SASHA
Sweetpotato Action for Security and Health in Africa

Orange-fleshed Sweetpotato Puree
Development & Utilization Continues to Grow

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Consumers find that OFSP bread made with shelf-stable puree is just as good as bread made with fresh puree. Shelf-storable puree (Fig. 1), even for limited periods of time, is expected to attract many more small- and medium-size bakeries and home cooks into using OFSP puree.

Fig. 1 Shelf-stable Orange fleshed sweetpotato puree with locally available preservatives stores up to 3 months with no refrigeration

What is the problem?

Biofortification is now a proven technology for addressing micronutrient malnutrition and improving livelihoods in Sub-Saharan Africa (SSA). Orange-fleshed sweetpotato (OFSP) is the posterchild of biofortification. CIP and its partners have been promoting OFSP in many SSA countries to enhance vitamin A intakes at the household level. However, consumers in many Sub-Saharan African SSA countries prefer sweetpotato varieties that have high dry matter (DM) content to eat as boiled or steamed roots. OFSP varieties with a range of DM contents exist, and those with lower DM are particularly suitable for processing into puree (steamed and mashed roots). Moreover, due to limited land size in many SSA countries, adoption of OFSP is accelerated when it can be considered a cash crop. Using OFSP as an ingredient in food processing is a use that creates market opportunities for farmers. Work done in Rwanda, Kenya and Malawi has showed that making products with OFSP puree is commercially viable. However, fresh OFSP puree is perishable and a value chain that depends on expensive cold chains is less than ideal. Moreover, particularly in countries with unimodal rainfall, year-round supply of roots to processors can be an issue. An economic way to store puree is key for achieving year-round availability and stored puree must be able to make acceptable products.

What do we want to achieve?

The widespread adoption of OFSP puree by food processors, especially bakers, creates market opportunities for rural farmers. OFSP puree is a versatile ingredient which also offers food processors many benefits, such as nutrition marketing and lowered production costs. We want to ensure food processors both in formal and informal sector utilize OFSP puree in many food products and that there is sufficient vitamin A in each product. Last year, CIP developed a shelf-stable OFSP puree with chemical preservatives (1% citric acid, 0.25% sorbate and 0.25% benzoate) together with vacuum packing that preserves the puree for 3-4 months at room conditions (<25C). Now the question is whether products made with preservative treated shelf-stable OFSP puree are similar to those made from fresh OFSP puree. The shelf-stable OFSP puree is potentially a game changing technology for SSA.

FANEL
Food and Nutritional Evaluation Laboratory

CIP
INTERNATIONAL POTATO CENTER
A CGIAR RESEARCH CENTER

CGIAR
RESEARCH PROGRAM ON
Roots, Tubers and Bananas

Fig. 2 OFSP buns fresh from the oven

Fig. 3 Learning how to bake bread with OFSP puree

How are we making it happen?

OFSP puree has been successfully adopted and commercialized by several bakeries in Kenya (Fig. 2), Rwanda and Malawi. CIP and the Natural Resources Institute (NRI) conducted trials on the development of shelf-stable OFSP puree and determined it shelf-life and safety. CIP and the University of Nairobi conducted studies to show the differences in physiochemical characteristics of bread made with shelf-stable OFSP puree and the consumer acceptance of those products. CIP and Euro-Ingredients Ltd (EIL) embarked on cooking demonstrations with local bakeries in Western Kenya and Nairobi (Fig. 3), showing food processors the advantages of using the fresh and the shelf-stable OFSP purees. In addition, CIP is also exploring how to work with North Carolina State University (NCSU) and the private company SinnovaTek in North Carolina (USA) to pilot a small-scale microwave processing technology for OFSP puree with shelf-life of 12-24 months for SSA.

What have we achieved so far?

CIP in partnership with NRI and the University of Nairobi showed that chemical preservatives (sorbate, benzoate and citric acid) together with vacuum packing can extend the shelf-life of OFSP puree by at least 3 months at temperatures below 25 ºC and that it was safe.

Research was undertaken to explore whether products made with shelf-stable OFSP puree when used with modified recipes have similar physiochemical properties and have the same consumer acceptance as those made from fresh OFSP puree. Treatments of shelf-storable OFSP puree of treatment 1 having 0.5% potassium sorbate, 0.5% sodium benzoate and 1% citric acid and treatment 2 having 0.2% potassium sorbate, 0.2% sodium benzoate and 1% citric acid, fresh puree and wheat flour were used to make bread with normal white bread and fresh OFSP puree-based bread acting as controls. The wheat flour substitution was done at two levels of 30% and 40%. The 9-point hedonic scale was used in the descriptive sensory analysis of the breads, 24 hours after their baking. The study found that all the bread samples were acceptable to the consumers as they had overall acceptability of above 5. The samples with the highest consumer preference were bread samples developed from white wheat flour, fresh puree and shelf-storable puree treated with 0.5% potassium sorbate, 0.5% sodium benzoate and 1% citric acid. The least preferred bread was developed from shelf-storable puree treated with 0.2% potassium sorbate, 0.2% sodium benzoate and 1% citric acid. Bread made by substituting wheat with 30% of fresh OFSP puree showed no significant differences in consumer preference to the bread developed from shelf-storable OFSP puree. Moreover, there was no significant loss of beta-carotene in shelf-storable puree up to 3 months; however, there was a significant drop-off by 4 months.

Unfortunately the preservatives used such as sorbate slow down the yeast activity, therefore the application of the shelf-stable is more relevant to pastries which do not require yeast, and for small bakeries with low turnover. The shelf-storable puree helps tackle the problem of seasonality in sweetpotato root production.

What's next?

CIP is now working with a hot fill technology to develop purees that can be stored in aseptic packaging without refrigeration or preservation. In addition, CIP is also collaborating with North Carolina State University and the private company SinnovaTek to develop a scaled down but equally effective microwave processing technology to produce aseptic OFSP puree for SSA. CIP is partnering with SinnovaTek on a grant from USDA to develop a low-cost microwave processing system for OFSP puree which could be operated using solar, diesel and/or alternative power sources. CIP is also working with food processors and the informal sector to incorporate OFSP puree in a diverse range of food products. We are also partnering with humanitarian organizations to develop rapid therapeutic foods using OFSP as a major ingredient in foods designed to serve areas affected by disasters, conflicts and emergencies.

CONTACT

Tawanda Muzhingi (CIP)
t.muzhingi@cgiar.org
Antonio Magnaghi
antonio@euroingredients.net