

Shelf-storable OFSP purée for bakery applications in Sub-Saharan Africa (SSA)

We have demonstrated that we can extend the shelf-life of OFSP purée to about 12 weeks at room temperatures of between 15-23°C by treating it with potassium sorbate (0.5%), sodium benzoate (0.5%) and citric acid (1%), combined with vacuum packing.



Fig 1. OFSP bread made from six week old purée (credit T. Muzhingi)

What is the problem?

Experience across many Sub-Saharan African (SSA) countries has shown that compared to using OFSP flour, it makes economic sense to use orange-fleshed sweetpotato (OFSP) purée (steamed and mashed) as a partial substitute for wheat flour in bakery products like bread, buns, muffins and cookies. In bread making, OFSP purée can replace between 35-55% of wheat flour requirements (Fig 1). However, its use is hampered because it is a wet and perishable product. For processors, it is most convenient to either make fresh purée whenever needed or to freeze it for future use. In developed countries, aseptic purée processing and packing extends the shelf-life of the purée. In poor countries, aseptic processing is beyond the reach of many processors. The ability to store OFSP purée at ambient conditions for more than three months will guarantee all year OFSP purée supplies to processors, even during off-seasons, thus ensuring uninterrupted supply of bakery products to consumers. Therefore, shelf-storable purée could potentially be the breakthrough technology for expanded use of OFSP purée in SSA.



Fig 2. Puree from unpeeled, cooked sweetpotato roots (credit T. Muzhingi)

What do we want to achieve?

The goal is to be able to store quality OFSP purée for six to 24 weeks without a cold chain and to ensure that the products made from stored purée are not markedly different to those from fresh purée.

Where are we working?

The OFSP purée storage trials are being conducted in Kenya at the Biosciences for east and central Africa (BecA) Research Hub at the International



CIP
INTERNATIONAL
POTATO CENTER
A CGIAR RESEARCH CENTER



Scaling up
Sweetpotato
through Agriculture
and Nutrition



Fig 3. Preparing wheat flour-OFSP puree dough at the bakery (credit T. Muzhingi)

Livestock Research Institute (ILRI) and at Organi Limited, a private sector processor based in Ringa, Homa-Bay County.

How are we going to make it happen?

In the Food and Nutritional Evaluation Laboratory (FANEL), opened in 2015, we have conducted research experiments to explore the use of chemical preservatives such as potassium sorbate, sodium benzoate, citric acid, and natural antimicrobial agents (nisin and natamycin) and their combinations, together with vacuum packing to extend the shelf-life of OFSP purée at ambient conditions in SSA.

Who are we working with?

We are working with Organi Limited, Tuskys Supermarkets, the Natural Resources Institute (NRI-Greenwich University, UK) and Euro-Ingredients Limited.

What have we achieved so far?

Our results indicate that the shelf-life of OFSP purée treated with potassium sorbate (0.5%), sodium benzoate (0.5%) and citric acid (1%) and vacuum packed (Fig 4) can be extended to about 12 weeks at room temperatures of between 15-23°C. Our research also shows that chemical preservatives sorbate, benzoate and citric acid are the most cost effective options (US\$0.04/kg) compared to the natural antimicrobial preservatives (natamycin and nisin) (US\$4.00/kg).

What's next?

We are currently working on determining the differences between bakery products made with fresh OFSP purée and OFSP purée treated with

preservatives and stored for one, two, four, eight and 16 weeks. Preliminary results indicate that sorbate at high levels affects yeast during the dough development process of bread making (Fig 3). We are, therefore, working with other baking ingredients to improve the dough development in OFSP purée treated with sorbate. We are also testing making OFSP purée using unpeeled roots (Fig 3 and 4). Our preliminary studies indicate that there is no difference in bread quality made with OFSP purée from unpeeled OFSP roots and peeled OFSP roots. Instead, use of unpeeled OFSP roots make the OFSP purée making business more profitable by increasing purée yield and reducing the labor required for peeling. Unpeeled OFSP puree also has added nutritional value because the sweetpotato skin is high in mineral content, fiber and phytonutrients.



Fig 4. Vacuum packing the OFSP puree (credit T. Muzhingi)

Partners:

- Antonio Magnaghi, Euro-Ingredients Limited
- Natural Resources Institute (NRI), Greenwich University, UK
- Organi Limited, Ringa, Homa-Bay, Kenya
- Tuskys Supermarkets Limited, Nairobi, Kenya

CONTACT

Tawanda Muzhingi (CIP)
T.Muzhingi@cgiar.org

Jan Low (CIP)
J.Low@cgiar.org