HANDBOOK ON THE PROCESSING OF COCONUTS IN PALAU MARERO AND TARO 2013

HANDBOOK ON THE PROCESSING OF COCONUTS IN PALAU

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Message

I am happy to recognize the efforts of researchers from the Palau Community College in writing this "Handbook on the Processing of Coconuts in Palau"

Coconuts greatly abound in the Pacific Islands and is a very important and nutritious source of food in the Region. The book serves as a practical applications of research results giving instructions and practical demonstrations on the processing of coconuts.

Funding the printing of this handbook is courtesy of the National Institute of Food and Agriculture-United States Department of Agriculture (NIFA-USDA), one of the programs of the College of Micronesia Land Grant.

Dr. Singeru Singeo
Executive Director
College of Micronesia Land Grant Programs

Foreword

In line with the Palau National Economic Development Plan 2020, the Palau Community College-Cooperative Research and Extension (PCC-CRE) is working towards increasing agricultural production and self-sufficiency of food supply by way of developing processed food products from a very abundant raw material like coconuts.

It is high time to consume local food products, as the increase in the consumption of imported processed foods in Palau has led to an overall decline in local food production resulting in trade imbalance.

Coconuts are abundant in Palau, and the nuts are literally just falling down. The PCC-CRE focused their Research and Development efforts on food processing. Results of these researches are taught to the consumers in extension programs like the Expanded Food and Nutrition Education Program (EFNEP) and Food Technology Classes. These programs are offered to the communities free of charge, so that people preparing food will be updated with new product ideas and skills in preparing safe and nutritious foods for their families and for business opportunities.

It is hoped that locally produced food products continue to be popularized among consumers as well as tourists, to be able to contribute to the increase in the Gross Domestic Products (GDP) from the Agriculture sector.

PATRICK U. TELLEI, EdD
President
Palau Community College

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LYDIA M.MARERO
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INTRODUCTION

Coconut (*Cocos nucifera L.*), known locally as "lius" in Palau is a popular crop but still underutilized in the island. Due to the small population in Palau, there are sufficient food resources, among which are coconuts which are abundant all over the country. Research activities of the Palau Community College-Cooperative Research and Extension (PCC-CRE) are, thus, focused on new and improved product development of coconuts. Production and utilization of local foods could create surpluses that can be converted into value-added products for the market.

Coconut utilization in Palau offers promising potentials because the fruit is available as indigenous raw material from a perennial crop that is hardly destroyed by floods and other harsh weather conditions. Except for coconut water and coconut oil, there is low domestic consumption of coconut products in Palau. It is therefore interesting to give attention to researches that utilize coconuts into processed foods and value-added products.

Coconut water or juice is a traditional drink during parties, custom events, meetings, and other gatherings. Utilization of the meat, however, is not done, as the nut is just thrown away after consumption of the water. Many products can be processed from the meat such as pies, ingredient for fruit salad, pudding, candies, and many other products.

The Research and Development (R & D) Station of PCC-CRE implemented a research on the development of coconut products from a Hatch Act funding from the USDA. Results of these researches are transferred to consumers by way of taste test activities during civic events like Olechotel Belau Fair (OBF), Career Week, Earth Day, Independence Day, World Food Day, and offered to guests of R & D Station during tour visits.

Food processing of coconut products are also taught to participants of Expanded Food and Nutrition Education

Program (EFNEP) and Food Technology Classes as an outreach/extension program of PCC-CRE.

Participants of the outreach programs of PCC-CRE have been trained on the processing of coconut products, providing them with skills to prepare local foods that are attractive to consumers and tourists. Changes in behavior of the participants were created when many of them have prepared the food items for their families, communities, and for microenterprise development. These efforts result in the overall contribution to food security in the country.

NUTRITIONAL VALUE OF COCONUTS

Although coconut oil is classified as saturated oil or fat that is presumed to be harmful to health, various researches showed that coconut oil is cholesterol-free. In researches undertaken by notable authorities on coconut, it was found out that coconut oil raises good cholesterol (Blackburn, 2000). It does not raise total cholesterol, i.e., it is a neutral fat as shown by populations with high coconut oil dietary intake that have low incidence of coronary heart disease (Dayrit, 1994). Coconut oil is richest in medium chain triglycerides (MCTs) that provide instant energy (Enig, 2000). It has anti-cancer activity (Lim-Silianco, 2000). It provides anti-microbial benefits against many pathogens (Kaunits, 2000).

According to Dr. Walter Willet, a Harvard University nutrition expert and a prominent researcher on diet and heart disease, coconut oil has a neutral effect on cholesterol level (Boceta et al., 2000). He found out that 62% of the coconut oil is composed of 8-12 carbon fatty acids classified as MCTs. MCTs are quickly and easily digested and converted into energy unlike Long Chain Triglycerides (LCTs) found in animal fats and in soybean, canola, safflower, sunflower, corn and cottonseed oils. He mentioned that the cause of at least 30,000 heart disease deaths a year in the USA is not coconut oil but the trans fatty acids (TFAs) of partially hydrogenated vegetable oils such as soybean, corn, cottonseed and canola.

Dayrit (1994) found that of the 12 regions of the Philippines, Bicol has the highest intake of fat from coconut because they cook most food in coconut milk. Sixty two point five per cent (62.5%) of the dietary fat of people from Bicol Region is from coconut. Despite this, Bicol people's mortality rate from coronary and cerebrovascular disease is the lowest among the five important regions of Luzon Island, Philippines.

Recto (2000) and Macrohon (1995) found that oil from coconut is good cholesterol (HDL) and can help soften or clear bad cholesterol (LDL) that accumulate in the arteries. Coconut oil does not develop blockages in the arteries, and can prevent further obstruction later on.

The cholesterol contents of various fats and oils is shown in Table 1.

Coconut oil is uniquely rich (48%) in the 12 carbon fatty acid (lauric acid) which is generally classified as medium chain. Intestinal absorption and body transport of medium chain fatty acids differs from those of the longer chain. They are also more readily converted to energy. Body turnover rate of lauric acid is thus likely to be faster and storage in body fat is minimal (US Coconut for Coconut Research/Information brochure, 2000).

Table 1. Cholesterol content of various fats and oils (ppm).

Fat or Oil	Cholesterol Content (ppm)
Coconut oil	0-4
Palm oil	18
Soybean oil	28
Corn oil	50
Butter	3150
Lard	3500

(Adapted from Coconuts Today, 1994).

Fatty acids of 12 carbons or less do not require carnitine to enter mitochondria (Blackburn et al., 1989). Because of their rapid utilization for energy, the shorter chain fatty acids do not provide a large substrate pool for VLDL incorporation by the liver (Bach and Babayan, 1982).

The use of MCT has been suggested in the treatment of weight reduction of humans (Bach and Babayan, 1982). In lieu of the longer chain triglycerides (LCT) as those derived from soybean oil, corn oil, butterfat and other animal fats, the ingestion of a meal containing MCT results in a higher resting metabolic rate (RMR) for the individual, indicating a greater consumption of energy in calories, thus preventing the deposition of fat (Mascioli et al., 1989).

Other medicinal benefits from coconut oil's monolaurin was found to be cure for AIDS by destroying the AIDS virus (Nuguid, 1999). Monolaurin is a monoglyceride that has established potent antiviral, antibacterial and anti protozoal properties. Monolaurin breaks down fat coating of enveloped viruses such as HIV virus. This fat coating of the HIV virus insulates it from effects of anti-viral drugs as well as attacks by CD-4 cells or white blood cells which forms the body's defense against viruses. Tests tend to show that monolaurin breaks down the HIV virus' protective envelope by solubilizing the lipids and phospholipids in the envelope surrounding the virus (Enig, 1999). With its defenses down, the HIV virus can now be vulnerable to attacks by white blood cells or to the effects of anti-viral drugs.

Coconut water has varied medicinal value which is a proven therapeutic drink for those prone to high blood pressure. Because of its high contents of glucose and fructose, coconut water is a good source of intravenous fluid. Coconut water can be used as fluid for oral rehydration. Coconut water from mature coconut prevents formation of kidney stones (Macalalag, 2000). It is a dextrose substitute (Anzaldo, 1995). Fresh coconut milk has soothing and cooling effects on the body (Boceta, 1997).

Table 2 shows the nutritional value of coconut water, young coconut, and mature coconut.

Coconut water contains only 22 kilocalories compared to the other three coconut parts, but it is higher in carbohydrates content than cream and oil.

Coconut meat has the highest calcium content (33 mg%) while water and cream contains about 15mg% only.

Coconut cream contains 100 mg % phosphorus, meat has 77 mg%, and water only 6 mg%.

Table 2. Nutritional value of coconut water, coconut meat, coconut cream and coconut oil per 100 g sample. (Adapted form FCT, FNRI, 1989.

Component	Water	Meat	Cream	Oil
Water, g	94.4	84.3	56.9	Trace
Energy, Kcal	22	67	343	895
Protein, g	Trace	1.7	5.5	Trace
Fat	0.2	1.8	34.8	99.1
Carbohydrate, g	5.1	11.1	1.9	0.8
Crude Fiber, g	0	1.4	0	0
Ash, g	0.3	1.1	0.9	0.1
Calcium, mg	16	33	15	2
Phosphorus, mg	6	77	100	3
Iron, mg	0.2	1.3	1.6	Trace
Retinol, mcg	0	0	0	0
B-carotene, mcg	0	0	0	0
Total Vit.A (RE, mcg)	0	0	0	0
Thiamin, mg	Trace	0.02	0.02	Trace
Riboflavin, mg	Trace	0.03	0.01	Trace
Niacin, mg	Trace	1.1	0.3	Trace
Ascorbic acid, mg	Trace	10	Trace	0

Processing of Coconut Products
A. Coconut Water/Juice

Bottled Coconut Water

Fig. 1 Bottled coconut water.

Ingredients:
Coconut water/juice

Procedure:
- Wash young coconuts (8 months old).
- Obtain coconut water from the nut and strain in sterile cheesecloth.
- Pour into sterile bottles, seal, label and store in the freezer.
- To serve, thaw , and consume cold.

Coconut Drink

Fig. 2 Coconut drink.

Ingredients:

2	cups	coconut water from mature nuts more than 10 months old
2	cups	coconut milk

Procedure:

- Remove husk of mature coconut and obtain water.
- Grate coconut meat and extract coconut milk by adding 2 cups water, squeeze and strain.
- Mix coconut water and coconut milk to make coconut drink.
- Transfer coconut drink to sterile bottles, seal, label, and store in the freezer.
- To serve, thaw, shake and consume cold.

Coconut Beverage

Fig. 3 Bottled coconut beverage with slivered coconut meat.

Ingredients:

2	cups	coconut water from 8 months old nuts
1	cup	slivered coconut meat

Procedure:

- Wash young coconuts.
- Obtain water from the nut, strain thru sterile gauze.
- Scrape coconut meat using a shredder tool that yields slivered coconut meat.
- Mix coconut water and slivered meat.
- Transfer to sterile bottles, seal, label and store in the freezer.
- To serve, thaw frozen coconut beverage and consume cold.

Coconut Wine

Fig. 4 Bottled coconut wine.

Ingredients:

5	cups	coconut water from mature coconuts
1- ½	cups	refined sugar
1	Tbsp.	yeast

Procedure:

- Strain coconut water and measure. Add sugar, stir, and boil .
- Dissolve 1 Tbsp. yeast in lukewarm water. Add to coconut water and transfer to sterile glass jars. Cover jars with paper secured with rubber band. Ferment for 2 months. Decant the clear liquid and age for 3 months. Pasteurize wine by heating to 70° C for 20 minutes. Cool. Pour wine into sterile bottles, seal, label and store at room temperature.

Coconut Vinegar

Fig. 5. Bottled coconut vinegar.

Ingredients:

8	cups	coconut water from mature nuts
1	cups	sugar
1	Tbsp.	yeast

Procedure:

- Obtain coconut water from mature nuts, strain and measure.
- Add sugar and dissolved yeast and stir.
- Transfer to sterile glass jars and cover with paper secured by rubber band. Ferment for 4 weeks,
- Siphon the liquid and pasteurize at 70^{o} C for 20 minutes.
- Cool, pour into sterilized bottles, seal, label and store at room temperature.

Nata De Coco

Fig. 6 Sweetened nata de coco.

Ingredients:

Starter:

6	cups	coconut water
½	cup	sugar
1	Tbsp.	glacial acetic acid
1	tube	*Acetobacter xylinium*

Nata:

12	cups	coconut water from mature nuts
1	cup	sugar
2	Tbsp.	glacial acetic acid
¼	cup	nata starter

Procedure:

Starter

- Prepare nata starter by mixing all ingredients in preserving jars, half-seal, and sterilize in boiling water for 45 minutes.
- Tighten cover or seal completely and allow jars to cool.
- Add Acetobacter xylinium starter to sterilized media.
- Ferment for 5 days for the organism to multiply.

Nata

- Prepare nata by straining coconut water thru a cheesecloth.
- Add sugar and acetic acid and boil 10 minutes and cool.
- Add nata starter and distribute to wide-surfaced containers 3 inches deep.
- Cover containers with paper and ferment undisturbed for 2 weeks. Harvest nata when it is 1 inch thick.
- Wash thoroughly and cut into cubes, add equal amount of sugar and boil.
- Pack sweetened nata in preserving jars and sterilize in boiling water for 25 minutes. Seal tightly.

B. Processed Young Coconut

(8 Months Old Nuts)

Coconut Pie

Fig. 7. Coconut pie.

Ingredients:

Crust:

2- ½	cups	all-purpose flour
2-½	Tbsp.	sugar
½	tsp.	salt
¾	cup	shortening (Crisco)
1/3	cup	ice-cold water
1	pc	egg

Filling:

4	cups	scraped young coconut meat
½	cup	sugar
¾	cup	cornstarch
1	cup	evaporated milk

Procedure:

- In a mixing bowl, combine flour, sugar, and salt. Cut in shortening until mixture is crumbly.
- Combine cold water and egg, beat slightly. Pour this slowly with a fork. Mix dough into a ball. Place in a bowl, cover and refrigerate for 30 minutes.
- Preheat oven to 400° F. Divide dough into 2 portions. With a rolling pin, roll out 1 portion to about 1/4 inch thick to cover a 9-inch pie pan. Trim off excess dough around the pie pan rim.
- Bake in oven for 10 minutes. Cool.
- Combine scraped coconut meat, milk and sugar and boil. Add dissolved cornstarch and stir until thickened. Set aside.
- Preheat oven to 400° F.
- Pour coconut filling into the crust pie dough and cover pie with rolled dough. Pinch edges with fork tines.
- Bake 20 minutes or until crust turns light brown.

Coconut Salad

Fig. 8 Coconut salad.

Ingredients:

3	pcs	young coconut meat, diced/slivered
1	can	pineapple, diced
1	bottle	nata de coco
1	bottle	sweetend palm (kaong)
1	can	Nestle's cream

Procedure:

- Mix all ingredients.
- Refrigerate and serve.

Coconut Pudding

Fig. 9 Coconut pudding.

Ingredients:

8	slices	loaf bread
1	cup	evaporated milk
3	pcs.	egg
½	cup	sugar
1	cup	scraped young coconut
1	Tbsp.	brown sugar

Procedure:

- Tear slices of loaf bread into small pieces. Soak the pieces of bread in milk. Press on the lumps with a fork until the mixture is smooth.
- Mix in the eggs, sugar, and coconut. Spread 1 Tbsp. brown sugar at the bottom of loaf pan. Heat over low fire to caramelize sugar. Pour mixture into the pan, steam for 20 minutes.

Coconut Pandan Dessert

Fig. 10 Coconut-pandan dessert.

Ingredients:

2	cups	slivered young coconut
½	cup	sugar
1	bar	green gelatin (dried seaweed gel)
5	pcs.	Pandan leaf
2	cups	water
1	cup	flour
2	pcs	eggs

Procedure:

- Boil 2 cups water and 5 pieces pandan leaf. Remove leaves and set aside.
- Tear up green gelatin into small pieces and dissolve by boiling in 2 cups pandan water for 2 minutes or until no more solids.
- Add slivered coconut meat and sugar. Cool to lukewarm and transfer to molding trays. Let stand at room temperature. Gelatin sets when the mixture cools.
- Beat eggs, mix in flour and mix well. Transfer 1/4 cup in greased frying pan and tilt until mixture is spread.
- Wrap gelatin and fold over. Garnish.

Coconut Turnover

Fig. 11 Coconut turnover.

Ingredients:

Wrapper:

2	cups	all-purpose flour
½	cup	shortening
1	pc	egg
1	cup	water

Filling:

2	cups	young coconut meat, chopped
1	can	green peas
1	cup	chicken, boiled, chopped

Procedure:

- To make wrapper, sift flour and cut in shortening with a knife.
- Add slightly beaten egg and water and mix well. Do not knead.
- Divide dough into 2 parts. Roll out and form with a plate rim.
- To prepare filling, sauté garlic, onion, and chicken in oil and add chopped young coconut and green peas and mix well.
- Place 2 tablespoon filling on each wrapper, fold over and press edge with fork tines.
- Bake at 350°F for 15 minutes or fry in hot oil.

Coconut Pancakes

Fig. 12 Coconut pancakes.

Ingredients:

1 - ½	cups	all-purpose flour
1	cup	young coconut meat, chopped
½	cup	sugar
1	Tbsp.	baking powder
½	tsp.	salt
2	pcs.	eggs
1	cup	evaporated milk
2	Tbsp.	oil

Procedure:

- Sift together flour, baking powder, sugar, and salt.
- Combine egg and milk.
- Add sifted flour mixture to egg-milk mixture and stir well. Mix oil and add chopped young coconut.
- Cook pancake in greased skillet and turn when puffy.
- Serve with syrup or peanut butter.

Sweetened Coconut

Fig. 13 Sweetened coconut.

Ingredients:

2	cups	young coconut
1	cup	evaporated milk
2 - ½	cups	sugar

Procedure:

- Mix all ingredients.
- Cook gently until mixture is thick.
- Cool and transfer to serving tray.

C. Mature Coconuts

Coconut Candy

Fig. 14 Coconut candy.

Ingredients:

2	cups	grated coconut
1	cup	powdered milk
2 - ½	cups	sugar
2/3	cup	brown sugar

Procedure:

- Mix all ingredients and boil.
- Cook gently until the mixture is thick.
- Pour into greased pans. Cool.
- Cut into pieces and wrap in cellophane.

Coconut Jam

Fig. 15. Coconut jam.

Ingredients:

2	cups	thick coconut milk
1 - ½	cups	brown sugar
1	Tbsp.	Cornstarch

Procedure:

- Mix sugar with thick coconut milk and cook until droplelts form.
- Thicken with cornstarch dissolved in 1/4 cup water.
- Pour jam in a sterilized jar with new cap. Seal, label and store at room temperature.

Rootcrop-Coconut

Fig. 16. Root crop-coconut mix

Ingredients:

2	pcs.	coconut, grated
5	cups	water
2	cups	taro, cubed
2	cups	cassava, cubed
2	cups	sweet potato, cubed
½	cup	sago
2	cups	ground glutinous rice
5	pcs	cooking banana cubed
2	cups	sliced jackfruit
1	cup	sugar

Procedure:

- Mix 2 cups grated coconut and 1/2 cup water and squeeze out about 1 cup coconut milk. This is thick coconut milk, Pour 4-1/2 cups water again to the grated coconut and squeeze out 5 cups coconut milk (thin milk). Transfer to a stock pot and boil.
- Add taro, cassava, sweet potato and sago and simmer until tender, with constant stirring.
- Shape powdered rice moistened with water into small balls and drop into the simmering mixture.
- Stir in bananas, and jackfruit, and simmer 10 minutes.
- Blend in sugar and 1 cup thick coconut milk.
- Cool and serve.

Coconut-Taro Leaves

Fig. 17 Coconut-taro leaves.

Ingredients:

1	lb	taro leaves with stems
2	pcs	coconuts, mature
5	cups	water
1	Tbsp.	oil
1	Tbsp.	crushed garlic
1	Tbsp .	crushed ginger
1	cup	chopped onion
1	cup	diced pork
5	pcs	red hot pepper

Procedure:

- Cut taro leaves and stems into 1- inch pieces.
- Grate 2 coconuts. Get 1 cup thick coconut milk by adding 1 cup water to grated coconut and squeeze.
- Pour remaining water to grated coconut and make a second extraction of milk.
- In a sauce pan heat oil and sauté garlic, onion, ginger and pork.
- Add second extraction of coconut milk and simmer. Add taro leaves and stems and simmer until tender.
- Add thick coconut milk and simmer 10 minutes.
- Cool and serve.

Coconut Milk Custard

Fig. 18 Coconut milk custard.

Ingredients:

1	cup	thick coconut milk
2	pcs.	eggs
½	tsp.	salt
2	Tbsp.	brown sugar
1	tsp.	vanilla
½	cup	sugar
¼	cup	water

Procedure:

- Combine eggs, coconut milk, salt, sugar, and vanilla, beat lightly and strain.
- Caramelize brown sugar by melting it over slow fire until brown.
- Line mold with caramelized syrup and pour egg-coconut milk mixture.
- Steam over medium flame for 15 minutes or until a toothpick stuck at the center comes out clean.

Coconut-Rice Cake

Fig. 19. Coconut-rice cake.

Ingredients:

1	cup	rice flour
½	cup	thick coconut milk
½	cup	slivered young coconut
3	Tbsp.	melted margarine
2	pcs.	eggs
¾	cup	sugar
4	tsp.	grated cheese

Procedure:

- Beat egg, add sugar, melted margarine and coconut milk.
- Mix rice flour and young coconut. Add 2 tsp. cheese and mix well.
- Line a round pan with banana leaves and pour in the mixture.
- Bake in moderate oven.
- Brush with margarine and sprinkle top with a little sugar and cheese.

Coconut-Fish

Fig.20. Coconut-fish.

Ingredients:

3	med.	fish
2	cups	coconut milk
3	med	tomatoes
6	segment	garlic
1	pc	onion, sliced
1	small pc	ginger, crushed
2	tsp.	salt
6	pcs	pechay leaves

Procedure:

- Mix tomatoes, garlic, onion, and ginger with coconut milk and season with salt.
- Lay fish on top of 2 pechay leaves, season with 2 Tbsp coconut milk mixture and fold leaves over. Arrange by layer in a saucepan.
- Cover with remaining milk mixture.
- Cook over moderate heat for 10 minutes.
- Cool and serve.

Coconut-Anchovies

Fig. 21 Coconut-anchovies

Ingredients:

1	cup	fresh anchovies
2/3	cup	thick coconut milk
12	pieces	taro leaves
6	pieces	green pepper, cut into strips
1	tsp.	salt
3	Tbsp.	vinegar
1	small pc.	ginger, crushed

Procedure:

- Mix tomatoes, garlic, onion, and ginger with coconut milk and season with salt.
- Lay fish on top of 2 pechay leaves, season with 2 Tbsp coconut milk mixture and fold leaves over. Arrange by layer in a saucepan.
- Cover with remaining milk mixture.
- Cook over moderate heat for 10 minutes.
- Cool and serve.

Coconut-Shrimp

Fig. 22 Coconut-shrimp.

Ingredients:

2	pcs.	young coconuts, slivered
2	cups	shrimp, peeled and chopped
3	pcs.	hot pepper
1	cup	thick coconut milk (1st extract)
1	cup	thin coconut milk (2nd extract)
1	small	onion
1	tsp.	salt

Procedure:

- Mix chopped shrimps, coconuts, and onion. Add salt and pepper.
- Wrap 2 Tbsp. mixture in taro leaves.
- Arrange in pot and pour over thin coconut milk, cover and simmer.
- Add thick coconut milk and hot pepper.
- Continue cooking until sauce thickens.
- Cool and serve.

Coconut-Eggplant

Fig. 23 Coconut-eggplant.

Ingredients:

1	cup	thick coconut milk
½	cup	vinegar
1	tsp.	pepper corn
2	tsp.	salt
6	pcs.	eggplant

Procedure:

- Place all the ingredients in a pan except eggplant, and simmer with constant stirring.
- Add washed whole eggplants and cook for 15 minutes.
- Cool and serve.

Coconut Brownies

Fig. 24 Coconut brownies.

Ingredients:

1	cup	all-purpose flour
1	cup	grated coconut
1	cup	margarine
2	cups	sugar
6	pcs	eggs
1	tsp.	vanilla
½	Tbsp.	baking soda
½	tsp.	salt
1	cup	cocoa
1	cup	chopped nuts

Procedure:

- Cream margarine then add sugar gradually.
- Add eggs one at a time mixing well after each addition. Mix in vanilla.
- Mix together all purpose flour, grated coconut, baking soda, salt and cocoa.
- Add flour mixture to creamed margarine and mix well. Add 1/2 of chopped nuts.
- Pour into greased pans. Top with remaining nuts.
- Bake at 350° F for 15 minutes.

Coconut Cake

Fig. 25 Coconut cake.

Ingredients:

2-½	cups	all purpose flour
2	cups	coconut, grated
1-¼	cups	sugar
½	tsp.	Salt
2	tsp.	baking soda
2	tsp.	baking powder
1	cup	oil
6	pcs.	eggs
1/8	tsp	cream of Tartar
1/3	cup	brown sugar

Procedure:

- Sift together flour, sugar, salt, baking soda and baking powder in a bowl.
- Make a well at the center and put oil, egg yolk, and coconut. Mix.
- Beat egg whites with cream of Tartar until soft peaks form and add sugar gradually, beat until stiff. Fold in batter.
- Pour batter into prepared loaf pans.
- Bake at 350° F for 1 hour.

Coconut Cookies

Fig. 26. Coconut cookies.

Ingredients:

4	cups	all purpose flour
2	cups	grated coconut
1 - ½	Tbsp.	baking powder
1 - ¼	cups	sugar
3	pcs	eggs
1	Tbsp.	vanilla

Procedure:

- Sift together flour and baking powder.
- Cream margarine and sugar. Add egg one at a time and add vanilla. Fold in sifted flour mixture.
- Knead dough, place inside a plastic bag and roll. Shape cookies with empty can ends.
- Bake at 300° F for 20 minutes.

Coconut Crepes

Fig. 27 Coconut crepes.

Ingredients:

2	cups	all purpose flour
2	cups	milk from grated coconut
2	cups	young coconut, scraped
2	cups	flour
2	pcs	eggs

Procedure:

- Scrape young coconut, set aside.
- Extract thick milk from grated mature coconut. Set aside.
- Prepare wrapper by mixing beaten egg and flour and spreading 1/4 cup mixture in greased pans.
- Wrap young coconut with the prepared wrapper, fold.
- Pour thick coconut milk on top of crepes.

Coconut Bread

Fig.28 Coconut bread.

Ingredients:

4	cups	all purpose flour
1 - ½	cups	grated coconut
½	cup	powdered milk
1 - ½	cups	sugar
4	cups	water
1	Tbsp.	yeast
1	Tbsp.	vanilla
½	cup	shortening (Crisco)
1	pc	egg
½	tsp.	Salt

Procedure:

- Dissolve yeast in lukewarm water and set aside to bubble.
- Mix flour, milk, salt, coconut, shortening, and egg.
- Mix yeast to the dry ingredients.
- Knead dough until smooth and elastic.
- Cut into 4 equal parts and rest 30 minutes in a dark place.
- Roll evenly and cut into small sizes.
- Arrange in trays and proof for 45 minutes in an unlighted oven.
- Bake at 300° F for 15 minutes.

Macaroons

Fig. 29 Macaroons with raisins and glazed fruit.

Ingredients:

3	cups	grated coconut
2	cups	all purpose flour
½	cup	margarine
3	pcs.	eggs
1	can	condensed milk
2	tsp.	baking powder
1	Tbsp.	vanilla
½	cup	sugar
1	cup	raisins and glazed fruit (optional)

Procedure:

- Mix together all ingredients and blend well.
- Place 1 Tbsp. mixture into paper cups and arrange in baking sheets.
- Top with raisins and glazed fruit.
- Bake in preheated oven at 350° F for 20 minutes.

Coconut-Roasted Cassava

Fig. 30. Coconut-roasted cassava.

Ingredients:

2	cups	grated cassava
1	cup	sugar
1	cup	thick coconut milk

Procedure:

- Mix grated cassava and sugar.
- Wrap 1/2 cup mixture in banana leaves and roast over fire.
- Cut into pieces and top with thick coconut milk.

Coconut Steamed Cake

Fig. 31 Coconut-steamed cake.

Ingredients:

3	cups	grated coconut
3	cups	all purpose flour
½	cup	sugar
1	Tbsp.	baking powder
2	Tbsp	margarine
1	cup	evaporated milk
2	cups	water

Procedure:

- Combine all ingredients and mix with sell.
- Pour our mixture into muffin pans.
- Steam for 20 minutes.

Coconut-Cassava

Fig. 32 Coconut-cassava

Ingredients:

2	cups	grated cassava
2	cups	pandan water (5 leaf in water)
1	cup	sugar
2	cups	grated coconut

Procedure:

- Mix grated cassava, pandan water and sugar.
- Steam mixture for 10 minutes or until solidified.
- Scoop out 1/4 cup steamed cassava and roll in grated coconut.

Coconut Pastilles

Fig. 33 Coconut pastilles.

Ingredients:

1	can	condensed milk
1	cup	grated coconut

Procedure:

- Mix milk and coconut.
- Cook over low fire until thick. Cool and roll mixture between 2 sheets of plastic.
- Cut into pieces and wrap in cellophane.

Coconut Crabs

Fig. 34 Coconut crabs.

Ingredients:

1	lb	crab, cut into serving pieces
3	pcs.	hot pepper
1	cup	thick coconut milk (1st extract)
1	cup	thin coconut milk (2nd extract)
1	small	onion
1	tsp.	salt
½	tsp	pepper

Procedure:

- Mix cut crabs, thin coconut milk, and onion in a pan.
- Add salt and pepper.
- Cover and simmer.
- Add thick coconut milk and hot pepper.
- Continue cooking until sauce thickens.
- Cool and serve.

Coconut Stuffed Crabs

Fig. 35 Coconut stuffed crabs.

Ingredients:

10	pcs	land crabs
1	cup	thick coconut milk
2	tsp.	salt

Procedure:

- Boil crabs and separate shells. Pick meat and stuff into the shells.
- Add thick coconut milk on top of the crabmeat.
- Refrigerate to harden coconut milk and serve.

Coconut Crab Omelet

Fig. 36. Coconut-crab omelet.

Ingredients:

10	pcs	land crabs, boiled
1	cup	thick coconut milk
3	pcs	eggs
4	Tbsp	oil
1	tsp	salt
½	tsp	pepper
1	small	onion, chopped

Procedure:

- Separate crab shells from the body and pick crab meat.
- Mix crabmeat, coconut milk, salt, pepper, and scrambled egg.
- Stuff into crab shells.
- Fry in hot oil.

Coconut Yoghurt

Fig. 37 Coconut yoghurt.

Ingredients:

1	cup	thick coconut milk
1	cup	milk
1	tsp	yoghurt starter or 1/2 cup yoghurt

Procedure:

- Extract 1 cup thick coconut milk by adding 1 cup water to grated coconut from one nut and squeeze.
- Mix together thick coconut milk and milk. Add yoghurt starter.
- Pour into clean containers, cover and ferment undisturbed for one day.

Frozen Bottled Coconut Cream

Fig. 38 Frozen bottled coconut cream

Ingredients:

2	pcs	coconut, mature
2	cups	water

Procedure:

- Grate 2 coconuts
- Extract coconut cream from grated coconuts by adding 2 cups water and squeeze.
- Strain and transfer to sterilized bottles, seal, label, and freeze.

Virgin Coconut Oil

Fig.39 Virgin coconut oil.

Ingredients:

2 pcs mature coconuts

Procedure:

- Grate coconut from 2 pieces mature nuts.
- Add 1 cup water and squeeze to get coconut cream.
- Transfer to clean glass jars and refrigerate overnight.
- Separate oil which is the upper phase from the lower phase.
- This is virgin coconut oil which is clear like water.
- Transfer to sterile bottles, seal, and label.

PACKAGING STUDIES OF COCONUT PRODUCTS

Frozen coconut products were found stable when packed in sterile PET bottles. Prepared food products packed in 0.5 mil thick PE or PP bags and stored at freezer temperature were found very stable for more than 6 months. Fermented products like wine and vinegar packed in sterile PET bottles were also stable for two years or longer at room temperature.

Coconut wine and vinegar on storage studies are shown in Fig. 40.

Fig. 40.Coconut wine and vinegar on storage.

CONSUMER AND MARKET TESTS OF COCONUT PRODUCTS

Coconut food products were evaluated by visitors of R & D Station (see Fig.41)and during food exhibits in civic events like Olechotel Belau Fair, Independence Day, Earth Day, Career Awareness Week, and many other occasions.

Tourists were able to taste the products during a "Taste of Palau" event sponsored by the Palau Visitors' Authority and they signified their interest to buy the products if sold in the market.

Fig. 41. School children tasting coconut products.

TECHNOLOGY TRANSFER OF PROCESSED COCONUT PRODUCTS

Selected coconut food products were taught to more than 636 participants of Food Technology Classes in a 24-hour training period, usually done in a three-week, 2-hour per day
sessions.

Fig. 42. Participants of Food Technology Class in Peleliu State.

Table 3. 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
Madalaii 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**

IMPACT

Coconut products can be used to benefit the food industry development in Palau. The economic value that the products can contribute is to support the agriculture sector, despite being a subsistence agriculture system at present. This initiative contributes to the Gross Domestic Product (GDP) from agriculture, which declined from 9.9% in 1983 to 2.9% in 1992 (LGP-COM). The project also help reduce the consumption of imported foods which has led to an overall decline in food production in Palau, resulting in trade imbalance. Moreover, the processing of coconut products can lead to microenterprise development with sound market potentials. Bringing the technologies to the farm level in PCC-CRE outreach programs can bring about an increase in farmers' household income, leading to countryside development. Coconut processing can bring down retail prices of food products in the rural areas, while increasing farmers' share in the prices of their value-added produce. Such endeavors employ women workers in the farm, increasing their productivity and improving their entrepreneurial skills. The initiative can boost the nutritional status of farmers, their families, and children by making available nutritious products for their table. The development of processed food products from coconuts help support the tourism industry, the lifeblood of Palau economy, by making available local foods for tourists.

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