The Soft Touch: How postharvest handling affects the quality and shelf-life of sweetpotato roots

SASHA
Sweetpotato Action for Security and Health in Africa

SEP 2016

Across Kenya, supermarket customers are now buying delicious golden bread made with vitamin A boosting orange-fleshed sweetpotato (OFSP) purée. To meet this demand, a year-round supply of fresh sweetpotato roots is required, and can be achieved through a combination of staggered production and the storage of fresh OFSP roots to cover periods of low supply. However, careful postharvest handling is required to optimise the quality and shelf-life of these roots.

Fig. 1 NRI researcher Tanya Stathers selects OFSP roots for postharvest handling trial following soil removal with a wet brush and air drying (credit P. Muoki)

What is the problem?

A constant year-round supply of high quality OFSP roots is required to produce the OFSP purée -based nutritious golden bread now being purchased in supermarkets across Kenya. This constant supply of roots can be achieved through a combination of staggered production, purchase from different geographical areas, and the storage of fresh OFSP roots to cover periods of low supply. However, the current practices of rough handling and insufficient sorting of sweetpotato roots can lead to quality degradation and losses during storage.

What do we want to achieve?

Improved shelf-life and quality of fresh sweetpotato roots through avoidance of damage incurred during harvesting and postharvest handling and transport.

How are we going to make it happen, and where are we working?

Understanding of the harvesting and postharvest handling practices of OFSP fresh roots which smallholder farmers and processors could employ to improve root quality and shelf-life was very limited. To address this knowledge gap (Fig 1), we compared the effect of different harvesting, soil removal methods, and packaging containers on the keeping quality of freshly harvested OFSP roots in the Nyanza area of Kenya, where sweetpotato is widely commercialized.

We compared:

- two harvesting methods – a manual hoe and an ox-plough
- four methods for removing the soil from the freshly harvested roots - wet manual (washing roots by hand); wet brush (using a soft shoe brush in water to wash the roots); dry manual (rubbing the soil off manually); and no soil removal.
- three types of packaging container – polypropylene sacks, wooden crates and plastic crates (Fig 2).

In the trial, we used roots from the two main OFSP varieties, Kabode and Vita, being produced in the Homa Bay area of Kenya. Following the different harvest and postharvest handling treatments, the roots were kept in their packaging containers for 3, 7, 10 or 14 days in store rooms at ambient temperatures before sampling.

At sampling, a number of different criteria were assessed, including: weight change of over time; general appearance; root sponginess, shrivelling,

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rotting and damage; percentage out-turn of roots after peeling; peeling quality and speed (Fig 3).

Who are we working with?

These postharvest handling trials were designed and managed by researchers from the Natural Resources Institute (NRI) of the University of Greenwich, UK and the International Potato Centre (CIP) in Kisumu and Nairobi, in conjunction with staff at the Organi Ltd OFSP purée processing facility in Ringa, Kenya.

What have we achieved so far?

This trial has enabled us to start to understand how the different ways farmers harvest and then handle their sweetpotato roots affects their keeping and processing qualities. This knowledge is important for commercial sweetpotato puree processors who purchase OFSP roots from farmers and often need to then store them to secure their constant supply and quality as raw materials for their puree processing unit. Whilst it was anticipated that the washed roots kept in sacks would rot after 4-5 days, this did not happen. In this trial, weight loss over time was less pronounced for all soil removal treatments tested when the roots were kept in sacks, as opposed to in wooden or plastic crates for up to 14 days. At the start, those roots which had not been washed (e.g. those where any soil had been removed using the dry manual method, or those where no soil removal had occurred) were judged as having a better general appearance than the washed roots (i.e. they more closely resembled freshly harvested roots). Packing the roots in sacks as opposed to wooden crates led to a less rapid decline in their general appearance during this trial.

Fig. 2 Postharvest handling effects on root keeping quality trial in storage room (credit T. Stathers)

Fig. 3 Assessment of peeling quality of OFSP roots during postharvest handling trial (credit T. Stathers)

The results suggest OFSP purée processors should encourage the farmers they source roots from to manually wash the soil off the roots and then air-dry the roots, and sort them carefully to discard those with weevil damage or rotting before marketing them. In addition to enhancing the keeping qualities, there would also be economic benefits to the processor, due to the significant weight of the soil remaining on roots and costs of water and labour associated in washing.

The results also suggest that the washed and air-dried roots can then be packed into sacks for transport to the processing facility to help reduce the weight of packaging containers being transported. However, sacks should not be over-packed, and further study is needed of whether the same results occur when large quantities of fresh roots are being transported in trucks to the processing unit. On arrival at the factory the roots can be further sorted to determine: a) which need to go for immediate peeling and processing, b) which can be kept in sacks for up to 14 days, and c) which will be cured and then placed into long-term storage.

What's next?

Further work is planned to determine the impact of different postharvest handling techniques on fresh sweetpotato roots that will be cured and then stored longer-term (e.g. 2-3 months); and to better understand the practicalities around farmer adoption of improved sweetpotato postharvest handling practices.

SPHI
Sweetpotato for Profit and Health Initiative

The Sweetpotato for Profit and Health Initiative (SPHI), launched in 2009, seeks to improve the lives of 10 million African households in 17 SSA countries by 2020 through providing access to improved varieties of sweetpotato and their diversified use.

Support for the establishment of the Platforms and the holding of CoP meetings is provided by the Sweetpotato Action for Security and Health in Africa (SASHA) Project, led by the International Potato Center with over 26 collaborating partners.

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