7th Annual SPHI Sweetpotato Meeting.

Addis Ababa, Ethiopia

Scaling up Sweetpotato through Agricultu and Nutrition

Sweetpotato Action for Security and Health in Africa

SASHA





Progress in Developing Shelf-Storable Puree and OFSP Bread Improvement

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SUSTAIN

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Puree



Puree |pyoo rāpyoo rē| (also purée)

- a smooth, creamy substance made of liquidized or crushed fruit or vegetables: *stir in the tomato puree*.
 ORIGIN:
- early 18th century: from French *purée*, literally '**purified**,' feminine past participle of *purer*.

SOURCE:

• According to Siri (Apple Inc.), Samsung Note 7 Exploded

Background



- The growing demand for innovative and healthy foods has generated a new bread market worldwide.
- The use of OFSP flour as a substitute for wheat flour is **not cost-effective**, the use of OFSP in puree form is **economically advantageous**.
- The major bottleneck to expanding use of puree compared to flour is the inconvenience of having to prepare and store the puree.

OFSP Puree Storage Practices



- Aseptic Processing using Continuous Flow Microwave (Gold Standard). (NCSU)
- Canning
- Cold Storage (Freezing), current practice
- Preservatives
 - Natural (Natamycin and Nisin)
 - Chemical (Sorbates and Benzoates)

Development of Shelf-Storable OFSP Puree

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There is potential to store puree without refrigeration.

- To determine the storage life of this puree and in particular, the safety of the product as it ages.
- To demonstrate and ensure the nutritional and bread quality attributes of stored OFSP puree
- To determine the cost effectiveness of shelf storable puree to production, transportation and Storage

OFSP Puree Storage Studies



To determine the effect of different preservative and preservative combination and vacuum packing on the quality of OFSP puree and baked products.

- Hurdle technology is a method of ensuring that pathogens in food products can be eliminated or controlled. This means the food products will be safe for consumption, and their shelf life will be extended.
- Hurdle technology usually works by combining more than one approach. These approaches can be thought of as "hurdles" the pathogen has to overcome if it is to remain active in the food. The right combination of hurdles can ensure all pathogens are eliminated or rendered harmless in the final product.

Shelf-Storable OFSP Puree





OFSP Puree Storage



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- Treated OFSP puree samples were stored at ambient conditions in Kenya and Temperature monitoring (15-23C).
- Treated OFSP puree samples were stored at ambient conditions in fresh root storage room at Organi Ltd, Ringa Kenya and Temperature monitoring (15-23C).

Storage of OFSP puree 12 weeks Ambient conditions (15-23C)



0.5% potassium sorbate, 0.5% sodium benzoate and 1% citric acid with vacuum packing (VP).

- No fermentation, pH <4.2
- No significant change is beta-carotene content
- No significant change is the color
- Use of chemical preservatives has no effect on the beta-carotene content and color
- Cost effective US\$0.04 per kg
- Final Product was microbially sterile after baking

Stored OFSP Puree for Bakery Applications

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- Hypothesis 1:
 - Stored and preservative treated OFSP puree makes bakery products with same quality as fresh OFSP puree.
- Hypothesis 2:
 - Potassium sorbate and Sodium Benzoate (chemical preservatives) have no effect on yeast activity and dough development



Shelf-Stored OFSP Puree Bread Trials

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Shelf-Storable OFSP Puree Bread Trials





Compared to Fresh OFSP Puree Bread

- 1) Taste =
- 2) Color =
- 3) Texture =
- 4) Odor =
- 5) Bread volume \neq
- 6) Shelf-life ↑

Effects of Sorbate on Dough



- Chemical preservatives in shelf-storable puree increased the proofing/fermentation time from 1hr to 5hrs.
- Sorbates retard yeast activity and extend fermentation or proofing times of yeast leavened products.
- Dough conditioners will improve the dough development in the presence of sorbate

High Fiber OFSP Puree



- Unpeeled sweetpotato increase the productivity of OFSP puree production from 70% yield to 95%.
- Unpeeled sweetpotato puree is more nutritious by addition fiber, antioxidants and minerals found in the skin
- Savings on labor, time and production cost and waste management.



Development of High Fiber Puree

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Unpeeled OFSP Puree Bread

- Bread made with unpeeled OFSP roots was not different from bread made from peeled roots OFSP puree in terms of taste, color, and texture.
- The baking processing of using unpeeled OFSP roots and peeled OFSP roots puree was the same.



Research steps



- Development of an optimized recipe for OFSP sorbate treated puree for bread applications
- Optimize the OFSP puree formulations for the volume/size of products
- Shelf-life studies of OFSP bread versus standard white bread
- Characterize the functional ingredients and nutrition of OFSP puree bread



Challenges



- Its difficult to store OFSP puree at Temperature above 25C, even with preservatives. (optimal 15-23C)
- Good Manufacturing Practices (GMPs) and Good Agricultural Practices (GAPs) prerequisite for achieving shelf-storable OFSP puree.
- OFSP varieties (Shape, Size & Skin color)