

# Popular Orange-fleshed Sweetpotato Products in Rwanda: Biscuits and Doughnuts

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Golden Power Biscuits and *mandazi* (fried doughnuts) have emerged as the top products made with freshly prepared orange-fleshed sweetpotato (OFSP) purée at Urwibutso Enterprises. Biscuits require OFSP varieties with higher dry matter contents than doughnuts do.

The recipes below were modified recipes of products already being produced by Urwibutso Enterprises. Food scientists at the Rwanda Agricultural Board and Antonio Magnaghi of Euro Ingredients Ltd sought to maximize the use of orange-fleshed sweetpotato purée as a partial substitute for wheat flour in the existing products. Since sweetpotato does not contain gluten, it is not possible to substitute 100% of the wheat flour. Urwibutso Enterprises makes the OFSP purée on their premises. They typically make and use the purée on the same day, occasionally freezing it for future use. Any waste material (i.e. peels) is given to their pig rearing operation.

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Fig. 1 Machine making quality OFSP purée (credit K. Sindi)

## A. Making OFSP purée

**Variety selection.** The flesh color of OFSP varieties should be medium to deep orange to ensure sufficient beta-carotene (pro-vitamin A) in the final product. For biscuits, varieties with dry matter content of 32% and above (like *Carceapedo* or *Vita*) are preferred. For *mandazi* or juice, lower dry content varieties (25-28%) like *Gihingamukunga* are preferred and cook faster. It is very important that roots are harvested when they are mature. Roots that have “overstayed” in the ground have lots of fibers that cannot be converted into purée.

**Cooking and Peeling.** At Urwibutso, roots are cooked, then peeled<sup>1</sup>. Cooking the variety *Gihingamukungu* takes 30 minutes with 10L of water and one bundle of firewood (each bundle 15-20 kgs). Higher dry matter content varieties take 1 hour to cook, using 20 liters of water and 2 bundles of firewood. It takes one hour

for 2 people to peel 100 kilograms (kgs) of cooked roots.

**Making the Purée.** In small-scale operations, OFSP purée can be made by mashing by hand. Larger quantities of higher quality purée require a stainless steel machine that turns the cooked root into “strings of spaghetti” (Fig. 1)<sup>2</sup>. This product easily mixes in with the other ingredients. It takes 15-30 minutes to make the purée from a 50 kg batch of roots. On average, 100 kgs of fresh root produces 70 kgs of OFSP purée (30% loss).

<sup>1</sup> It is imperative that the roots are washed very well particularly when they are cooked before peeling. From a food safety standpoint, it is better to wash and peel before cooking. This, however, if not carefully done can result in higher percentage than desired of the root being removed with the peel. Peeling machines are an alternative, but we did not explore this in Rwanda due to a desire to maximize job opportunities for the local community.

<sup>2</sup> The equipment for making purée and biscuits is made by Proteo Due, an Italian company. Contact Euro Ingredients Ltd for quotes.

### Key Partners:

- Rwanda Agricultural Board (RAB), co-lead
- Urwibutso (SINA) Enterprises, private sector agro-processor
- Euro Ingredients Ltd, Kenya
- Catholic Relief Services (CRS) Rwanda international NGO
- Imbaraga, local NGO specializing in agricultural produce marketing
- Young Women Christian Association of Rwanda (YWCA), local NGO
- Kigali Institute of Science and Technology, Food Science & Technology (KIST)

## B. Recipe for the Golden Power Biscuits

**Table 1. Ingredients (amounts and cost as of December 2014) for a batch of 1404 Golden Power Biscuits.**

Ingredients	Quantity in recipe	Cost/unit (Rwanda Franc)	Total cost (Rwanda Franc)	Total Cost (USD)
Wheat Flour	8 kg	680	5,440	8.37
OFSP purée	8 kg	250	2,000	3.08
Blue-band margarine	4 kg	1,600	6,400	9.85
Sugar	4 kg	540	2,160	3.32
Bicarbonate soda	0.1 kg	17	17	0.03
Baking powder	0.2 kg	135	135	0.21
Vanilla flavor	25 ml	917	458	0.71
Eggs	55 units	80	4,400	6.77
Total cost of ingredients			21,010	32.32
		Cost per biscuit	15	0.02



### Preparation procedures.

1. Weigh all ingredients (Table 1)
2. Beat the eggs together in a bowl
3. In the mixer, add the OFSP purée, margarine, sugar, bicarbonate of soda, vanilla and the beaten eggs
4. Mix all the ingredients in the mixer for 10 minutes
5. Add the wheat flour and baking powder into the mixer
6. Mix everything in the mixer for an additional 5 minutes
7. After mixing the resultant dough is placed into the biscuit dropper machine for molding and shaping (Fig. 2). 45 biscuits fit on the standard baking sheet. The number of baking sheets prepared will depend on the oven capacity.
8. The baking sheets are placed in the oven pre-heated to 225 °C and cooked for 25 minutes. The average weight of the final biscuit is 46 grams (Fig. 3)

## C. Recipe for OFSP Fried Doughnuts (Mandazi)

**Table 2. Ingredients (amounts and cost as of December 2014) for a batch of 500 mandazi**

Ingredients	Quantity used	Cost per unit (Rwanda Franc)	Total cost (Rwanda Franc)	Total Cost (USD)
Wheat flour	25 kg	680	17,000	26.15
OFSP Purée	7 kg	250	1,750	2.69
Sugar	3 kg	540	1,620	2.49
Salt	0.2 kg	260	52	0.08
Baking powder	0.1 kg	135	135	0.21
Yeast	0.25 kg	500	125	0.19
Cooking oil in product	0.5 liter	1,160	580	0.89
Water	7 liters			
Cooking oil for frying	8 liters	1,160	9,280	14.28
Total costs			30,542	46.99
		Cost per mandazi	61	0.09

### Preparation procedures.

1. Add OFSP purée into the mixer or beater and beat into a smooth consistency for about 10 minutes
  2. Weigh the OFSP purée after obtaining the right consistency
  3. Weigh all the ingredients (Table 2) and add all, including the water, into the mixer and mix for 15 minutes
  4. Take out the dough from the mixer and flatten the dough with rollers
  5. After flattening the dough, cut it into cubes of equal size
  6. The cut dough cubes are left to rise for another 10-15 minutes
  7. Add the risen, cut dough into a fryer with boiling cooking oil (temperature 270°C)
  8. Fry the dough for about 10 minutes, until the pieces have a dark golden color outside
- From start to finish it takes about 3 hours to make one batch of *mandazi*, and several batches can be prepared simultaneously. The average weight of small *mandazi* is 84 grams (Fig. 4).



Fig. 2 Biscuits being shaped and formed (credit J. Low)

Fig. 3 Youth at Kigali Fair enjoying Golden Power Biscuit (credit J. Low)

Fig. 4 *Mandazi* ready to eat (credit M. Randolph)

### CONTACTS

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