



MANUAL FOR PRODUCTION AND VALUE ADDITION TO HIGH QUALITY SWEETPOTATO FLOUR



Prepared by
Papa Toah Akonor, Charlotte Oduro-Yeboah, Evelyn Buckman and Alice Paddy

CSIR-FOOD RESEARCH INSTITUTE
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FOREWARD

Agricultural research technology development, adoption and dissemination are intricately related to agricultural development, national agricultural productivity and food security. The adoption of new innovations within the agriculture sector has the overall impact to boost productivity, increase demand for employment and improve incomes through the utilization of the innovations within the sector.

To ensure that research responds to the need of farmers to upsurge their productivity and eventually improve their livelihood, the Council for Scientific and Industrial Research (CSIR) in collaboration with Directorate of Agricultural Extension Services (DAES) has developed training manuals to respond to key farmer constraints emanated from the 2017 Research – Extension – Farmer Linkage Committee (RELC) Planning Session. The resultant manuals have been duly validated by all stakeholders along the agricultural value chain.

This training manual is intended to providing technical guidance for field Officers to backstop the Regions and Districts in extension delivery.

With the help of the Government of Canada under the component 3 of the Modernizing Agriculture in Ghana (MAG), the CSIR and DAES received support to repackage agricultural research to strengthen agricultural extension services and improve agricultural productivity. A key aspect is the extension material development and dissemination for effective extension services delivery.

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INTRODUCTION

Sweetpotato is widely grown in Ghana. It is an important source of energy and other nutrients such as vitamin A and mineral salts (Low *et al.*, 2007). Traditionally, it is cooked or fried and eaten with stews or hot pepper sauce in most areas, while in others the roots are chipped and dried. Heavy losses of the crop occur every season because there are only few uses. In order to overcome this problem Sweetpotato may be processed into flour, which is used to make other food products. In Ghana, there are many Sweetpotato varieties, and these include orange, cream and purple fleshed Sweetpotato. These varieties of Sweetpotato may be used in flour production.

Figure 1: Types of sweet potatoes



Picture 1: Orange fleshed Sweetpotato



Picture 2: Purple-fleshed Sweetpotato



Picture 3: Cream fleshed



Picture 4: Purple skin Sweetpotato

SWEETPOTATO FLOUR

Sweetpotato roots serve as the raw material for the production of Sweetpotato flour. The raw material used must be of high quality to ensure good quality flour. The steps for production of high quality Sweetpotato flour is shown in the flow diagram below.

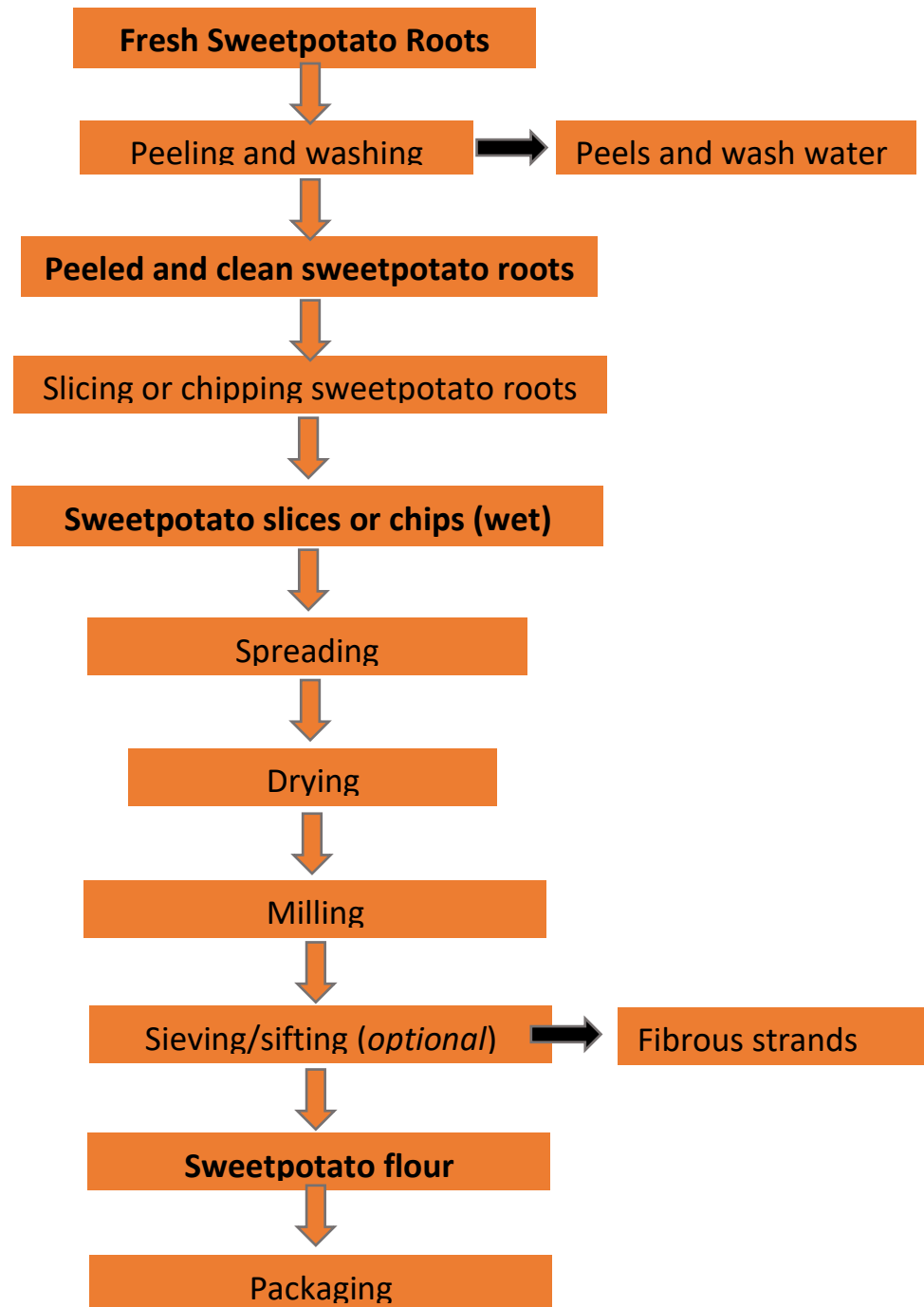


Figure 2: Flow diagram for High quality Sweetpotato flour production

Equipment needed for High quality Sweetpotato flour production

- a.** Stainless steel knives
- b.** Hand-held peeler
- c.** Plastic buckets and bowls
- d.** Stainless steel Chipping machine
- e.** Solar dryer or mechanical dryer
- f.** Hammer mill or disc attrition mill
- g.** Sealing machine (Impulse sealer)
- h.** Packaging materials

PICTURES OF EQUIPMENT



Picture 1: Stainless steel



Picture 3: Plastic bucket



Picture 5: Mechanical dryer



Picture 7: Sealing machine



Picture 2: Hand-held peeler



Picture 4: Stainless steel slicer/ chipping machine



Picture 6a: Disc attrition mill



Picture 6b: Hammer



Picture 8: Packaging materials

Processing of High Quality SweetPotato Flour

The steps for processing high quality Sweetpotato into flour are shown below:

Step 1: Raw material

- Select mature, healthy and fresh Sweetpotato for flour production.



Do not use

- Rotten/bad tubers
- Immature tubers
- Over-aged tubers



Step 2: Washing and peeling

- Wash whole Sweetpotato with clean water with sponge to remove dirt and other impurities.





Step 3: Peeling

- Peel Sweetpotato with clean stainless steel knife or hand-held peeler into a bowl of water to prevent discoloration.
- Peel carefully to reduce losses (not to remove useful parts) for improved yield.



Step 4: Washing and slicing

- Wash immediately after peeling.
- Use clean water for washing.
- Wash well to ensure that Sweetpotato is completely clean.

Note: Peeled Sweetpotato must be immersed in 0.5 % sodium meta bisulphite/chlorine/salt water before slicing to avoid browning.



- Cut Sweetpotato into thin slices of 2-3 mm thick into a bowl containing water.
- Use a sharp stainless-steel knife.



- After peeling, the Sweetpotato roots may be reduced into thin slices using a stainless-steel chipping machine.



Step 5: Drying

- Drain and arrange the sliced Sweetpotato on drying racks/trays.
- Transfer to a Mechanical dryer
- Dry until flakes are crispy (when flakes break easily with the least pressure).



Step 6: Milling

Mill dried slices using a stainless-steel hammer mill. Disc attrition mill (corn mill) may also be used.



Step 7: Sieving

- Sieve into fine flour.



Step 8: Packaging

- Weigh and package the fine high quality Sweetpotato flour into food grade polythene or polypropylene bags.
- Seal airtight with an impulse sealer.
- Label the package
- Store in a cool dark place, away from water.



Utilization of High Quality SweetPotato flour

High quality sweet potato flour may be used as a raw material in processing a wide range of food products, including pastries (e.g. cake, biscuits, chips, *bofrot*, bread, etc.) in combination with wheat flour. The flour may also be used in the production of noodles and as a coating during frying.



Pan cake



Bread



Bofrot



Noodles

Figure 3: Sweetpotato flour products

Quality Measures

High quality sweet potato flour must be of very good quality and safe for human consumption. Also, the quality of the flour must be consistent and must meet the required standards. In order to achieve this, the following quality measures must be observed before, during or after production of flour:

1. Processing must be done in a clean environment.
2. All equipment, buckets, bowls, knives and contact surfaces used for processing must be clean.
3. Good personal hygiene MUST be observed during food processing.
4. Use appropriate working garments (clothing, headgear, hand gloves) and ensure that open sores/cuts are covered during processing.
5. Sweetpotato selected for processing must be fresh, clean and wholesome. They must not show signs of diseases or rot.
6. Be sure to wash the Sweetpotato effectively before and after peeling.
7. Use clean water for washing.
8. Drying must be done, using a mechanical dryer.
9. Packaging must be done carefully not to contaminate the flour.
10. Flour must be kept in a cool dry place, away from rodents and pest.
11. All processing equipment, bowls, buckets, knives and contact surfaces must be properly and thoroughly cleaned after processing. These must be kept clean at all times.
12. All waste products (peels, wash water, etc.) from processing activities must be properly disposed.

Specification for High Quality SweetPotato flour

Product	Specification	Value
HQCF (High Quality sweet potato Flour)	odourless	
	Starch content	>60%
	Moisture content	12 %
	Total Ash (dry matter basis)	3.0g/100g
	Acid insoluble ash, Maximum by mass	0.15%
	Crude fibre (Maximum dry matter basis)	5.0g/100g
	Pasting temperature	-
	Cook Paste viscosity	-
	Total Cyanogens (CNP)	-
	pH	4.9 – 7.0
	Particle size	250μ

References

Low JW, Arimond M, OFSman N, Cunguara B, Zano F, and Tschirley D. (2007). A Food-Based Approach Introducing Orange-Flesh Sweet Potatoes Increased Vitamin A Intake and Serum Retinol Concentration in Young Children in Rural Mozambique. *J. Nutr.* **137** (5).

Coordinated By:

Mr. Emmanuel Agyei Odame, Ms. Prospera Anku, Prof. Paa Nii Johnson and Dr. Seth Manteaw

For further information please, contact RELC Unit, DAES – MoFA and CSIR -FRI