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Federal Ministry of Agriculture and Rural Development.

## ATASP-1 Outreach Program

# Training Manual on Product Development for Cassava

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# Introduction

Cassava can be processed into livestock feed, industrial raw materials, and a wide range of food products and snacks (Fig. 1). Some of the main objectives of processing cassava are to:

- Improve on its palatability.
- Provide a variety of products derivable from it.
- Improve on storage and extended shelf life.

## Cassava Products

- The most important food into which cassava is converted is a granular free-flowing product (roasted granules of the dried wet mash) called gari.
- Other food forms produced from cassava roots include odorless cassava *fufu*, flour, *lafun*, *abacha*, *nsisa*, *akpu*, *fufu*, starch, and tapioca (produced from starch).
- Salad cream from cassava starch. Cassava root is processed into cassava root meal (CRM) containing more than 65% starch and a safe level of cyanide (less than 50 mg/kg). CRM has been used as a substitute for maize at 50% level and at 70% level, respectively, production of feeds for layers and broilers.

The recipes compiled in this manual comprise food products made from fresh cassava roots, cassava starch, and high quality cassava flour. We hope that these recipes will find application in homes to diversify cassava food products available to households for food security; and for small-scale enterprises for income and employment generation. The recipes here are adapted from a previously published work.

## Processing entry points

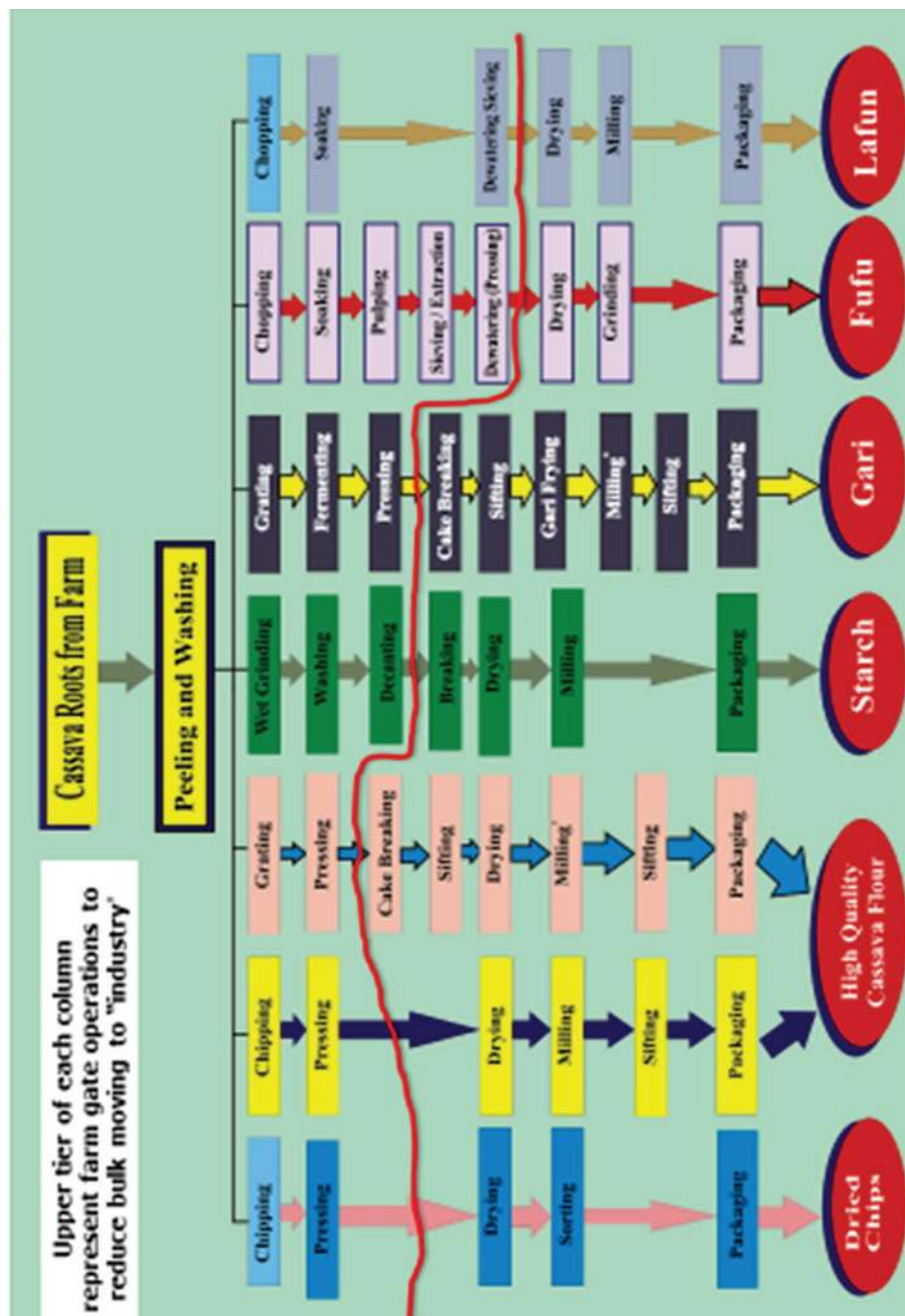


Figure 1. Processing entry point for cassava product development (Courtesy Dr. R U. Okechukwu).



# High quality cassava flour

2

High quality cassava flour (HQCF) has been produced for composite cassava products in the proportion of 20% cassava: 80% wheat for making bread and other confectioneries which include chin-chin, bread, meat/fish pies/rolls, strips; sausage rolls, queen cakes, biscuits, doughnuts, buns, fritters, and croquettes. Only sweet cassava should be used for all the recipes prepared from cassava flour and starch, e.g., fritters, croquette doughnuts, crisps, pancake, meat balls, and meat cake to avoid the harmful effect of cyanide. The steps involved in HQCF production are presented in Figure 2.



**Figure 2. High quality cassava flour production process.**

## Short Crust Pastry



### Ingredients

Cassava flour, sifted	2 cups	200 g
Margarine	¼ cup	50 g
Egg	1 medium	45 g
Salt	1 level teaspoon	5 g
Baking powder	1 teaspoon	5 g
Water	¼ cup	62 ml

### Method

1. Weigh out 150 g, ¾ cup of cassava flour in a bowl.
2. Add margarine, salt, and mix. Keep aside.
3. Put the remaining 50 g cassava flour in ¼ cup of boiling water, remove from heat, and fold into the water 3 times.
4. Add the mixture to the flour that has margarine and salt. Mix thoroughly with fingertips, until the mixture resembles breadcrumbs.
5. Whisk egg and add to the mixture.
6. Mix with finger tips to obtain stiff dough, which leaves the sides of the bowl.
7. **Use the pastry for any recipe, which requires short crust pastry such as meat pie and doughnut.**

## Cassava Root Fritters

### Ingredients

Cassava root, grated	2 cups	450 g
Onions, grated	1 small	30 g
Eggs, whisked	2 medium	90 g
Salt	1 teaspoon	5 g
Vegetable oil	3 cups	750 ml

### Method

1. Mix grated cassava roots, onions, and egg thoroughly.
2. Add salt to taste.
3. Scoop into hot oil, using spoon or clean hand.
4. Deep fry until golden brown.



## Cassava Croquettes



### Ingredients

Cassava root, finely grated	5 cups	1125 g
Coconut, finely grated	2½ cups	150 g
Salt	2½ teaspoons	12.5 g
Meat filling	1 cup	250 g
Vegetable oil	3 cups	750 g

### Method

1. Mix grated cassava and coconut.
2. Add salt to taste.
3. Take a tablespoon of the mixture, flatten on palm, and put a teaspoon of meat filling in the center.
4. Cover with the mixture so that the meat filling does not come out during frying.
5. Roll into ball.
6. Deep fry in hot oil until golden.

## Cassava Root Doughnuts



### Ingredients

Cassava root, grated, de-watered	5 cups	1125 g
Banana, ripe, mashed	2 cups	250 g
Sugar, granules	¼ cup	50 g
Yeast	2 teaspoons	10 g
Vegetable oil	3 cups	750 ml

### Method

1. Add sugar, yeast, and mashed banana to the grated cassava mash.
2. Mix together.
3. Cover and set aside for 1 hour.
4. Heat vegetable oil.
5. Mold mixture into balls (2 cm diameter) and deep fry until golden brown.
6. Serve hot.



## Cassava Crisps



### Ingredients

Cassava root, grated, dewatered	2 cups	450 g
Salt	½ teaspoon	2.5 g
Bouillon cube	½ cube	2 g
Vegetable oil	3 cups	750 ml

### Method

1. Take 2 cups (450 g) of grated dewatered cassava mash.
2. Add salt and bouillon cube, mix together.
3. Knead well to bind.
4. Divide into desired portion and make a flat shape of each portion using palms.
5. Deep fry in hot oil until golden brown.

## Cassava Pancake



### Ingredients

Cassava root, grated, dewatered	2 cups	450 g
Ginger (chopped)	½ teaspoon	2 g
Egg, whisked, beaten	2 medium	90 g
Sugar	¼ cup	50 g
Vegetable oil	1 tablespoon	15 ml

### Method

1. Add 2 cups of grated, dewatered cassava mash.
2. Add ginger, eggs, and sugar.
3. Mix thoroughly.
4. Spread a little drop of vegetable oil on the frying pan and put on low heat.
5. Scoop paste in the heated pan and allow baking, turn each side until both sides are evenly brown.
6. Repeat until all the pastes are baked.
7. Serve with coffee or tea as breakfast food.

## Cassava Meat Balls



### Ingredients

Cassava root, grated, dewatered	2 cups	450 g
Minced meat, cooked	1 level cup	87.6 g approx.
Pepper, chopped	1 large	10.6 g approx.
Onions sliced	1 medium	20.5 g approx.
Curry powder	1 level teaspoon	2.5 g
Salt	1 level teaspoon	5 g
White pepper	1 level teaspoon	1.5 g
Vegetable oil	3 cups	750 ml

### Method

1. Mix grated cassava mash, minced meat, salt, white pepper, and curry powder thoroughly.
2. Add the sautéed onion and pepper.
3. Mix to form a smooth dough.
4. Cut into desired size and mold.
5. Deep fry until brown.
6. Serve hot.



## Cassava Meat Cake



### Ingredient

Cassava mash, cooked	2 cups	250 g
Minced meat, cooked	1 cup	100 g
Bread crumbs	¼ cup	50 g
Garlic crush	1 clove	2.5 g
Onions, chopped	1 medium	50.6 g
Pepper, dry ground	1 teaspoon	1.5 g
Salt	1 teaspoon	5 g
Egg	1 small	26.3 g
Vegetable oil	3 cups	750 g

### Method

1. Mix cooked, mashed cassava; minced meat; garlic; onion; pepper; and salt to form a very thick dough.
2. Roll out on a flat board to about 1 cm thick, cut out into desired shapes.
3. Cut in desired portions and drop each in whisked egg, then coat with crushed breadcrumbs.
4. Deep fry in hot oil until brown.

## Cassava French Fries



### Ingredients

Cassava root, sweet variety	1 medium	
Vegetable oil	3 cups	750 ml

### Method

1. Peel and wash cassava root.
2. Cut into chips of finger size, using a knife or French fry cutter.
3. Deep fry in oil at medium heat until golden brown.

## Cassava Bread (100% Cassava)



### Ingredients

Cassava flour	2 cups	200 g
Sugar	2 teaspoons	10 g
Salt	½ teaspoon	2.5 g
Yeast	1 teaspoon	5 g
Margarine	1 heaped tablespoon	20 g
Eggs	2 small	52.6 g
Water	2 small	52.6 g
Water	¼–½ cup	83–125 ml

### Method

1. Weigh all the dry ingredients into a mixing bowl.
2. Add margarine and mix thoroughly for about 1 minute.
3. Whisk eggs thoroughly and add.
4. Add water gradually (83–125 ml, depending on the cassava flour) and mix for another 10 minutes at high speed. Take up the batter with a spatula and allow an easy drop.
5. Pour the batter into a greased baking pan, put in a warm place and allow to ferment for about one hour until the size doubles.
6. Bake at 200 °C (395 °F) until golden brown crumb color is observed.
7. Remove the bread from the oven, remove the bread from the pan, and allow to cool before slicing or wrapping.

## Composite Flour Bread (Wheat (95%) + Cassava (5%))



### Ingredients

Cassava flour	1 cup	50 g
Wheat flour	9 cups	950 g
Sugar	10 teaspoons	50 g
Margarine	5 tablespoons	100 g
Yeast (instant)	5 teaspoon	25 g
Salt	2½ level teaspoons	12.5 g
Water	2–3 cups	500–750 ml

### Method

1. Weigh all the ingredients except water into a mixing bowl.
2. Mix thoroughly.
3. Add water and mix until a soft dough, which can easily be handled is obtained.
4. Knead until smooth.
5. Cut into desired sizes and shape and put in a well-greased bread pan.
6. Allow to rise until size doubles.
7. Bake at 200 °C (395°F) for 15–20 minutes or until the crust is brown.
8. Remove pan from oven, remove the bread from the pan, and allow to cool before slicing or wrapping.

## Cassava Meat Pie



### Ingredients

Shot crust pastry

Meat filling

### Method

1. Make short crust pastry.
2. Roll out to about  $\frac{1}{4}$  inch (6–7 mm) thickness on a floured board.
3. Cut into circular shape with a big cutter.
4. Fill one side of the circle with the meat filling and fold the other side over. Press the edges with a fork to close firmly.
5. Brush the surface with beaten egg white and bake in a hot oven at 175 °C (350 °F) for 30 min.

*Note: The dough can be fried instead of baked to make fried meat pie.*



## Cassava Sausage Rolls



### Ingredients

Short crust pastry		120 g
Sausage meat		240 g
White pepper	1 teaspoon	5 g
Black pepper	1 teaspoon	5 g
Curry powder	½ teaspoon	1.25 g

### Method

1. Make short crust pastry.
2. Roll out pastry in a floured board of 1 cm thickness.
3. Divide pastry into desired pieces of cylindrical shape.
4. Season sausage meat with white pepper, black pepper, and curry to taste.
5. Put the sausage meat on one side and fold over the other side of each piece.
6. Close edge firmly with fork.
7. Brush the surface with beaten egg white to glaze the pastry.
8. Bake in a hot oven at 175 °C (350 °F) for about 30 min.

## Cassava Cookies



### Ingredients

Cassava flour	2 cups	200 g
Margarine	$\frac{1}{2}$ cup	100 g
Sugar	$\frac{1}{4}$ cup	50 g
Baking powder	1 teaspoon	5 g
Vanilla essence	1 teaspoon	5 ml
Salt	$\frac{1}{2}$ teaspoon	2.5 g
Nutmeg (grated)	$\frac{1}{4}$ teaspoon	1.5 g
Water	$\frac{1}{8}$ – $\frac{1}{4}$ cup	30–61 ml

### Method

1. Weigh all the dry ingredients in a bowl.
2. Mix thoroughly.
3. Add margarine and mix.
4. Add water gradually to make a stiff dough.

## Cassava Coconut Biscuits



### Ingredients

Cassava flour	1 cup	100 g
Sugar	¼ cup	50 g
Margarine	¼ cup	50 g
Coconut (grated)	¼ cup	50 g
Egg	1 small	26.3 g
Baking powder	½ teaspoon	2.5 g
Water	1 tablespoon	15 ml

### Method

1. Cream sugar and margarine until fluffy.
2. Add cassava flour, baking powder, and the grated coconut.
3. Mix to a stiff paste.
4. If too stiff, add some water.
5. Roll out on a floured board.
6. Cut into shapes and arrange on a greased cookie tray or any other baking tray.
7. Prick with a fork to prevent the dough from rising.
8. Bake for 15 minutes at 175 °C (350 °F) or until evenly brown.



## Cassava Queen Cakes



### Ingredients

Cassava flour sifted	3 cups	300 g
Sugar	$\frac{1}{2}$ cup	100 g
Margarine	1 cup	200 g
Baking powder	$1\frac{1}{2}$ teaspoon	7.5 g
Vanilla essence or other flavor	1 teaspoon	5 ml
Eggs	4 medium	180 g
Milk evaporated	$\frac{1}{4}$ cup 62 ml or 4 level teaspoon of powdered milk in $\frac{1}{4}$ cup of water	
Mixed fruit (optional)	1 cup	100g

### Method

1. Cream sugar and margarine until fluffy.
2. Beat egg until light, and add to the cream.
3. Add vanilla essence mix.
4. Add baking power to the flour and mix.
5. Fold the flour into the cream. When the mixture is becoming stiff, add milk.
6. Add mixed fruit if used.
7. Grease queen cake pans with oil or margarine, dust the greased pan with some flour, and scoop batter to fill  $\frac{2}{3}$  of the pan.
8. Bake in a moderately hot oven at 175 °C (350 °F) for 20–25 minutes or until lightly but evenly brown.

## Cassoy Rich Cake



### Ingredients

Cassava flour	2 cups	200 g
Soy flour	½ cup	53 g
Sugar	¼ cup	50 g
Margarine	½ cup	100 g
Baking powder	1 level teaspoon	5 g
Orange juice	3 tablespoons	45 ml
Orange rind	1 tablespoon	5 g
Cinnamon	1 level teaspoon	1.0 g
Eggs	2 small	52.6 g

### Method

1. Cream sugar and margarine until fluffy.
2. Add beaten egg.
3. Mix flour, baking powder, and cinnamon. Add to the batter.
4. Add orange juice and rind.
5. Mix lightly.
6. Grease queen cake pans with oil or margarine and fill  $\frac{2}{3}$  full with the batter.
7. Bake in a preheated 175 °C (350 °F) oven until golden brown.

## Cassava Strips



### Ingredients

Cassava flour	1 cup	100 g
Cowpea grains	1 cup	240 g
Cowpea paste	1 cup	225 g
Onion	1 large	90 g
Salt	2 teaspoons	10 g
Vegetable oil	3 cups	750 ml

### Method

1. Soak cowpea for about 5 minutes, then de-hull.
2. Grind de-hulled cowpea and onion together into a smooth paste.
3. Take 1 cup of paste; add salt and cassava flour to form a soft, non-sticky dough.
4. Heat the oil. Push the mixture through a cake decorator or extruder into the oil.
5. Deep fry until golden and crispy.
6. Serve for cocktails or as a snack.

## Cassava Cocktail Titbit



### Ingredients

Cassava flour	1 cup	100 g
Cowpea flour	1 cup	100 g
Egg white	2	
Baking powder	1 teaspoon	5 g
Onion	1 small	30 g
Salt	2 teaspoons	10 g
Water	¼ cup	30 ml
Vegetable oil	3 cups	750 ml

### Method

1. Soak cowpea grains for about 5 minutes, de-hull.
2. Dry the grain and mill finely into flour. Measure out 1 cup.
3. Grind onion and add to the cowpea flour. Add salt.
4. Beat egg white until light and add to the mixture.
5. Mix thoroughly; add cassava flour and baking powder.
6. Roll out thinly on a floured board and cut into shapes or push dough through a cake decorator.
7. Deep fry and serve with a drink.

## Cassava Flour Doughnuts



### Ingredients

Cassava flour	2 cups	200 g
Sugar	$\frac{1}{4}$ cup	50 g
Margarine	1 tablespoon	20 g
Baking powder	1 teaspoon	5 g
Egg	1 medium	45 g
Nutmeg grated	$\frac{1}{2}$ teaspoon	1.5 g
Vegetable oil	3 cups	750 ml

### Method

1. Mix  $1\frac{1}{2}$  cups flour with sugar, margarine, baking powder and nutmeg.
2. Boil  $\frac{1}{2}$  cup water and add the remaining  $\frac{1}{2}$  cup flour in the fire, remove from heat, and turn 3 times immediately.
3. Add the cooked cassava flour and break with finger tips until mixture resembles breadcrumbs.
4. Whisk egg until light and add to the mixture. Mix with finger tips into smooth dough that leaves the sides of the bowl clean. Do not knead.
5. Mold into doughnut shapes and deep-fry in hot oil until golden.

*Note: The doughnuts may also be baked. Before baking, brush with beaten egg to give a good crust.*



## Cassava Chinchin



### Ingredients

Cassava flour	4 cups	400 g
Sugar	½ cup	100 g
Margarine	2 tablespoons	40 g
Baking powder	2 teaspoons leveled	10 g
Eggs	2 medium	90 g
Nutmeg	1 teaspoon	3 g
Water	1 cup	250 ml
Vegetable oil	3 cups	750 ml

### Method

1. Mix 3 cups of the flour with sugar, margarine, baking powder, and nutmeg.
2. Boil 1 cup of water, put 1 cup of flour into the boiling water and remove from heat, and turn times immediately.
3. Add the cooked cassava flour and mix together with finger tips until mixture resembles breadcrumbs.
4. Whisk eggs until light, and add to the mixture. Mix with finger tips into smooth dough which leaves the sides of the bowl clean. Do not knead.
5. Roll evenly on a floured board.
6. Cut into desired shape and size, length and thickness.
7. Deep-fry in oil until attractively brown.
8. Drain excess oil.

## Cassava Egg Rolls



### Ingredients

Cassava flour	4 cups	400 g
Sugar	½ cup	100 g
Margarine	2 tablespoons	40 g
Egg	2 medium	90 g
Baking powder	2 level teaspoons	10 g
Nutmeg	1 teaspoon	3.0 g
Salt	½ teaspoon	2.5 g
Boiled eggs	6 medium	
Water	1 cup	250 ml
Vegetable oil	3 cups	750 ml

### Method

1. Mix 3 cups of the flour with sugar, margarine, baking powder, and nutmeg.
2. Boil 1 cup of water, pit 1 cup of flour into the boiling water and remove from heat, and turn 3 times immediately.
3. Add the cooked cassava flour and mix together with finger tips until mixture resembles breadcrumbs.
4. Whisk eggs until light, and add to the mixture. Mix with finger tips into smooth dough which leaves the sides of the bowl clean. Do not knead!
5. Cut dough into sizes big enough to wrap a whole boiled egg.
6. Mold dough smoothly to enclose a boiled egg and cover up.
7. Deep-fry until golden brown.

## Cassava Buns



### Ingredients

Cassava starch	½ cup	100 g
Margarine or vegetable oil	2½ tablespoon	50 g
Water	½ cup	125 ml
Salt	¼ teaspoon	1.25 g
Egg whisked	1 medium	45 g

### Method

1. Melt the margarine in a saucepan or heat the vegetable oil (if used).
2. Add water and salt and allow to boil until an emulsion is formed.
3. Pour the hot emulsion into the cassava starch and stir at low speed.
4. Add the whisked egg and continue mixing at high speed until a uniform, viscous dough is obtained.
5. Divide the dough into round balls of desired size using greased palms.
6. Bake at 200 oC for 20 minutes.



## Cassava Flakes (Crackers)



### Ingredients

Cassava starch	1 cup	200 g
Water	4¼ cups	1125 ml
Salt	1 teaspoon	5 g
Seasoning (chicken, fish, or onion)	1 teaspoon	5 g
Vegetable oil	1 cup	250 ml

### Method

1. Dissolve starch in water.
2. Add desired seasoning and salt.
3. Put on medium heat, stirring continuously until thick to avoid lumps.
4. Drop teaspoonful on a line tray and dry at 50–55 °C in a drying oven or in the sun.
5. Deep-fry in hot oil for about 2 seconds.
6. Drain, and serve as a snack.

## Processing starch from fresh cassava root Introduction

STEP 1	<ul style="list-style-type: none"><li>• Peel and wash, freshly harvested cassava roots.</li></ul>
STEP 2	<ul style="list-style-type: none"><li>• Grate or grind smoothly paste</li></ul>
STEP 3	<ul style="list-style-type: none"><li>• Mix paste with clean water (Ratio: Root paste (1kg ): Water (10 liters) .</li></ul>
STEP 4	<ul style="list-style-type: none"><li>• Stirr and mix thoroughly, and then filter through a fine sieve mesh or a clean muslin cloth.</li></ul>
STEP 5	<ul style="list-style-type: none"><li>• Allow the filtrate to settle, and then decant the supernatant within a day.</li></ul>
STEP 6	<ul style="list-style-type: none"><li>• Wash off the starch residue several times with water to get white, dorless, and tasteless starch.</li></ul>
STEP 7	<ul style="list-style-type: none"><li>• Put in a clean bag and press to dewater</li></ul>
STEP 8	<ul style="list-style-type: none"><li>• Break cake, spread thinly on a tray and sun dry.</li></ul>
STEP 9	<ul style="list-style-type: none"><li>• Finely mill the dried starch granules and sift if necessary.</li></ul>
STEP 10	<ul style="list-style-type: none"><li>• Package in airtight containers</li></ul>

Figure 3. Stepwise process of cassava starch production.

## Tapioca Production Process

### Introduction

- 1 Remove fresh cassava starch cake from sedimentation container.
- 2 Spread thinly over a clean surface, use fingers to break up the cake into granules.
- 3 Put the semidried starch granules into an earthenware pot or a heavy griddle pan and roast over a slow fire, stirring constantly to avoid uneven cooking or burning.
- 4 Stir until tapioca is dry (grains should increase in size during this process, with some popping sound).
- 5 Remove tapioca from pot and spread out to cool.

## Uses of cassava



**Figure 4.** Cassava field displaying leaves that can also be used in the recipe for different dishes.

*Note: The consistency of the cassava leaves preparation is a matter of choice. It may be dry, i.e., very little water, with oil seeping out of the vegetable as preferred in the Democratic Republic of the Congo, or very wet, with vegetable suspended in a water-in-oil emulsion as preferred in Sierra Leone.*

## Cassava Leave Soup

### Ingredients

Cassava leave (fresh)	1 kg	150 ml
Palm oil	$\frac{3}{4}$ cup	
Groundnut paste to taste		
Salt to taste		
Pepper to taste		
Water	4 $\frac{1}{8}$ cups	1 L

### Optional

Fish (smoked, salted)	To taste	
Onions	2	60 g
Leek	2 stalks	

### Method

1. Select young and tender cassava leaves.
2. Remove leaves from stalk.
3. Wash in cold water.
4. Pound in mortar until all the leaves are broken into tiny pieces.
5. Put pounded leaves into a pot and add 1 L of potable water. Cook for 15–30 minutes from the time it starts to boil.
6. Sauté the onion, add to the cassava leaves with salt, pepper, fish, leek, and groundnut paste, if used.
7. \*Add palm oil or peanut butter if preferred.
8. Cover pot and cook for another 15 minutes.
9. Serve with rice, fufu, eba, or pounded yam.

*\*Alternatively the cooked cassava leaves at this stage could be added to tomato stew being prepared and the cooking completed in 15 minutes.*

## Nutrient Profile for New Food Products from Cassava

Product	% Moisture	% Protein	% Ash	% Fat	% CHO	Energy kcal/100 g
Cookie	1.8	0.5	2.6	21.1	74.0	488
Chin-chin	3.4	1.2	2.0	25.8	67.6	507.4
Doughnut	6.9	2.3	1.5	9.9	72.2	387.1
Cassava bread (20%)	14.9	6.0	1.6	4.8	72.7	358.0
Meat pie	9.4	7.8	1.5	14.3	67.0	428.0
Croquettes 9.6	3.3	1.3	22.6	63.2	469.4	

# Appendix. Volume, Weight, and Measure

## Standard volume and weight of spoon

Measuring teaspoon	Volume (ml)	Weight of sugar/ margarine/salt /yeast (g)
1 tablespoon	15	20
½ tablespoon	10	10
1 teaspoon	5	5
½ teaspoon	2.5	2.5
¼ teaspoon	1.2	1.2
⅛ cup	0.6	0.6

## References

Sanni L, B. Maziya-Dixon, A.O. Onabolu, B.E. Arowasafe, A.E. Okoruwa, R.U. Okechukwu, A.G.O. Dixon, A.D.I. Waziri, P. Ilona, C. Ezedinma, G. Ssemakula, J. Lemchi, M. Akoroda, F. Ogbe, G. Tarawali, E. Okoro, and C. Geteloma. 2006. "Cassava recipes for household food security". IITA Integrated Cassava Project, Ibadan, Nigeria.