

CLIMATE CHANGE ADAPTATION

A manual for trainers

**Root crops
processing and
preservation in
Papua New Guinea**



Supported by the European Union



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Preserving food is fun and important when drought hits
and people are hungry

Proposed Program to Training Villagers

Time	Day before	First Day	Second Day	Third Day	Fourth Day
08:00→08:30am		Welcome (Devotion)	(Devotion)	(Devotion)	(Devotion)
08:30→1000am		Getting to know each other	Sweet Potato and Cassava Flour Processing	Reading a Recipe	Trying out Recipe 4,5,6,7
10:00 →10:30am		Break	Break	Break	Trying out recipe 8
10.30→13.30am		What can we expect from this training?	Processing continue	Milling of dry Sweet Potato and cassava shreds into flour	Trying out recipe 9, 10, 11 and 12
13:30→14.30am		Lunch	Lunch	Lunch	Lunch
→1500		What is Roots and Tuber Food Processing?	Food Safety, Personal Hygiene and Sanitation	Trying out recipes 1,	Product evaluations and Sessions Summary
1500-1530	Gather	Break	Break	Break	
1530-1630	People travel and gather	Summarising the day, Questions, Suggestions, evaluation.	Summarising the day, Questions, Suggestions and evaluation	Trying out Recipe 2, 3	Session End
1630 on	Informal	Session End	Session End	Session End	



Introduction

Facilitator(s) to introduce himself/ herself. Where you come from, about your family, your experience and why you want to conduct this training course for them.

Participants to introduce themselves, where are you from. Tell the group a little about your family, in case you make any food products at home for either home consumption or for sale tell the group about it and why you are interested in this training.

Farmers will →



- Get to know other participants; introduce themselves so that everyone is relaxed
- Be able to know the aim and purpose of the training course
- Know what is expected of them
- Have an idea of what they will learn during the course



Working together

Divide into groups.

- Identify those with basic food processing skills to be group leaders.
- Ask them to create ground rules



Material

- List of participants names
- Name tag for participants and trainers
- Training manual, exercise book and biro
- Marker and pin up flip-charts

Trainer Day 1

Session 1: Food Processing and Preservation- Learning Goals

Farmers will →	
	<ul style="list-style-type: none"> • Know importance of food processing and preservation • Be able to practise safe food handling • Know how to construct a simple drying bed • Successfully process roots and tuber into flour. • Confidently read and interpret recipes • Confidently develop products from sweet potato and cassava flour • Be able to make pawpaw and pineapple jam • And most importantly, impart knowledge attained to others
	<p>What is food processing and why is it important?</p> <p>Food processing covers more than just preparation and cooking of raw products. Traditionally our methods of processing have been limited to washing, peeling and boiling. However there are process involved apart from boiling to process and preserve food/</p> <p>What are the benefits of food processing?</p> <ul style="list-style-type: none"> • Reduces post harvest losses • Increase food security by making food available for the off season • Adds variety to the families diet, especially during drought, frost or flood • Can be used to earn income by selling products in the local market, especially after harvest when food process increase • Simple activity that can be carried out at home, without the need for specialized equipment
	<p>Thinking together</p> <p>In groups, discuss some steps involved in our traditional way of food processing. Example; Coconut creamed rice.</p>



Learning Goals



Working together

Discuss in groups

- Is there some food processing going on in the area that you come from?
- If so, what sort of food products do you/they process?
- What can you do to make it better?



Session 2: Food Safety and Personal Hygiene

Fruits and vegetables are living products that need to be handled carefully and properly to ensure they stay in the best condition and are good to eat. The length of time a fruit or vegetable remains fresh and edible for is known as the shelf life. Some fruits and vegetables can be stored for along time after they have been harvested, but others are more delicate and susceptible to spoilage and cannot be stored for long. Fruits and vegetables usually have a short growing season and a short shelf life.

Several factors cause fruit and vegetable to spoil:

- -enzymes within fruits and vegetable
- -micro-organism (moulds)
- Environmental factors, including temperature moisture and sunlight

Enzymes and what they do

Naturally present in the plant are chemicals (enzymes) that help it to grow, mature and ripen. Theseenzymes continue to work, even after harvest. It is important to stop them from working. This is done by heating the fruit or vegetables.

Types of micro organisms-

There are three types of micro-organisms. They includebacteria yeast and fungi/moulds.

Bacteria and fungi belong to a general group that are known as microbes or microbial organisms. They are all around us, they live in the water, the soil and in the air and are on the skin of the fruit and vegetable, even on the skin of the people who handle them. Some microbes that we come across in food processing are useful while others are not.

Possible sources of contamination -

- Water
- Hands
- Cough, colds and disease
- Equipment
- Over- ripe and damaged fruit
- Exposure to animals, insects, and rodents
- Exposure to animal and human waste (faeces)



Farmers will →

- Know the type of organisms that lead to food spoilage
- Know importance of safe food handling
- Learn the danger of improper storage of cooked food



Controlling food spoilage through processing

Processing increases the shelf life of food by deactivating the enzymes and destroying the bacteria. It transforms the raw material (fresh) into new product.

There are three stages involved in the food processing chain :

- Post harvesthandling and storage
- Processing
- Post processing and storage

In the all the three stages, caution is to be taken on how the food is handled.



What are the four simple rules for food safety?

Allow the group to brain storm what they think are four important safety rules in food safety. See if they are in line with the below:

- Clean - Clean hands, utensils and surfaces often to keep everything clean and free bacteria
- Separate - Keeps foods separate to avoid cross contamination
- Cook - Cook foods to proper temperatures
- Chill - Refrigerate and freeze perishable foods promptly

Material

Provide to each group, a

- Flip chart/white board
- Marker
- Soaps and warm water
- Some food showing sign of food spoilage maybe in poster



Session 3: Processing of Roots and Tubers

Tubers into Flour

A number of operations (steps) are commonly used in processing of root crops. Traditional method of processing has been limited to washing, peeling and boiling. Boiled sweet potato or cassava is consumed with vegetables and some protein as a complete meal. Some household, wash and boil and peel as they consume.

Basic processing Steps

Peeling

This involves the removal of the outer layer of roots (skin) and is traditionally carried out by hand, although mechanical and chemical peelers are available for larger scale.



Picture of woman group peeling banana.

Drying

It has been noted that our crops, sweet potato, cassava banana have high moisture content. The preservation and longer storability depends on removing as much moisture to a level which prevents the growth of microorganisms. Drying is very simple, inexpensive and

common method of removing water in crops and so extending their shelf life.



Picture of drying of sweet potato and cassava shred.

Boiling and Steaming

Roots crops are often cooked by boiling or steaming, either for direct consumption or as one step in a processing system. This does not preserve the crop, which is usually eaten afterwards, unless it is further processed. Boiling and steaming are important in cassava processing, partially to detoxify the material.



Frying and Roasting

Many types of root crops are commonly prepared by frying in hot oil or roasting. Roasting is widely practised. Added advantage and frying and roasting is that it enhances the flavour of the root crop and most importantly reduces the moisture content, so extending its shelf life.

When packaged properly, fried, crisp products can have a shelf life of several months.



Picture showing food preparation by frying.

Grating

The action of grating into fine shreds is a step common to the processing of many root crops and facilitates later steps in a process, for example, dewatering, drying or pulping. The process alters the texture of the material. Grating methods range from simply rasping the roots on a grater of some sort.



Picture showing woman involved in grating cassava.

Pounding

Pounding changes the texture of the previously prepared root crop to a more palatable, past-like consistency. The root is first peeled and softened by boiling or soaking. Traditionally a large pestle is used.

Dewatering

De-watering, as the name implies, involves the removal of the internal liquid from the root crops by pressing. This process is most common in cassava processing being an important method of reducing toxicity. Traditionally, heavy weights are placed on the prepared root crop and the expelled liquid is allowed to drain away. A squeezing process is also involved in the other traditional methods.



Starch extraction

While the starch can be extracted from any root crop, the most common starting materials are potato and cassava. Industrially starch can be extracted by a combination of wet milling, sieving and either settling or centrifuging. Starch can also be extracted by simpler methods. The juice draining from cassava, for example, during de-watering may be collected and left to stand allowing the starch to settle. After decanting the liquid layer the remaining starch may be rinsed and further processed into flour by pounding and drying.



Picture showing cassava starch extraction



Farmers will →

- Construct a simple sun drying bed
- Learn how to process and preserve sweet potato and cassava in flour
- Identify ways for safe root and tuber flour storage



Safe food storage

To make sure that the crop store and remain in good condition throughout the season, the storage container and the stored product must be inspected regularly for signs of damage to birds, mice, rats and insects. Signs of insect damage can include: small feeding holes in the product, large amount of dust in the product, sacks or storage structure; presence of insects; distinctive smell. If signs of pest attack are spotted early, action can be taken before the damage becomes too severe.

Type of storage

- Parboiling
- Salting
- Sun-drying
- Re-drying



Processing Roots and Tubers



- Rolling and shaking
- Traditional protect ants
- Insect proof containers
- Storage duration
- Varietal difference

Working together



Split the participants into two groups. Ask the participants whether they have stored foods in a dried form before. If they have discuss why they decided to store dried chips and then make a list of the ways they prepares the dried chips. Did they experience any problem during storage, If so what did they do about them? How long have they kept the chips for?



Picture showing packing of potato slices into cellophane bags for storage or sale



Session 4: Flour Processing

Construction of Drying Bed

Materials

- 4 of 2.4 m long 4 x 2 timber
- 2 m galvanised iron (kapa)
- Shade cloth (4m)
- Black Plastic(4m)

Sweet Potato Flour Processing

Materials

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Sweet potato (kaukau) tubers • Lemons • Kitchen knife • Pots and dishes • Peeler | <ul style="list-style-type: none"> • Strainer • Hand grinder or wooden mortar and pestle • Cellophane bags |
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Steps

1	<ul style="list-style-type: none"> • Harvest and sort • Sort, peel or grate the kaukau using a peeler 	
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Processing Roots and Tubers



2		<ul style="list-style-type: none">• Pour clean water into a large dish.
3	<ul style="list-style-type: none">• Squeeze some lemon into a cup and strain it into the large dish of water.	
4		<ul style="list-style-type: none">• Wrap the kaukau peelings in a cloth sheet or laplap, and place this into the lemon water, making sure all the peelings are submerged.
5	<ul style="list-style-type: none">• Soak the kaukau peelings in lemon water for 45 minutes.	



Processing Roots and Tubers



6		<ul style="list-style-type: none">• Remove the kaukau peelings from the dish and spread them onto a drying bed.
7	<ul style="list-style-type: none">• Dry in the sun with grates for 4-5 days.	
8		<ul style="list-style-type: none">• Mill separately with a hand grinder or a wooden mortar and pestle.• Sieve and pack the flour.

Pictures showing sweet potato flour processing



Cassava Flour and Starch Processing (1hour)

Materials

- Cassava tubers
- Kitchen knife
- Pots and dishes
- Strainer
- Hand grinder or wooden mortar and pestle
- Cellophane bags

Steps

1	<ul style="list-style-type: none">• Harvest and sort.	
2		<ul style="list-style-type: none">• Peel, wash and soak
3	<ul style="list-style-type: none">• Grate using a grater.	



Processing Roots and Tubers



4		<ul style="list-style-type: none">• Add enough water and mix.
5	<ul style="list-style-type: none">• Squeeze out the liquid.	
6		<ul style="list-style-type: none">• Dry grates in the sun.
7	<ul style="list-style-type: none">• Stand the squeezed out liquid overnight	



Processing Roots and Tubers



8		<ul style="list-style-type: none">• Slowly pour out the liquid.• Wash the starch at the bottom of the pot and place on metal trays.
9	<ul style="list-style-type: none">• Dry the grates in the sun for 4-5 days.• Mill separately with a hand mill, wooden mortar and pestle.	
10		<ul style="list-style-type: none">• Sieve and pack the (flour) from grates and (starch) from liquid.

Pictures showing processing of cassava starch and flour



Training Day 2

Session 1: Reading Recipe



Farmers will →

- Identify good recipes
- Explain the segments of recipes
- Know how to choose a recipe

Types of Recipes (1hour)

A recipe contains ingredients and instructions that help you make food that tastes the same each time. Recipes are written in different formats, but usually have common sections.

There are two different types of recipes:

- **Standard:** Ingredients are listed first, separate from the method
- **Narrative/action:** Lists ingredients and measurements amongst the method (e.g. In a small saucepan heat 250 ml of water)



Recipes Rating

Your course leader will pass out some different recipes. Check each for:

- a complete list of ingredients and equipment
- a clear step-by-step instructions
- temperature
- time
- servings

Ask the participants to go back into groups. Ask each group to discuss the following question:

- What are characteristics of a good recipe?
- Why is it important to read and follow a recipe?
- How is using a recipe for cooking and preparing food



Recipes always tell you how much of each ingredient to include when cooking or baking.

Learning how to measure these ingredients is important to make sure your good food.

Session 2: Recipes for you to try



Farmers will be able to→

- Know the importance of gluten in dough making Understand importance of wet mix and dry mix
- Mix in ratio's on the recipe
- Develop different fried and baked products from sweet potato and cassava flour

Preparing food differently from the normal makes it look nice and good to eat. It involves changing something we are use to eating to something new!

In this session, we will be developing products from sweet potato flour, cassava flour, making fruit jam and pawpaw jam and also other interesting recipes from our local food crops to try out!

What do you notice?

To come up with consistent dough for baking and frying, borrow gluten from wheat by mixing roots and tuber flour with wheat flour.



Rule of thumb for mixing and adding ingredients:

- Add the dry ingredients to one bowl and mix
- Add the wet ingredients to a separate bowl
- Combine the two



Recipe 1: Sweet Potato Muffin (30 min)

Materials

<ul style="list-style-type: none"> • Measuring Cup • Wooden Spoon • Egg Whisker 	<ul style="list-style-type: none"> • Muffin Tray • Muffin Cup • Table spoon
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Ingredients

<ul style="list-style-type: none"> • Wheat flour (3 cups) • Kaukau flour (1 cup) • Salt (1 teaspoon) • Baking powder (1 teaspoon) 	<ul style="list-style-type: none"> • Butter (3½ cups) • Sugar (3 cups) • Egg (3- 4eggs) • Milk (1/2 cup or 125ml)
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Steps

1	<ul style="list-style-type: none"> • Beat the eggs in a mixing bowl and then mix in the milk. Add the sugar and whisk until dissolved. • Sift the flour with the baking powder and salt separately, then add together with the wet mixture • With the egg beater, mix the ingredients thoroughly until it turns into a fine paste. • Preheat the oven to a medium temperature. Line a muffin tray with paper muffin cups. 	
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Recipes



2		<ul style="list-style-type: none">• With a tablespoon, fill into muffin cups
3	<ul style="list-style-type: none">• Bake in a oven at 180^o degree Celsius for 20-30 minutes	
4		<ul style="list-style-type: none">• When the muffin is cooked, remove from the oven and place it on the table with the help of spatulas.



Jennifer says →
Baking in drum
ovens give you
good muffins



Recipe 2: Sweet Potato and Cassava Strips (30 min)

Materials

- Mixing bowl
- Measuring cup
- Table spoon
- Deep frying pan

Ingredients

<ul style="list-style-type: none"> • Kaukau /Cassava flour 1cup • Wheat flour 2 cups • Cooking fat 4 table spoons • Eggs 1 	<ul style="list-style-type: none"> • Sugar 3 tablespoons • Oil (for frying) 2 cups • Baking powder 3 teaspoons
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Steps

1	Sift all dry ingredients in a mixing bowl.	6	Cut small strings from rolled dough.
2	Add cooking fat and rub in.	7	Heat oil and drop in the stings and let cook.
3	Beat eggs and add to the bowl and mix.	8	When brown, remove and drain
4	Roll dough on floured surface and to 1 centimetre	9	Keep in covered container to prevent hardening
5	Add a little warm water and knead to smooth dough		



Recipe 3: Cassava Crisps (1hour)

Material

<ul style="list-style-type: none">• Banana leaves• Plastic sheet• Pot	<ul style="list-style-type: none">• Dish• Scissors• Serving plate
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Ingredients

<ul style="list-style-type: none">• Cassava (tapiok)• Oil• Salt

Steps

<p>1</p>	<ul style="list-style-type: none">• Grate the tapiok in a dish.• Heat the banana leaves gently on an open fire before rolling out the tapiok, then get a handful of tapiok and place on a piece of banana leaf.	
<p>2</p>		<ul style="list-style-type: none">• Place a sheet of plastic on top of the tapiok and banana leaf, and roll out the tapiok



Recipes



3	<ul style="list-style-type: none">• Roll out several of the tapiok on banana leaves into thin sheets.	
4		<ul style="list-style-type: none">• Steam the sheets on banana leaves for 10 minutes
5	<ul style="list-style-type: none">• Dry the sheets on banana leaves in the sun (or hang up).	
6		<ul style="list-style-type: none">• Remove the banana leaves from tapiok sheets



Recipes



7	<ul style="list-style-type: none">• Cut the tapioca sheets into squares using a scissors.	
8		<ul style="list-style-type: none">• Deep fry the tapiok squares in hot oil.
9	<ul style="list-style-type: none">• Add salt.	
10		<ul style="list-style-type: none">• .Serve



Recipe 4: Pineapple Jam (30 min)

Materials

<ul style="list-style-type: none">• Grater or blender• Stainless steel knife• Aluminium pot	<ul style="list-style-type: none">• Glass jam jars• Wooden spoon
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Ingredients

<ul style="list-style-type: none">• Fresh pineapple (1.5kg)• Sugar (1 kg)	<ul style="list-style-type: none">• Pectin (50g)• Lemon juice (15ml/1 tablespoon)
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Steps

1	<ul style="list-style-type: none">• Choose ripe and not spoilt pineapple.• Clean, remove the eyes and chops into good sizes for blending and grating	
2		<ul style="list-style-type: none">• Grate with a grater or blend in a blender.
3	<ul style="list-style-type: none">• Add to the pot and weigh, while sterilizing jam jars by heating.•	



Recipes



4		<ul style="list-style-type: none">• Weigh the ingredients according to the weight of the pulp.• Dry mix the dry ingredients.
5	<ul style="list-style-type: none">• Heat the pulp till thickened.	
6		<ul style="list-style-type: none">• Add the dry mix to the pot and allow to dissolve while stirring continuously.
7	<ul style="list-style-type: none">• Concentrate at jam point (103—105 C), then add the lemon juice.	



Recipes



8		<ul style="list-style-type: none">• Turn the hot jars upside down and allow to cool.
9	<ul style="list-style-type: none">• Pour the hot jam into still warm jars and seal.	
10		<ul style="list-style-type: none">• Pour the hot jam into still warm jars and seal.



Picture showing pineapple jam made in KG Wan, Gembogl District.



Recipe 5: Sago Pops (1hour)

Materials

<ul style="list-style-type: none"> • · Measuring cup • · Steamer • · Mixing cup • 	<ul style="list-style-type: none"> • Banana leaves or baking paper • or plastic sheet • · 2mm size sieve mesh • · Cooler or fridge
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Ingredients

<ul style="list-style-type: none"> • · 3 cups of sago starch • · 2 cups of mashed potato or sweet potato (kaukau) 	<ul style="list-style-type: none"> • · 3 cups of sago or cassava starch • · 2 cups of mashed potato or 3 cups of sago or cassava starch
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Steps

<p>1</p>	<ul style="list-style-type: none"> • Peel, slice and steam potato until cooked using a steamer, and then mash 	
<p>2</p>		<ul style="list-style-type: none"> • Measure two cups of mashed potato.



Recipes



3	<ul style="list-style-type: none">• Measure three cups of sago flour using the same cup.	
4		<ul style="list-style-type: none">• Mix the sago and potato thoroughly and pass through the sieve gently
5	<ul style="list-style-type: none">• Press a handful with fingers, then roll on the bench into rods	
6		<ul style="list-style-type: none">• Steam the mixture for 45 minutes, and place on a rack in the cooler overnight.



Recipes



7	<ul style="list-style-type: none">• Slice the sago thinly and uniformly	
8		<ul style="list-style-type: none">• Dry the slices under the sun until thoroughly dry.
9	<ul style="list-style-type: none">• Deep fry the slices in hot oil and after a few seconds they will pop.	
10		<ul style="list-style-type: none">• . Serve the sago pops immediately.• After cooling the sago pops can be stored in cellophane bags.•



Recipe 6: Sweet Potato Donut (40minutes)

Materials

<ul style="list-style-type: none"> • • Mixing bowl • • Measuring cup 	<ul style="list-style-type: none"> • Table spoon • • Deep frying pan
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Ingredients

<ul style="list-style-type: none"> • ☐ Grated Kaukau (½ cup) • ☐ Wheat flour (2 cups) • ☐ Yeast (1 tablespoon) • ☐ Sugar (2 tablespoons) 	<ul style="list-style-type: none"> • ☐ Salt (pinch) • ☐ Oil (2 cups) • ☐ Milk/Egg (optional) • ☐ Cooking fat (1 tablespoon) • ☐ Lukewarm water (adequate)
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Steps

1	<ul style="list-style-type: none"> • Put yeast and 1 tablespoon in
2	<ul style="list-style-type: none"> • Add 3 tablespoons of warm water and leave for 10 minutes.
3	<ul style="list-style-type: none"> • Put the grated kaukau into a mixing bowl and sift in the dry ingredients.
4	<ul style="list-style-type: none"> • Rub in the cooking fat and then add the risen yeast and mix.
5	<ul style="list-style-type: none"> • Add water to the mixture and knead into a dough.
6	<ul style="list-style-type: none"> • On a floured surface, roll the dough slightly.
7	<ul style="list-style-type: none"> • Make dough into a ball and return to mixing bowl.
8	<ul style="list-style-type: none"> • Cover the mixing ball with wet warm cloth and leave to double.
9	<ul style="list-style-type: none"> • Re-knead the dough after doubling and roll onto a floured surface
10	<ul style="list-style-type: none"> • Cut into desired shapes and deep-fry till golden brown.



Recipe 7: Banana Chips (30 minutes)

Materials

- | | |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Banana leaves or mat• Potato slicer• Deep fryer, gas cooker, cooker or pot | <ul style="list-style-type: none">• Knife• Trays• Cellophane bags |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|

Ingredients

- | |
|-------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Newly harvested banana• Salt for seasoning• Vegetable oil |
|-------------------------------------------------------------------------------------------------------------------------------|

Steps

1	<ul style="list-style-type: none">• Peel the skin from the newly harvested bananas	
2		<ul style="list-style-type: none">• Slice the peeled bananas into thin circular strips.



Recipes



3	<p>Dry for 15 minutes</p>	
4		<ul style="list-style-type: none">• Deep fry in oil.
5	<ul style="list-style-type: none">• Spread the banana slices evenly on banana leaves or a mat and dry in a shaded area for 30 minutes.	
6		<ul style="list-style-type: none">• Remove allow to cool• Pack into cellophane bags and season with salt.



Recipe 8: Making Sweet Potato Bread (1 hour)

Materials

- Mixing bowl
- Measuring cup
- Baking pan

Ingredients

<ul style="list-style-type: none"> • Grated kaukau 1/2 cup • Wheat flour 2 cups • Yeast teaspoon • Sugar 1 tablespoon 	<ul style="list-style-type: none"> • Salt pinch • Lukewarm water adequate • Oil 2 tablespoons
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Steps

1	<ul style="list-style-type: none"> • Mix yeast and sugar in a cup.
2	<ul style="list-style-type: none"> • Add 3 table spoons of water to the cup and leave to rise.
3	<ul style="list-style-type: none"> • For quick rising, cover cup with a warm cloth and put in the sun for 5 minutes or 10 minutes at room temperature.
4	<ul style="list-style-type: none"> • Mix grated sweet potato with other dry ingredients in a mixing bowl.
5	<ul style="list-style-type: none"> • Add the yeast mix into the mixing bowl.
6	<ul style="list-style-type: none"> • Knead into dough and add the oil to make it smooth.
7	<ul style="list-style-type: none"> • Divide into 2 parts.
8	<ul style="list-style-type: none"> • Grease bread tins and shape each dough and place in tin.
9	<ul style="list-style-type: none"> • Leave to rise to double size.



Recipes



10	<ul style="list-style-type: none"> • Bake in oven at 200°C (400°C) for 15 to 20 minutes.
11	<ul style="list-style-type: none"> • Remove and allow to cool and then wrap. •

Recipe 9: Sweet Potato Chapatti (30 minutes)

Materials

<ul style="list-style-type: none"> • Mixing bowl • Rolling pin • Chapati pan

Ingredients

<ul style="list-style-type: none"> • Grated kaukau 1 cup • Wheat flour 2 cups • Soya flour 1 cup 	<ul style="list-style-type: none"> • Salt 1 teaspoon • Lukewarm water adequate • Oil ½ cup
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Steps

1	<ul style="list-style-type: none"> • Mix ingredients together in a bowl.
2	<ul style="list-style-type: none"> • Add the grated kaukau and mix.
3	<ul style="list-style-type: none"> • Add one table spoon of oil to the flour and mix well
4	<ul style="list-style-type: none"> • Add the water to the mixture in a bowl and knead till smooth paste is formed.
5	<ul style="list-style-type: none"> • Divide the dough into 8-10 equal balls.
6	<ul style="list-style-type: none"> • On a floured surface roll one ball at a time.
7	<ul style="list-style-type: none"> • Fold each ball at a time to form a strip.



Recipes



8	<ul style="list-style-type: none">• Coil each strip to form a circle and put aside for 20 minutes.
9	<ul style="list-style-type: none">• On a floured surface, roll out each coil into a thin circular sheet.
10	<ul style="list-style-type: none">• Grease a shallow frying pan.
11	<ul style="list-style-type: none">• Fry each circular sheet on both sides till golden brown.
12	<ul style="list-style-type: none">• Ensure to grease both sides.
13	<ul style="list-style-type: none">• The product is the chapatti and can be served with stew or tea.



Recipe 10: Sweet Potato Crisps (30 minutes)

Materials

<ul style="list-style-type: none"> • Knife • Deep fryer • Peeler

Ingredients

<ul style="list-style-type: none"> • Sweet potato roots medium 6 • Oil cups 2 	<ul style="list-style-type: none"> • Salt to taste • Water containers 2
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Steps

1	<ul style="list-style-type: none"> • Remove soil from roots and peel as you place in clean water.
2	<ul style="list-style-type: none"> • Wash off any soil.
3	<ul style="list-style-type: none"> • Slice into very thin pieces using a knife or larger blade of grater.
4	<ul style="list-style-type: none"> • Drain off the water.
5	<ul style="list-style-type: none"> • Heat the oil and deep fry till starting to brown.
6	<ul style="list-style-type: none"> • When brown remove and drain.
7	<ul style="list-style-type: none"> • Salt and serve warm or cold.



Recipe 11: Sweet Potato Cake (30 minutes)

Materials

<ul style="list-style-type: none"> • Bowl • Baking tray 	<ul style="list-style-type: none"> • Table spoon • Mixing bowl
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Ingredients

<ul style="list-style-type: none"> • Sweet potato flour 1 cup • Wheat flour 3 cups • Eggs 4 • Blue band 5 tablespoons 	<ul style="list-style-type: none"> • Baking powder 3 teaspoons • Lemon 1 medium • Sugar 3 table spoons
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Steps

1	<ul style="list-style-type: none"> • Sift all dry ingredients in a bowl.
2	<ul style="list-style-type: none"> • Add the sweet potato mash and 4 tablespoons of blue band and rub in.
3	<ul style="list-style-type: none"> • Beat the eggs and add to the bowl and mix well.
4	<ul style="list-style-type: none"> • Grate lemon rind and add to the bowl and mix.
5	<ul style="list-style-type: none"> • Make juice from the lemon and add to the bowl contents and mix well.
6	<ul style="list-style-type: none"> • If consistency not runny, add a little water.
7	<ul style="list-style-type: none"> • Grease baking pan and pour in contents.
8	<ul style="list-style-type: none"> • Bake in oven at 175°C (360°F) for 30 minutes or till brown.
9	<ul style="list-style-type: none"> • 9. Alternatively bake on open fire (see tips on open-fire baking below)



Recipe 12: Kaukau Strips (30 minutes)

Materials

<ul style="list-style-type: none"> • • Mixing bowl • • Measuring cup 	<ul style="list-style-type: none"> • Table spoon • • Deep frying pan
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Ingredients

<ul style="list-style-type: none"> • Kaukau flour 1cup • Wheat flour 2 cups • Cooking fat 4 table spoons • Eggs 1 	<ul style="list-style-type: none"> • Sugar 3 tablespoons • Oil 2 cups • Baking powder 3 teaspoons
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Steps

1	<ul style="list-style-type: none"> • Sift all dry ingredients in a mixing bowl.
2	<ul style="list-style-type: none"> • Add cooking fat and rub in.
3	<ul style="list-style-type: none"> • Beat eggs and add to the bowl and mix.
4	<ul style="list-style-type: none"> • . Add a little warm water and knead to smooth dough.
5	<ul style="list-style-type: none"> • . Roll dough on floured surface and to 1 centimetre.
6	<ul style="list-style-type: none"> • Cut small strings from rolled dough.
7	<ul style="list-style-type: none"> • Heat oil and drop in the stings and let cook.
8	<ul style="list-style-type: none"> • When brown, remove and drain.
9	<ul style="list-style-type: none"> • Keep in covered container to prevent hardening