
Variety	**Earliness**	**CV (%)**	**Root storability**	**CV (%)**	**Root size**	**CV (%)**	**Root shape**	**CV (%)**	**General impression**	**CV (%)**
440144	3.3	24.9	3.7	13.0	3.6	14.3	4.4	11.7	4.3	15.7
SP93/5	3.9	22.5	3.9	25.5	4.3	19.1	3.8	29.9	4.3	15.6
S993/13	2.3	41.2	3.1	35.5	2.8	32.8	3.5	30.9	2.9	30.2
Mwananjemu	2.9	41.3	3.6	29.8	3.3	20.5	3.7	25.6	4.0	20.4
Polista	3.9	14.6	3.6	19.4	3.8	11.1	3.6	14.3	4.2	15.1
Kagole	3.8	27.2	4.4	15.9	4.2	18.8	4.2	18.8	4.6	15.2
Bagalanentukuru	3.2	24.6	3.4	28.4	3.5	24.3	3.6	19.4	3.7	18.2

Subjective ranking: 1 = very poor; 2 = poor; 3 = moderate; 4 = good; 5 = very good.

Note: Higher values of CVs indicate wide variability in farmers perception. N = number of farmers who participated in the assessment.

Table 2.10 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/0*	Iboja, Mwanamonde, Biganana
Want a high yield	SPN/0*, Sinia-B *, Iboja	Biganana
Want to harvest piecemeal	Mwanamonde, Sinia-B*, Iboja, Biganana	SPN/0*
Have problems with weevils in your field	Biganana, Iboja, Sinia-B*	SPN/0 *, Mwanamonde
Want vines for livestock	Biganana, Sinia-B*	Iboja
Want to process	Biganana, Iboja, Sinia-B*	SPN/O*
Want leaves for a vegetable	Biganana, SPN/O*	Iboja
Want roots for selling	Sinia-B*, SPN/0*	Iboja

* Varieties released in 1999.

Data analysis

Use social statistical programs, such as SPSS, ABSTAT and GENSTAT, to analyse the information collected on the farmers' assessment.

Table 2.9 shows a summary of data obtained from a set of on-farm assessments conducted in the Lake Zone, while Table 2.10 shows how results can be used to provide a set of recommendations on suitable varieties for farmers.

2.3.3 Procedure for conducting taste tests

Simple taste tests are conducted at harvest for both on-farm and on-station trials. The samples for taste testing are taken from selected roots of each variety. A panel of tasters, consisting of at least 10 farmers and invited neighbours, is selected. It is important that the name of each taster be recorded on the data sheets. Roots should be cooked and cut into slices. They should be presented to the tasters labelled only with letters, for example, A–E. Characteristics normally assessed through this method include: appearance, taste, starchiness and fibre content of cooked roots. (Quantitative measurements of a larger set of characteristics by the use of trained panellists is explained in Chapter 4.) Two example assessment forms are presented in Figures 2.5 and 2.6.

The first allows scoring of five samples, while the second format requires one form per sample.

Name of the evaluator: **Sex:**

Date: **Village:**

Attribute	**Variety**				
	A	**B**	**C**	**D**	**E**
Appearance					
Taste					
Flavour					
Starchiness					
Fibre content					
General acceptability					

Subjective ranking:

1 = very good; 2 = good; 3 = moderate; 4 = good; 5 = very good.

Figure 2.5 Sample score sheet for post-harvest assessment of sweetpotato cooked roots

Sweetpotato Taste Testing

Name of evaluator:_____ **Age:**_____ **years**

Date:_____ **Cultivar:**_____ **Sex: Male / Female**

Attribute	 **1 = Very bad**	 **2 = Bad**	 **3 = Fair**	 **4 = Good**	 **5 = Very good**
Appearance					
Colour					
Colour intensity					
Colour uniformity					
Discoloration					
Flavour					
Sweetness					
Texture					
Moistness					
Fibre (free)					
Overall taste acceptability					

Figure 2.6 Detailed taste test evaluation sheet for consumers

2.4 Conclusions and implications

Poor uptake of some new varieties in the past has underlined the importance of incorporating the preferences of growers and consumers into the breeding process. This chapter describes surveys conducted in Tanzania to determine the farmer criteria for preferred sweetpotato varieties. The opinions of farmers on available varieties indicate that there is considerable room for improvement.

Thus, on-station assessment of varieties by farmers and on-farm testing are both central to the Tanzanian sweetpotato breeding programme.

References

FSR-NCU data file (1996) Farmers Preference of Crop Varieties and their Selection Criteria. (Draft). Farming Systems Research. Dar es Salaam: National Co-ordination Unit, Ministry of Agriculture. (unpublished)

HART, D.T. (1991) *Sweetpotato Production in Maswa and Meatu Districts: An On-farm Study*. Mwanza-Bukoba: Tanzania/Netherlands Farming Systems Research Project, Lake Zone.

HILDEBRAND, P.E. and RUSSELL, J.T. (1994) Adaptability Analysis for Diverse Environments. Paper presented at the *American Society of Agronomy Meeting, Seattle, Washington.*

KAPINGA, R.E. (1992) *Root and Tuber Crops and Their Constraints in Bukoba District*. *Field Note*, No. 24. Mwanza-Bukoba: Tanzania/Netherlands Farming Systems Research Project, Lake Zone.

KAPINGA, R.E., EWELL, P.T., JEREMIAH, S.C. and KILEO, R. (1995) *Sweetpotato in Tanzanian Farming and Food Systems: Implications for Research*. Dar es Salaam: International Potato Center and Ministry of Agriculture.

STEENHUIJSEN PITERS, B. DE (1995) *Diversity of Fields and Farmers; Explaining Yield Variations in Northern Cameroon*. PhD thesis, Wageningen Agricultural University, Netherlands.