New Agriculturist on-line
Reporting Agriculture for the 21st Century

Reaching the full potential of sweet potatoes in East Africa

An electronic ‘sweet potato’ has been helping in the investigation to discover where, when and how sweet potatoes receive the damage that destroys their market value. Inserted into the centre of a sack of real sweet potatoes, the electronic version records every bump and squeeze to which they are subjected. This is just one of the techniques adopted by scientists at the Natural Resources Institute (NRI) and its partners who are working to extend the life of this useful, nutritious, but short-lived crop.

Extending shelf-life

credit: Quirien van Oirschot

Although sweet potato has many advantages its short shelf-life is a major constraint. In the USA, roots can be kept for up to one year when maintained at 15°C, but in tropical environments, where refrigerated storage is not economically feasible, roots will generally keep for only a few weeks. When subjected to normal marketing practices, this is reduced to 1-2 weeks. This means that fresh roots can be eaten only for 3 months of the year in most developing countries. Extending the shelf-life would allow people to sell and eat fresh sweet potato for a longer period of time, and would make the crop more marketable hence improving incomes of many of the poorest farmers.

Two strategies to extend the shelf-life of sweet potatoes have been investigated: firstly improving handling during transport and marketing and, secondly, selecting varieties with better storage characteristics.

credit: Debbie Rees

Bumping along in the back of a truck

In Tanzania sweet potato is now increasingly being marketed, and production has thus increased by 25 to 30% between 1989 and 1999. Production is centred in the Lake Zone, Southern Highlands and Eastern Zone. The commercial supply chain can involve transporting roots in sacks weighing up to 250 kg several hundred kilometres, by different methods of transport (cart, bicycle, truck, canoe and boat). The marketing system, however, is poorly developed with significant losses in quality; roots attract a significant discount (10 to 30%) when shrivelled, cut or broken and more if the roots are rotten or insect damaged. To investigate the constraints and critical points in the supply and marketing chain that lead to root damage, a novel ‘electronic sweet potato’ was developed that could be placed in the centre of a sack to continuously monitor impacts, temperature and humidity. The electronic sweet potato indicated that the most severe impacts occurred during unloading and loading from trucks and ships. However, skinning injury and breakage of roots was caused by continuous vibrational minor impacts occurring during transport. Owing to the fact that transport charges are usually imposed by the sack, sweet potatoes are usually transported in very large sacks, and indeed enormous efforts and a great amount of time is taken to pack as much as possible into a sack (see picture). The excessive weight and size of the sacks makes them difficult to man handle and transport effectively. However, surprisingly, halving the

sack weight did not reduce the damage, whereas transporting smaller quantities (20 kg) of roots and replacing sacks with locally available fibreboard boxes did significantly reduce transport losses.

Analogous to the use of haulm removal to improve skin set in potatoes it has also been shown that pruning of the plant canopy 14 days before harvest makes sweet potato roots more durable and less susceptible to post-harvest damage. Pre-harvest pruning had the added benefit of significantly improving shelf life by reducing the occurrence of rots.

Healing properties

Encouraging a change in the handling system for sweet potatoes is difficult for social and economic reasons but varieties with improved keeping qualities require no changes to growers' or traders' normal practices. Trials conducted in Kenya and Tanzania show that existing sweet potato cultivars differ greatly in their shelf-life, and that this depends primarily on their tendency to lose water. Most water is lost through the wounds which occur during harvesting and, as a consequence, more than 25% of root weight may be lost within two weeks. Like Irish potato tubers, sweet potato roots can heal their wounds although they do so less efficiently. There appears to be a large range among cultivars in their ability to heal in normal marketing environments. It is the varieties with efficient wound-healing that have long-shelf-life. In collaboration with the International Potato Center (CIP), NRI has been investigating the physiological and biochemical differences underlying healing characteristics and weight loss. An index of wound-healing efficiency has been developed and an investigation of the links between carbohydrate metabolism and wound-healing is on-going.

Successes in store

Working closely with farmers who bring practical experience, NRI scientists have also been developing better long term storage for sweet potatoes. Unlined, minimally ventilated stores that contain undamaged and disease free roots have so far given the best results but work continues. If farmers can store their sweet potatoes more successfully, as well as transport them more safely, they can take better advantage of out of season high prices or, if they prefer, simply enjoy eating them for longer.

Article submitted by Quirien van Oirschot, NRI.

*The research team consists of members from both local and international organisations; from the Natural Resources Institute, University of Greenwich, UK, the Lake Zone Agricultural Development and Research Institute, Tanzania, Tanzania Food and Nutrition Centre and the International Potato Center. For further information and to access recent outputs please visit www.nri.org.
For further information: CIP http://www.cipotato.org

Back to Menu