

Sweetpotato seed systems in East Africa

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Abstract Sweetpotato seed systems in Uganda, Tanzania and Rwanda were identified by surveys in each country. Along the Equator where rainfall was evenly distributed, farmers mainly used vine cuttings from previous mature crops. On either side of it, there is a prolonged dry season and special seed systems were in place to supply the succeeding wet season. These included growing crops in swamp, shade, irrigated in a backyard or field, or growing crops from cuttings obtained from sprouting roots. The last was common, effectively free but resulted in late planting. Irrigation was expensive, growing a crop in swamps was laborious, growing a crop in shade or the backyard produced only small amounts of cuttings but these methods ensured early availability of planting material. Early planting material was valuable, yielding well for home consumption, sales and preservation, and surplus from crops in swamps or under irrigation was sold. It may be worthwhile distributing planting material of new varieties to commercial growers during the dry season, to conserve it for the rainy season. The opportunity for mild, asymptomatic virus diseases to spread is common to all seed systems. How important they are remains largely unknown.

Key words: Backyard, cuttings, swamp, Tanzania, Uganda

Introduction

Seed systems need to provide farmers with planting material (i) in sufficient quantities (ii) at the right time (iii) of an appropriate physiological state, vigour and health, (iv) of superior genotypes appropriate to the farmer's purposes, and (v) at an affordable price. There is also occasional need to disseminate new cultivars. Seed systems are mostly mixtures of formal and informal systems and private and public. In Tanzania, Uganda and Rwanda, the seed system is largely informal and private sector (Ndamagé, 1990; Bashaasha *et al.*, 1995; Kapinga *et al.*, 1995), with only occasional formal distributions for disaster relief and of new varieties by government or NGOs.

Sweetpotato is propagated by vine cuttings. Along the Equator in Uganda, there are two evenly-spaced rainy seasons and crops are grown continuously; here, no special measures are usually necessary to obtain planting material as vines are mostly available. Away from the Equator, there is one long dry season and, depending how far from the Equator it is, a short dry season. All three countries have areas where there is a long dry season and special measures need to be undertaken here by farmers to obtain vine cuttings (Gibson *et al.*, 2009). Food shortages are also common before the harvest of the new season's crop; sweetpotato is a potential early source of food but traditional sources of planting material are usually insufficient or late. Viruses also constrain yields in all three countries (Tairo *et al.*, 2004; Njeru *et al.*, 2008). Farmers select against infection with the severe disease, sweet potato virus disease (SPVD), caused by *Sweet potato chlorotic stunt virus* (SPCSV) synergising *Sweet potato feathery mottle virus* (SPFMV). They cannot select against infection with symptomless viruses, notably SPFMV when infecting alone. This paper looks at the seed systems

utilised in the three East African countries, the shortage of planting material following the long dry season and the need to disseminate virus-free stock.

Materials and Methods

Survey results were questionnaire-based and obtained from:

- (i) Uganda: 271 farmers in Soroti, Kamuli, Bukedea and Mukono districts in 2008;
- (ii) Tanzania: 126 farmers in Mara and Mwanza districts in 2010 and
- (iii) Rwanda: 434 farmers in the east, west, north and south Rwanda and Kigali town in 2009;

together with other informal surveys. The surveys involved mostly women and mostly small-scale sweetpotato farmers who grow the bulk of the crop.

Sweetpotato cuttings obtained from Wakiso district in Uganda were planted in a screenhouse at NRI UK and indexed by grafting a scion from each to the indicator plant *Ipomoea setosa*, retaining apparently healthy ones and recording symptoms of diseased plants. The plants causing no symptoms were infected with SPCSV and, after a 5 wk period, scions were again grafted onto *I. setosa* seedlings and checked for symptoms of SPVD.

Results

Cuttings obtained from mature ware crops are used throughout the three countries but have to be supplemented in areas with a long dry season by special

methods. Where the dry season is moderate, crops can be maintained in the shade, e.g., of banana and cuttings from vines used as planting material for the main ware crop. This is usually quite small scale and mainly for personal use. Where the dry season is longer, crops may be maintained in swamps. Such areas are, however, valued for growing other crops like tomatoes and cabbages; there may also be laws conserving swamps. Crops grown in swamps, being the only vegetation around and often sited far from home, risk being grazed. This practice is common around the shores of Lake Victoria in Tanzania and of Lake Kyoga in Uganda. In Tanzania, rice paddy fields are also used. In Rwanda, this practice is now largely replaced by large irrigated schemes for rice and other crops. Swampy areas may become flooded when the rains return so preventing harvest of planting material. Irrigation avoids both this and conservation laws but competition with other high value crops remains. In Tanzania, hand watering with buckets is common. It can be arduous as watering is done on average every other day from May to September inclusive, reaching a peak of almost every day in July, and for 3 ± 2.5 hrs day⁻¹. It is done primarily by women and young girls; in one location in Shinyanga Tanzania, 22 women and older girls were busy watering but, though several men and older boys were doing other work, none was watering. Non-Governmental Organisation (NGOs) may multiply planting material this way, often using a pump. The Ugandan Soroti Sweetpotato Producers Association (SOSPPA) provides an example of a large-scale farmers association with a pump. Large quantities of planting material may be sold from such enterprises to other farmers. Individual farmers may maintain small plots of planting material using waste domestic water; this is common in parts of Tanzania and Uganda. Grazing has to be prevented in all these methods; fields are mostly surrounded by a thick thorn fence. Farmers gain an early root harvest by planting early which either can be marketed profitably or eaten before the main cereal harvest or, if retained, provide a larger yield than late-planted crops.

The other common practice for obtaining planting after a long dry season is to wait for roots which have been accidentally left in fields to start sprouting when the rains come. This is very much the 'poor woman's approach'; it provides large amounts of planting material but it occurs late and planting is consequently delayed. This results in a late harvest, missing the period when roots are high value. The planting material is often weevil infested and suffers from grazing because it cannot be protected in the open field.

A main concern of farmers is the health of their planting material, both in terms of its freedom from insect pests, mainly weevils, and freedom from disease, mainly sweet potato virus disease (Table 1). In addition, they are also concerned about the number of varieties they can maintain. They cannot do much about the pests that affect their planting material (Table 2) but can ensure that their beds of planting material are free from weeds and, in line with their concern about diseases affecting their planting material (Table 1), they rogue out any diseased plants. A sample of planting material of New Kawogo, a Ugandan

landrace, proved to have about only half of the cuttings infected, the rest were apparently virus free (Table 3). It is significant that about 20% of the cuttings were infected with a sweepovirus. This disease has only recently been reported in Uganda but it appears already to be common.

Discussion

This paper reports the current main seed systems of sweetpotato in East Africa. What kind of seed systems should we be working towards? Figure 1 visualises a scenario in which specialist seed producers maintain planting material throughout the year. Planting material is maintained separately from ware crops and, therefore, to a higher standard of phytosanitation. More irrigation also

Table 1. The main constraints (apart from rainfall) to availability of vine cuttings perceived by farmers in Tanzania.

Main constraint	Number of farmers
Pests	22
Diseases	18
Insufficient planting material	11
Lack of different varieties	9
Lack of good seed	8
Lack of irrigation equipment	5
Destruction by animals	4
Poor market	4
<4 farmers with a particular view	13

Table 2. Methods which farmers in Tanzania perceive as useful for maintaining planting material.

Criteria	Number of farmers
Proper weeding	60
Inspecting & roguing out unsuitable plants	20
Irrigating during drought	10
Timely planting	9
Proper land preparation including use of manure	5
Protect from pests	1
Cut, usually at 9am	1
Proper handling	1
Do not know	8

Table 3. The number of cuttings of cv New Kawogo collected from symptomless field plants in Uganda which indexed virus free.

Results of indexing	Numbers of cuttings
Mosaic symptoms (probably SPFMV)	11
Leaf curling (probably sweepovirus)	10
Mosaic symptoms + leaf curling (probably SPFMV + sweepovirus)	2
Symptomless (presumed healthy)	31
Total	54

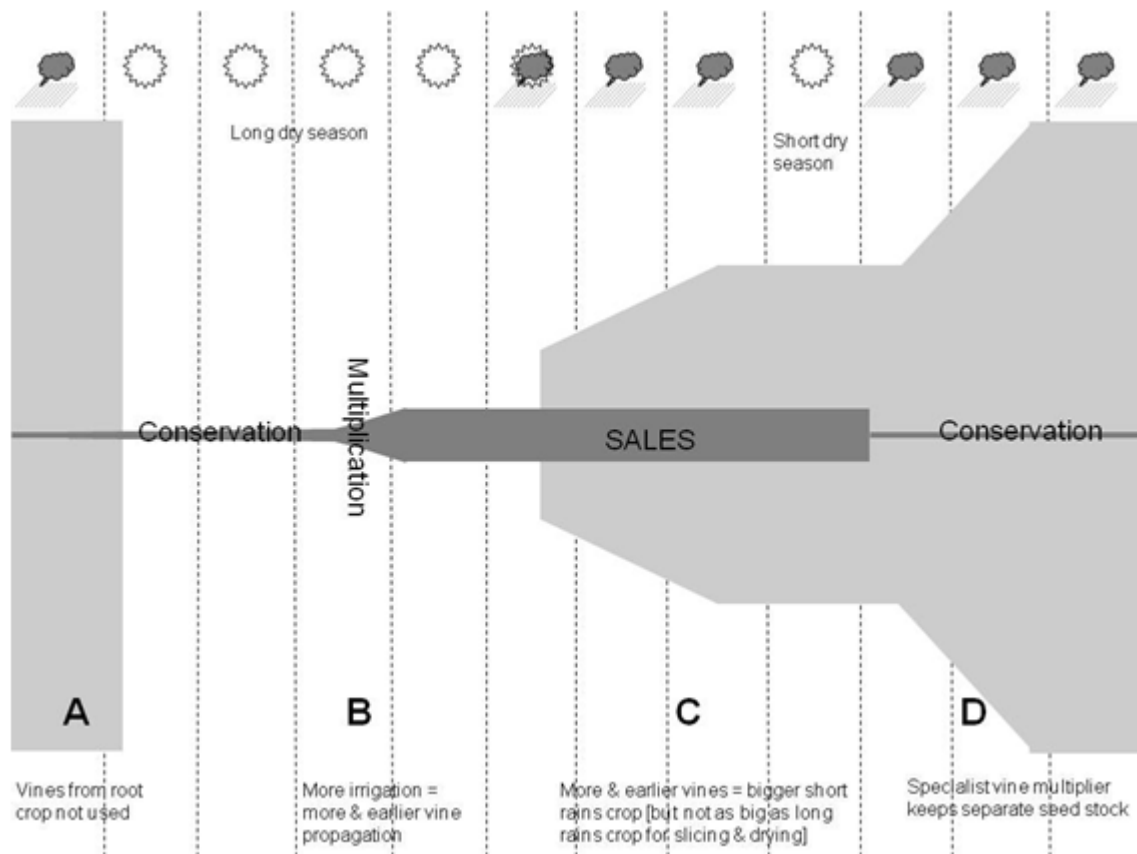


Figure 1. Some of the key advances needed to improve the seed system in areas with a prolonged dry season.

allows more planting material to be multiplied during the dry season. This means that adequate planting material becomes available at the start of the first rains, allowing larger areas to be planted early on and the crops to take benefit from the full duration of rains, gaining better prices and larger yields.

We have also developed a system, the Triple S System, whereby roots are stored in containers of dry sand in a shelter and then planted out during the latter part of the rains and encouraged to sprout early by watering (<http://sweetpotatoknowledge.org/seedsystem/training-communication-material/TRIPLE%20S%20SYSTEM%20ENGLISH.pdf/view>). This allows farmers to produce their own planting material at the start of the rainy season; it is probably mainly for small scale farmers wanting to obtain early planting material for their own use.

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