

PROCESSING OF SWEET POTATO IN PALAU

MARERO AND TARO

2013

PROCESSING OF SWEET POTATO IN PALAU



BY: LYDIA M. MARERO and
THOMAS TARO



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Thomas Taro

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Message



I welcome this opportunity to recognize the efforts of researchers from the Palau Community College to write this book on the “Processing of Sweet Potato in Palau”

A research on the “Processing of Root Crops in the Republic of Palau” was funded by the Hatch Act of 1887 administered by the National Institute of Food and Agriculture-United States Department of Agriculture (NI-FA-USDA), one of the programs of the Land Grant College of Micronesia.

Sweet potato is a nutritious food especially for the populations of Micronesia, as well as the Pacific Region. Its utilization into various food products can benefit the people of Palau and the surrounding countries in the Region.

A handwritten signature in black ink, appearing to read 'Singeru Singeo'.

Dr. Singeru Singeo

Executive Director

College of Micronesia Land Grant Programs



Foreword

In an effort to contribute to the improvement of our plunging economic condition, the Palau Community College-Cooperative Research and Extension (PCC-CRE) has implemented applied researches that can help farmers in converting farm resources like sweet potatoes into value-added processed food products. Development of processed sweet potato food products will ensure a stable supply that will redound to food security in Palau.

PCC-CRE is tasked to teach ways to preserve foods through its extension programs like Expanded Food and Nutrition Education Program (EFNEP) and Food Technology Classes.

The process of raising local foods will not only help directly in upgrading the nutritional status of the people, but also lessen the demand on the family income, allowing local food production to contribute to the widening gap between imported and local food supplies.

This publication can help food processors with product ideas that will enhance their local production for consumers and tourists who are always looking for processed local foods.

A handwritten signature in black ink, appearing to read 'Patrick U. Tellei'.

PATRICK U. TELLEI, EdD

President

Palau Community College

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**LYDIA M.MARERO
THOMAS TARO**

TABLE OF CONTENTS

	PAGE
MESSAGE	v
FOREWORD	vi
ACKNOWLEDGMENT	vii
INTRODUCTION	1
SWEET POTATO PRODUCTION IN PALAU	2
NUTRITIONAL VALUE OF SWEET POTATOES	4
PROCESSING OF SWEET POTATO PRODUCTS	6
Sweet potato Flour	6
Sweet potato Pancake Mix	7
Sweet potato Pancakes	8
Sweet Potato Steamed Cake Mix	9
Sweet Potato Steamed Cakes	10
Sweet Potato Doughnut Mix	11
Sweet Potato Doughnuts	12
Sweet Potato Tama Mix	13
Sweet Potato Tama	14
Sweet Potato Pasta Mix	15
Sweet Potato Pasta	16
Sweet Potato Pasta with Sauce	17
Sweet Potato Cookie Mix	18
Sweet Potato Cookies	19
Sweet Potato Brownie Mix	20
Sweet Potato Brownies	21
Sweet Potato Muffin Mix	22
Sweet Potato Muffins	23

	PAGE
Sweet Potato Bread Mix	24
Sweet Potato Bread	25
Sweet Potato Cupcake Mix	26
Sweet Potato Cupcakes	27
Sweet Potato Fries	28
Sweet Potato Chips	29
Sweet Potato Cake	30
Sweet Potato Pastilles	31
Sweet Potato Salad	32
Sweet Potato Hash Browns	33
Sweet Potato Pie	34
Sweet Potato Pastry	36
Sweet Potato Turnover	37
Sweet Potato Wine	39
Sweet Potato Vinegar	40
SENSORY EVALUATION OF SWEET POTATO PRODUCTS	41
PACKAGING STUDIES AND SHELF-LIFE OF PROCESSED SWEET POTATO PRODUCTS	42
TECHNOLOGY TRANSFER OF PROCESSED SWEET POTATO PRODUCTS	44
REFERENCES	46
ABOUT THE AUTHORS	47

LIST OF TABLES

TABLE	PAGE
1 Cooked colors of the sweet potato varieties at the R & D Station	3
2 Nutritional composition of cooked sweet Potatoes	4
3 Selected food products and their suitable packaging materials.....	42
4 Places and number of participants of Food Technology Classes	45

X

LIST OF FIGURES

FIGURE	PAGE
1 Flour prepared from purple sweet potatoes	6
2 Sweet potato pancake mix	7
3 Sweet potato pancakes	8
4 Sweet potato steamed cake mix	9
5 Sweet potato steamed cakes	10
6 Sweet potato doughnut mix	11
7 Sweet potato doughnuts	12
8 Sweet potato tama mix	13
9 Sweet potato tama	14
10 Sweet potato pasta mix	15
11 Sweet potato pasta	16
12 Sweet potato pasta with sauce	17
13 Sweet potato cookie mix	18
14 Sweet potato cookies	19
15 Sweet potato brownie mix	20
16 Sweet potato brownies	21
17 Sweet potato muffin mix	22
18 Sweet potato muffins	23
19 Sweet potato bread mix	24
20 Sweet potato bread	25
21 Sweet potato cupcake mix	26
22 Sweet potato cupcakes	27
23 Sweet potato fries	28
24 Sweet potato chips	29
25 Sweet potato cake	30
26 Sweet potato pastilles	31
27 Sweet potato salad	32
28 Sweet potato hash browns	33
29 Sweet potato pie	34
30 Sweet potato pastry	36
31 Sweet potato turnover	37

FIGURE	PAGE
32 Sweet potato wine	39
33 Sweet potato vinegar	40
34 Taste test of sweet potato food products by school children visiting R & D Station	41
35 Sweet potato food products under storage	43

INTRODUCTION

Sweet potato (*Ipomea batatas* (L.) Lam), locally known as “chemutii”, ranks third among root crops eaten in Palau. This crop is always available as it is produced year-round.

A project under Hatch Act of the Pacific Land Grant on the “Processing of Root Crops in the Republic of Palau” has opened the possibilities for the processing of sweet potatoes into food products that can keep long and can have potentials for food business opportunities.

Production of sweet potatoes in Palau must have increased by this time, as there are more farmers tilling land in the different States due to the accessibility of transport facilities brought about by the completion of the Compact Road.

Research and extension activities of PCC-CRE such as Expanded Food and Nutrition Education Program (EFNEP) and Food Technology Classes can boost the utilization of sweet potatoes in alleviating malnutrition among the 0-7 age group of the population.

A survey in Micronesia in 1997 revealed a significant number of children under 5 years of age as wasting (low weight-for-height, 7%) or stunting (low height-for-age, 39.6%)(Plan of Work, COM-LGP). It is understood that the amount and type of available foods affect part of youth malnutrition. It is advocated that the process of raising local foods like sweet potato, will not only help directly through providing increased amounts and types of quality foods, but also lessen the demand on the family income, allowing locally produced foods to be purchased in the market.

The R & D Station in Ngermeskang Hamlet of Ngeremlengui State in Palau has served as the repository of twenty four (24) varieties of sweet potatoes grown in Palau (Del Rosario, 2001).

All the 24 varieties of sweet potatoes were used in the product development activities at the Food Technology Laboratory of the R & D Station.

SWEET POTATO PRODUCTION IN PALAU

In 1998, the Palau Statistical Yearbook reported that 13,404 lbs of sweet potatoes were harvested and sold for \$10,053.00.(IESL, 1996).

Production and propagation of sweet potatoes in Palau contributes to the food basket, thus lessening large food importation. The increase in the consumption of imported foods in Palau has led to an overall decline in local food production resulting in trade imbalance. R & D efforts of PCC-CRE was thus focused on the production and utilization of local foods like sweet potatoes to deter the fast decline in the Gross Domestic Product (GDP) from the agriculture sector..

Table 1 shows the cooked colors of the different varieties of sweet potatoes in Palau.

Sweet potato varieties with purple-colored corms like Oisca and Bertakl, and dark orange varieties such as Kangkum, Ningsing, and Telentud, as well as the rich green leaves contain high amounts of anthocyanins. This phytochemical is reported to have various physiological functions in the body, because of their anti-oxidant and anti-cancer properties and protection against liver injury (Eastwood and Morris, 1992).

Table 1. Cooked colors of the sweet potato varieties at R & D Station.

Variety	Color (cooked)
Bent 1	pale yellow
Bent 2	dark yellow with purple tinge
Bent 3	white with red edge
Bertakl	purple edge with yellow center
Dirradid	pale yellow
Guam Orange	orange
Guam White	dark yellow
Hawaiian	dark yellow
Ishiobing	dark yellow
Kangkum 1	dark orange
Kangkum 2	white
Ngaraard	pale yellow
Nikangets	pale yellow
Ningsing	dark orange
Oisca	purple
Oreor 1	white
Oreor 2	white
Sers	dark yellow
Siakl	dark yellow
Sment	pale yellow
Tainung	dark yellow
Techebot	dark cream
Telekeok	pale yellow
Telentud	dark orange

NUTRITIONAL VALUE OF SWEET POTATOES

Table 2 shows the nutritional composition of different colors of sweet potatoes, such as purple, white, and yellow. The high energy value of sweet potatoes make them good sources of carbohydrates, with 30% and fiber, 3.0%. (Dreher, 1987).

Sweet potatoes contain good amounts of phosphorus (39 mg%) and calcium especially the white variety with 83 mg%.

Of the three colors of cooked sweet potatoes, only the yellow variety contained beta carotene (280 mg%). All three colors of sweet potatoes contain thiamin (0.07 mg%), riboflavin (0.02mg%),niacin (1.1 mg%) and ascorbic acid (29 mg %).

Table 2. Nutritional composition of cooked sweet potatoes.

Nutrient	Purple	White	Yellow
Edible portion, %	90	86	86
Water,%	68.6	68.8	68.1
Energy, kcal	122	126	128
Protein,%	0.6	0.4	0.5
Fat,%	0.2	0.8	0.3
Carbohydrate,%	29.5	29.3	30.7
Crude Fiber,%	0.7	2.7	3.0
Ash,%	1.1	0.7	0.4
Calcium, mg%	22	83	30
Phosphorus, mg%	39	37	26
Iron, mg%	0.2	0.7	0.4
Retinol, mg%	0	0	0
B-carotene, mg%	20	5	280
Total Vit. A (RE), mcg%	3	1	47
Thiamin, mg%	0.04	0.07	0.04
Riboflavin, mg%	0.02	0.02	0.02
Niacin, mg%	1.1	0.2	0.3
Ascorbic acid, mg%	29	23	14

Adapted from FNRI, 1987.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO FLOUR



Fig. 1. Flour prepared from purple sweet potato.

Ingredients:

Sweet potato, any variety

Procedure:

- Clean and wash sweet potato corms.
- Boil sweet potato for 1 hour, peel and rinse.
- Grind sweet potato in a food processor or any grinder or grate.
- Dry sweet potato in the sun until crisp.
- Blend/grind dried sweet potato until fine and sift.
- Pack in thick (0.5 mil) plastic bags, seal, and label.
- Store at room temperature (27° to 32° C) in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO PANCAKE MIX



Fig. 2. Sweet potato pancake mix.

Ingredients:

2	cups	sweet potato flour
2	cups	all-purpose flour
1	cup	sugar
1	cup	dry milk
1/4	cup	baking powder
1	tsp.	salt

Procedure:

- Mix together all ingredients in a plastic bag.
- Pack 1 cup mixture in thick (0.5 mil) plastic bags, seal and label. Store in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO PANCAKES



Fig. 3. Sweet potato pancakes.

Ingredients:

1	pack	Sweet Potato Pancake Mix
1	pc	egg
1/2	cup	water
1/4	cup	oil

Procedure:

- Mix all ingredients in a mixing bowl to form a batter.
- Pour 1/4 cup batter into frying pans, cook both sides until brown. Serve pancakes with syrup, jam, margarine, or peanut butter.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO STEAMED CAKE MIX



Fig. 4. Sweet potato steamed cake mix.

Ingredients:

2-1/2	cups	sweet potato flour
2-1/2	cups	all-purpose flour
2	cups	sugar
1/4	cup	baking powder
1	pack	coconut powder

Procedure:

- Mix all ingredients in a plastic bag.
- Measure 1 cup mixture and pack in thick plastic bags, seal, label and store in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO STEAMED CAKES



Fig. 5 Sweet potato steamed cakes.

Ingredients:

- 1 pack Sweet Potato Steamed Cake Mix
- $\frac{3}{4}$ cup water
- 1 Tbsp grated cheese

Procedure:

- Mix Sweet Potato Steamed Cake Mix with water
- Transfer $\frac{1}{4}$ cup mixture into muffin pans. Top with grated cheese.
- Steam for 20 minutes.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO DOUGHNUT MIX



Fig. 6. Sweet potato doughnut mix.

Ingredients:

3	cups	sweet potato flour
3	cups	all-purpose flour
1	cup	dry milk
1	cup	sugar
4	Tbsp.	baking powder
1/2	tsp.	nutmeg powder
1/2	tsp.	cinnamon powder

Procedure:

- Mix all ingredients in a plastic bag.
- Pack one cup (240 g) in thick (0.5 mil) plastic bag, seal, and label.
- Store in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO DOUGHNUTS



Fig. 7. Sweet potato doughnuts.

Ingredients:

- 1 pack Sweet Potato Doughnut Mix
- 1 pc egg
- 2 Tbsp. oil

Procedure:

- Empty 1 pack Sweet Potato Doughnut Mix into a mixing bowl, add 1 egg and 2 Tbsp. oil.
- Knead and divide dough into 6 balls.
- Flatten thickly and cut with doughnut cutter or form into rings.
- Deep fry in hot oil.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO TAMA MIX



Fig. 8. Sweet potato tama mix.

Ingredients:

3	cups	sweet potato flour
3	cups	all-purpose flour
1	cup	dry milk
1	cup	sugar
4	Tbsp.	baking powder
1/2	tsp.	nutmeg powder
1/2	tsp.	cinnamon powder

Procedure:

- Mix all ingredients in a plastic bag.
- Pack one cup (240 g) in thick (0.5 mil) plastic bag, seal, and label.
- Store in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO TAMA



Fig. 9. Sweet potato tama.

Ingredients:

- | | | |
|---|-------|-----------------------|
| 1 | pack | Sweet Potato Tama Mix |
| 1 | pc | egg |
| 2 | Tbsp. | oil |

Procedure:

- Empty 1 pack Sweet potato tama mix into a mixing bowl, add 1 egg and 2 Tbsp. oil.
- Knead and divide dough into 6 balls.
- Deep fry in hot oil.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO PASTA MIX



Fig. 10. Sweet potato pasta mix.

Ingredients:

2-1/2	cups	sweet potato flour
2-1/2	cups	all purpose flour
1	Tbsp.	salt

Procedure:

- Mix all ingredients in a plastic bag. Shake bag well to obtain a uniform mixture.
- Pack 1 cup mixture in a thick plastic bag, seal, label, and store in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO PASTA



Fig. 11 Sweet potato pasta.

Ingredients:

- 1 pack Sweet Potato Pasta Mix
- 1 pc egg

Procedure:

- Empty 1 pack of sweet potato pasta mix into a mixing bowl, add 1 egg, and mix well to form dough.
- Roll dough on a floured cutting board with a rolling pin, and cut into pasta with a knife.
- Drop sweet potato pasta in boiling water and cook until pasta floats (about 2 minutes).
- Drain, add 1 Tbsp. oil, and toss.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO PASTA WITH SAUCE



Fig. 12. Sweet potato pasta with sauce.

Ingredients:

1	cup	chicken, cooked, and diced
¼	cup	onion, chopped
1	Tbsp.	garlic, minced
¼	tsp.	black pepper
1	can	Nestle's Cream
1	Tbsp.	oil
1	cup	chicken stock
	sprig	parsley or green onions

Procedure:

- Saute garlic, onion, and chicken in vegetable oil.
- Add chicken stock, salt, pepper, and Nestle's cream.
- Cook for 5 minutes.
- Pour over cooked pasta. Garnish with parsley or chopped green onions.'

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO COOKIE MIX



Fig. 13. Sweet potato cookie mix.

Ingredients:

6	cups	sweet potato flour
6	cups	all-purpose flour
1/4	cup	baking powder

Procedure:

- Mix all ingredients in a plastic bag and shake well to obtain a uniform mixture.
- Measure 4 cups of Sweet potato cookie mix into thick (0.5 mil) plastic bags, seal, and label.
- Store in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO COOKIES



Fig. 14. Sweet potato cookies

Ingredients:

1	pack	Sweet Potato Cookie Mix
1	cup(2 sticks)	margarine
1	cup	sugar
3	pcs	eggs
1	Tbsp.	vanilla

Procedure:

- Cream margarine with 1 cup sugar.
- Add eggs, one at a time, and mix well.
- Add 1 Tbsp. vanilla and mix well.
- Empty 1 pack Sweet potato cookie mix into the mixture, and knead into dough.
- Roll with a rolling pin and cut with cookie cutter.
- Bake sweet potato cookies at 275° F for 45 min.
- Pack in thick plastic bags, seal, and label.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO BROWNIE MIX



Fig. 15. Sweet potato brownie mix

Ingredients:

3	cups	sweet potato flour
3	cups	all-purpose flour
3	tsp.	baking soda
3	cups	cocoa powder
3	tsp.	salt

Procedure:

- Mix all ingredients in a plastic bag.
- Measure 2 cups mixture and pack in thick (0.5 mil) plastic bags, seal, and label.
- Store at room temperature in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO BROWNIES



Fig 16. Sweet potato brownies

Ingredients:

1	pack	Sweet Potato Brownie Mix
1	cup	butter
2	cups	sugar
3	pcs.	eggs
1	tsp.	vanilla
1	cup	chopped nuts

Procedure:

- Cream butter, then add sugar gradually.
- Add eggs one at a time mixing very well after each addition.
Mix in vanilla.
- Add 1 pack Sweet Potato Brownie Mix and mix well.
- Add 1/8 cup chopped nuts.
- Pour mixture into greased pan. Smoothen surface with a rubber scraper
and top with the remaining nuts.
- Bake at 350° F for 15 minutes.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO MUFFIN MIX



Fig. 17 Sweet potato muffin mix

Ingredients:

3	cups	sweet potato flour
3	cups	all-purpose flour
4	tsp.	baking soda
1	tsp.	salt

Procedure:

- Mix all ingredients in a plastic bag.
- Measure 2 cups mixture and pack in thick plastic bags, seal, and label.
- Store at room temperature in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO MUFFINS



Fig. 18 Sweet potato muffins

Ingredients:

1	pack	Sweet Potato Muffin Mix
½	cup	raisins, chopped
½	cup	nuts, chopped
1	cup	yoghurt
1	pc.	egg
2	Tbsp.	margarine
½	cup	brown sugar

Procedure:

- Preheat oven to 350° F.
- Combine margarine, egg, and yoghurt. Add 1 pack Sweet Potato Muffin Mix and mix with a few strokes.
- Fold in chopped nuts and raisins.
- Fill greased muffin pans ½ full.
- Bake at 350° F for 20 min. or until toothpick comes out clean.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO BREAD MIX

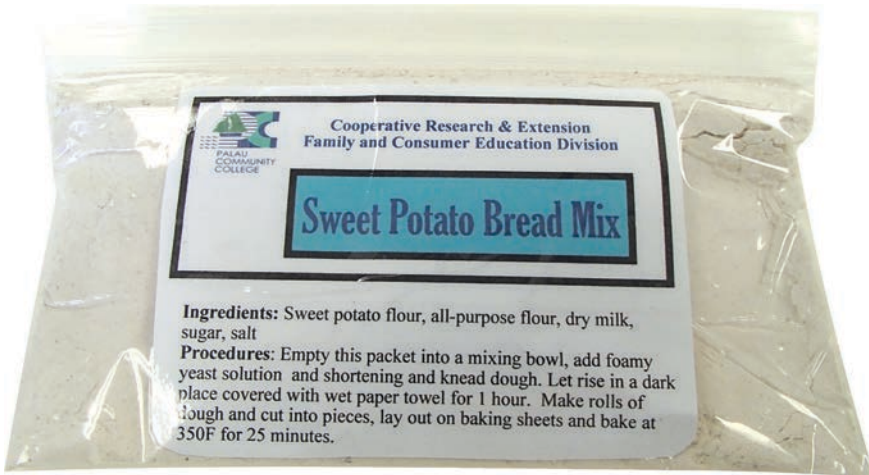


Fig. 19. Sweet potato bread mix

Ingredients:

10	cups	sweet potato flour
10	cups	all-purpose flour
1	cup	dry milk
1	cup	sugar
1	tsp.	salt

Procedure:

- Mix all ingredients in a plastic bag.
- Measure 5 cups mixture, pack in thick plastic bags, seal, and label.
- Store at room temperature in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO BREAD



Fig.20. Sweet potato bread.

Ingredients:

- 1 pack Sweet Potato Bread Mix
- 2- $\frac{1}{2}$ tsp. yeast
- 1 cup lukewarm, water
- 2 Tbsp. brown sugar
- $\frac{1}{4}$ cup shortening

Procedure:

- Dissolve yeast and brown sugar in 1 cup lukewarm water. Let stand for 10 minutes or until foamy.
- Add yeast solution to 1 pack of sweet potato bread mix, knead until dough is smooth.
- Place in a dark place covered with wet paper towel, and let rise for one hour.
- Shape and arrange on baking sheets. Let rise for one hour.
- Bake at 375° F for 25 minutes.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO CUPCAKE MIX

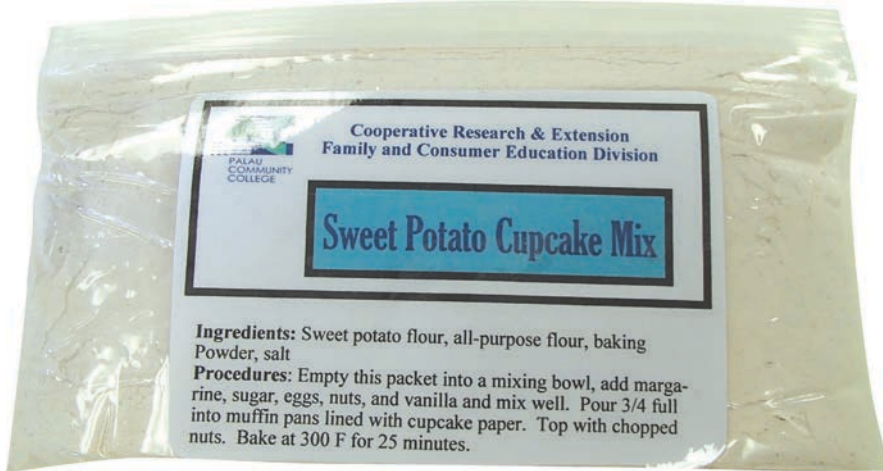


Fig. 21. Sweet potato cupcake mix

Ingredients:

5	cups	sweet potato flour
5	cups	all-purpose flour
5	tsp.	baking powder
5	tsp.	salt

Procedure:

- Mix all ingredients in a plastic bag.
- Measure 2 cups mixture, pack in thick plastic bags, seal, and label.
- Store at room temperature in a clean, dry place.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO CUPCAKE



Fig. 22. Sweet potato cupcakes.

Ingredients:

1	pack	Sweet Potato Cupcake Mix
1/2	cup	sugar
1/4	cup	butter
2	pcs	eggs
3	Tbsp.	nuts, chopped
1	tsp.	vanilla

Procedure:

- Beat margarine until fluffy. Add sugar gradually and eggs one at a time. Add sweet potato cupcake mix and nuts and mix well.
- Pour $\frac{3}{4}$ full in muffin pans line with cupcake paper. Top with chopped nuts.
- Bake in a pre-heated oven at 350° F for 35 min.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO FRIES



Fig. 23. Sweet potato fries

Ingredients:

2 lbs. sweet potatoes
oil for frying

Procedure:

- Peel sweet potatoes and slice longitudinally.
- Fry in deep, hot oil.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO CHIPS



Fig. 24. Sweet potato chips.

Ingredients:

2	lbs	sweet potatoes
1	cup	sugar
		oil for frying

Procedure:

- Peel and wash sweet potatoes.
- Slice thinly a food processor.
- Deep-fry in deep oil (first frying)
- Soak fried chips in syrup made of 1 cup sugar dissolved in 1 cup boiling water.
- Deep fry in hot oil (second frying) until crisp.
- Cool, pack, seal and label.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO CAKE



Fig. 25 Sweet potato cake

Ingredients:

3	cups	grated sweet potatoes
1	cup	coconut milk
1	cup	brown sugar
2	Tbsp.	grated cheese
1	can	condensed milk

Procedure:

- Wash, peel, and grate sweet potatoes and measure.
- Mix tapioca, coconut milk, and brown sugar and steam for 45 minutes.
- Pour condensed milk over steamed sweet potato, top with cheese and put in the broiler part of the oven, then broil until top is brown.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO PASTILLES



Fig. 26. Sweet potato pastilles

Ingredients:

2	lbs	sweet potatoes, boiled and grated
1	can	condensed milk
1	can	evaporated milk
1	cup	dry milk
2	cups	sugar
1/4	cup	margarine

Procedure:

- Boil sweet potatoes for 1 hour, peel and grate.
- Transfer to a big skillet and mix the other ingredients together.
- Cook with constant stirring in slow fire until very thick.
- Wrap 1 Tbsp in colored cellophane or tissue.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO SALAD



Fig. 27. Sweet potato salad.

Ingredients:

2	lbs.	sweet potato slice	1/2	tsp	salt
1/3	cup	yoghurt	1/2	tsp	pepper
1/4	cup	mayonnaise	2	pcs	eggs, diced
1/4	cup	chicken broth	3	Tbsp	vinegar
4	pcs.	spring onion, chopped			

Procedure:

- Boil sweet potato for 1 hour, peel and slice
- Combine all ingredients with the diced sweet potato.
- Toss until uniformly mixed.
- Garnish with diced boiled egg,

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO HASH BROWNS



Fig. 28. Sweet potato hash browns.

Ingredients:

2	lbs.	sweet potato, cooked and diced
1	pc.	onion, chopped
1	pc	bell pepper, chopped
1	clove	garlic
1	Tbsp.	olive oil
$\frac{3}{4}$	tsp.	salt
$\frac{1}{2}$	tsp.	pepper

Procedure:

- Cook sweet potato for 1 hour, peel, and dice. Saute garlic, onion, and green pepper in oil.
- Add sweet potato and season with salt and pepper.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO PIE



Fig. 29. Sweet potato pie.

Ingredients:

Crust:

2-1/2 cups	all-purpose flour
2-1/2 Tbsp.	sugar
1/2 tsp	salt
3/4	cup shortening
1/3	cup ice-cold water
1	pc egg yolk

Filling:

5 cups	grated sweet potato
2 cups	coconut
1 cup	cream
1 cup	flour
2/3 cup	sugar
3 Tbsp.	butter

Procedure:

Crust:

- Combine flour, sugar and salt in a mixing bowl. Cut in shortening until mixture is crumbly. Mix in cold water and slightly beaten egg yolk.
- Knead into a dough , form into a ball, and refrigerate for 30 minutes

Filling:

- Stir together all ingredients and transfer into a dough-lined pie plate, cover with flattened dough and cut edges with fork tines.
- Bake at 375° F for 45 to 59 minutes.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO PASTRY



Fig. 30. Sweet potato pastry

Ingredients:

Filling:

4 lbs sweet potato,grated
3 cups sugar
 $\frac{3}{4}$ cup water
 $\frac{3}{4}$ cup oil
1 bundle spring onions, chopped

Wrapper:

3 cups all-purpose flour
 $\frac{3}{4}$ cup oil
 $\frac{3}{4}$ cup water

Procedure:

- Wrapper: Mix wrapper ingredients and set for 10 minutes.
- Roll dough, flatten, and cut into pieces.
- Filling: Stir-fry pork until brown, put in onions and mix well.
- Add rest of the ingredients and stir while cooking.
- Wrap 1 Tbsp filling and bake at 350 F for 20 minutes.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO TURNOVER



Fig. 31. Sweet potato turnover.

Ingredients:

Wrapper:

1	cup	flour
1	Tbsp.	sugar
1/2	tsp.	baking powder
1/4	tsp.	salt
3	Tbsp.	butter
2	Tbsp.	Shortening
1/3	cup	ice water
4	Tbsp.	yoghurt

Filling:

4 cups	sweet potato
1 cup	chicken, diced
1 can	green peas
1 Tbsp.	cooking oil
1 tsp.	garlic
2 Tbsp.	onion
1/2 tsp.	salt
1/2 tsp	black pepper

Procedure:

Wrapper:

- Combine flour, sugar, baking powder, and salt.
- Cut in shortening and butter until mixture is like a coarse meal.
- Stir in yoghurt and sprinkle on ice water, shape into a dough and refrigerate 1 hour.

Filling:

- Saute garlic and onion in oil. Add chicken, sweet potato, and green peas.
- Season with salt and pepper.
- Wrap 2 Tbsp. mixture in round-shaped wrappers and seal edges with fork tines.
- Fry in deep oil.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO WINE



Fig. 32. Sweet potato wine.

Ingredients:

5	lbs.	sweet potatoes, boiled and grated
5	cups	sugar
20	cups	water
2	Tbsp.	yeast
1	Tbsp.	brown sugar

Procedure:

- Boil sweet potatoes in water for 1 hour, peel and cut into small pieces.
- Place 1 cup sweet potato and 1 cup water in a blender and blend for 2 minutes. This is sweet potato puree.
- Dissolve yeast in 1 cup lukewarm water and add brown sugar. Let stand 10 minutes or until foamy. Mix sweet potato puree with equal amount of water and stir in sugar and yeast solution.
- Transfer the mixture to a bottle and cover with paper towel secured with a rubber band. Ferment for 1 month and filter. The filtrate is sweet potato wine. Pasteurize sweet potato wine by heating to 90° C for 15 minutes. Cool, bottle, seal, and label.

PROCESSING OF SWEET POTATO PRODUCTS

SWEET POTATO VINEGAR



Fig. 33. Sweet potato vinegar

Ingredients:

5	lbs.	sweet potato, boiled and grated
5	cups	sugar
20	cups	water
2	Tbsp.	yeast
1	Tbsp.	brown sugar

Procedure:

- Boil sweet potato in water for 1 hour, peel and cut into small pieces and blend to make puree.
- Dissolve yeast in 1 cup lukewarm water . Mix sweet potato puree with equal amount of water and stir in sugar and yeast solution. Transfer the mixture to a bottle and cover with paper towel secured with a rubber band.
- Ferment for 3 months and filter. Pasteurize at 90° C for 15 minutes. Cool, bottle, seal and label.

SENSORY EVALUATION OF SWEET POTATO PRODUCTS

Sweet potato products like cookies were evaluated by about 5,000 respondents in the span of five years. The products were served to the public during events like Earth Day, Career Awareness Week, Women's Month, Tourism Week, Olehotel Belau Fair(OBF), World Food Day, Independence Day, as well as a main visitors' item at the PCC-CRE R & D Station during tours, served to school children, students, parents, teachers, and other guests All food tasters liked the products very well.

The food products, particularly the dry mixes, were put on exhibit at the 2002 and 2006 Japan Food Expo, Hawaii in 2006,Guam in 2007, and Italy Food Expo in 2007. During the 2006 "Taste of Palau" event, the tourists tasted the taro food products and they signified their interest in buying these foods if sold in the market.



Fig. 34. Taste test of sweet potato food products by school children visiting the R & D Station.

PACKAGING STUDIES AND SHELF-LIFE OF PROCESSED SWEET POTATO PRODUCTS

Sweet potato food products and their suitable packaging materials were studied and results are shown in Table 3.

Table 3. Selected food products and their suitable packaging materials.

Food Product	Packaging Material
Starch, flour, and flour products	polyethylene(PE) and polypropylene (PP) bags, 0.5 mil
Chips	PP bags, 0.5 mil
Ready-to-eat slices	PP bags, 0.5 mil
Fermented products	PETpolyethylene terephthalate) plastic bottles

Sweet potato flour and dry mixes were found stable when packed in 0.5 mil thick PE or PP bags and stored at room temperature. Sweet potato chips were found stable in 0.5 mil PE plastic bags.



Fig. 35. Sweet potato food products under storage.

The processed products kept well in their respective suitable packaging materials for a period of one year or longer for the dried products.

Sweet potato flour and dry mixes also kept for one year or longer at room temperature (27° to 32° C) when packed in thick (0.5 mil) plastic bags.

Baked/cooked/fried sweet potato products like cookies and chips, had a shelf-life of one month at room temperature (27° - 32° C).

Fermented products like wine and vinegar, packed in PET bottles were found to be stable at room temperature (27° - 32° C) for more than 2 years or longer.

TECHNOLOGY TRANSFER OF PROCESSED SWEET POTATO PRODUCTS

Selected sweet potato food products were taught to 636 participants in PCC-CRE Food Technology Classes in a 24-hour training period, usually done in a three-week, 2-hour per day sessions. The number of participants and places of training are shown in Table 4.

Among the trained participants, some went into a food business microenterprise. School chefs served some of the processed food products at the PCC Cafeteria and elementary schools of Ngeremlengui, Melekeok, and Ngiwal States.

Other trainees served the food items during custom events like funerals and birth ceremonies. Women prepared the products for their families, guests, and tourists visiting their places.

Table 4. Places and number of participants of Food Technology Classes

Place	Number
Ngeremlengui State Old Age Center	23
Melekeok State Old Age Center	17
Airai State Ked Center	19
Airai State Abai	17
Koror State PCC Campus	18
Koror State Ngarachamayong Cultural Center	16
Koror State Maibrel Center	18
Ngeremlengui State Old Age Center	9
Ngeremlengui State Training Center	23
Ngiwal State School Cafeteria	23
Ngatpang State	12
Ngerbeched, Koror	23
Kayangel State	17
Peleliu State	19
Airai State	11
Ngardmau State	12
R & D Station	3
Angaur State	23
Ngeremlengui Elementary School	53
Emmaus High School	24
Palau High School Special Education	12
Upward Bound Math- Science	18
Palau Parents Empowered	16
Bethania High School	27
Ngarchelong Head Start Parents	19
Meyuns Head Start Parents	24
Madalarii Head Start Parents	14
Peleliu Head Start Parents	19
Ngerbeched Head Start Parents	24
Expats Group I	22
Expats Group II	26
Cafeteria Staff	20
Ngaraard Ongall Group	15
Total	636

REFERENCES

- Agricultural Census, Republic of Palau. 1994. Department of Agriculture. Ministry of Resources and Development.
- Del Rosario, A.G. 2001 Sweet Potato varieties in the Republic of Palau. PCC-CRE Publication 24/01 (3.00 C) 38pp.
- Dreher, M.L. 1987. Physicochemical and functional properties of dietary fiber as related to bowel function and food use. In: Handbook of Dietary Fiber- An Applied Approach, pp.137-182. New York: Marcel and Decker Inc.
- Eastwood, M.A. and E.R. Morris, 1992. Physical Properties of Dietary Fiber that Influence Physiological Function: Model for polymers along the gastrointestinal tract. *Am. J. Clin. Nutr.* 55:436-442.
- Food Composition Tables, 1997. Food and Nutrition Research Institute Department of Science and Technology, Bicutan, Tagig, Metro Manila, Philippines.
- IESL, 1996. Informal Employment for Sustainable Livelihood Program Survey, 1996. Project of Palau Community Action Agency (PCAA), Koror, Palau.
- Plan of work, COM-LGP FY 2000-2004. College of Micronesia Land Grant Programs, Research, Extension, and Educational Programs.

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Lydia Marero worked as Researcher-Food Technologist at the Palau Community College-Cooperative Research and Extension (PCC-CRE) for ten years. She developed about 150 processed food products from taro, cassava, sweet potato, fish, coconut, and banana and taught food technology classes as an extension program of PCC-CRE. She obtained three USDA grants for her projects on the utilization of root crops and product development of local foods and rabbit fish. A food scientist, an educator and a scholar, Lydia earned a Bachelor's Degree in Food Technology at the De La Salle-Araneta University Foundation, graduating cum laude. Under a PCARRD scholarship, she pursued a Master's Degree in Food Science at the University of the Philippines in Los Baños. She obtained her Doctoral Degree in Food Science from the Ochanomizu Women's University in Tokyo, Japan as a Monbusho scholar and JSPS fellow. She further obtained a Post-Doctoral Degree in Food Science as a KOSEF fellow at the Seoul National University in South Korea.

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