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# Women of Buluan: Crackling Weeds in the Sea

The morning air blew and caressed the local women's faces as they took full strides toward the shoreline where they grew their seaweed in their respective areas. Rosalie Inso, president of the Buluan Women's Association, walked toward her own area, with the hope that the seedlings she would plant today would grow to be healthy and of good quality.

The shoreline in the early morning hours with the sun peering through the clouds was nothing short of paradise. The sand, mixed with pebbles and seashells, was both rough and comforting to the soles of their feet. This would have been a perfect place to relax and unwind, but for Inso and the rest of the seaweed planters, this was the very place where they toiled so they could survive and support themselves.

Inso, together with other women in her community, started to manufacture crackers made of seaweed to help support their families' needs. Their Buluan Women's Association started making the seaweed crackers almost three years ago. Now in 2016, they still faced the challenge of improving their products' quality. As she glanced at the site where her seedlings were planted, Inso thought to herself, would the harvest be sufficient to sustain the cracker business that they started? In what manner would she be able to better improve the quality of seaweed that they produced and processed as crackers?

## Seaweed Crackers: A Timeline

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Rosalie Inso was the housewife of a local fisherman in Buluan,<sup>i</sup> Ipil,<sup>ii</sup> Zamboanga Sibugay.<sup>iii</sup> Buluan was a community surrounded by a huge body of water. The community was located four hours from Zamboanga City.<sup>iv</sup> The majority of its male populace engaged in fishing as their source of livelihood. While the husbands set themselves to fishing activities, their wives were left at home to fend for their families.<sup>1</sup>

In 2011, the women in Buluan organized the Buluan Women's Association because the fishermen's families needed to have alternative sources of income to meet their livelihood needs.<sup>2</sup> By year 2012, Zamboanga Peninsula became a major seaweed producing region, contributing about 12% of the total national production, and 20% of the total seaweed production in Mindanao.<sup>v</sup> Zamboanga Sibugay was the largest seaweed contributor in the region, with 46% of the total production share.<sup>3</sup>

By the year 2014, the Buluan Women's Association was given seed capital under the Bottoms Up Budgeting Program of the Department of Agriculture<sup>vi</sup> and Local Government Units<sup>vii</sup> of Ipil, amounting to Php250,000<sup>viii</sup> (USD5000) to serve as start-up capital for seaweed cracker production. A year later, they also received a grant of machineries and equipment under the Siglang Pinoy Program of the Department of Science and Technology<sup>ix</sup> and Local Government Units of Ipil worth Php223,000 (USD4,546). A refurbished building worth Php500,000 (USD10,000) was also given to them by the LGU's for their production of their seaweed noodles and crackers.<sup>4</sup>

The organization was also involved in various important activities. The members actively participated in coastal clean-up drives and mangrove rehabilitation.<sup>5</sup> They also became a member of the management committee that oversaw the protection of the Buluan Island Marine Sanctuary.<sup>x</sup>

## Seaweeds Industry Overview, the Product, and the Raw Materials

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### The Seaweeds Industry in the Philippines

The Philippines was a major player in the seaweed and carrageenan industry. Seaweed production accounted for 60% of total aquaculture production, producing 1.8 million MT<sup>xi</sup> of seaweed valued at over USD212 million each year as of 2014.<sup>6</sup>

Although the Philippines had been the top supplier of raw dried seaweed in the world, providing 70% of global supply of raw dried seaweed, by 2014, the Philippines was third, after China and Indonesia,

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i Buluan is one of the Barangays of Ipil, Zamboanga Sibugay.

ii Ipil is a first class municipality and the provincial capital of Zamboanga Sibugay, Philippines.

iii Zamboanga Sibugay is a province in the Philippines located in the Zamboanga Peninsula Region in Mindanao.

iv Zamboanga City is a highly Urbanized City located in Mindanao Philippines, and is the 6th most populous and 3rd largest City by land in the Philippines.

v Mindanao is the second largest and southernmost major island in the Philippines.

vi Department of Agriculture (DA) is the Executive department of the Philippine Government responsible for the promotion of agricultural and fisheries development and growth.

vii LGUs is officially local government in the Philippines, often called Local Government Units and are divided into three levels- provinces and independent cities; component cities and municipalities; and barangays.

viii The Forex rate of 1 USD=49.1912 PHP as of November 14, 2016 has been used in this and all subsequent USD/PHP conversions <http://www.xe.com/currencyconverter/convert/?From=USD&To=PHP>

ix Department of Science and Technology (DOST) is the executive department of the Philippine Government responsible for the coordination of science and technology related projects in the Philippines.

x Buluan Island Marine Sanctuary (BIMS) is a gem in Zamboanga Sibugay's municipal capital of Ipil. Buluan Island is actually private property but it does not stop locals from visiting the place.

xi Metric tons

contributing only 40% of global RDS<sup>xii</sup> supply. But the country remained the top supplier of carrageenan in the world, serving 65% to 70% of worldwide demand.<sup>7</sup>

In 2013, Philippine seaweed production was at 1,558,377.74 MT (fresh/wet volume), with Mindanao accounting for 57.35%. Of the 893,799.32 MT of fresh seaweed produced in Mindanao, 68.15% came from ARMM<sup>xiii</sup>, accounting for 39.09% of the Philippine total production in 2013. Zamboanga Peninsula contributed 24.48% to Mindanao production while contributing 14.04% to the total nationwide production. Northern Mindanao had the third highest production volume at 42,261.32 MT, comprising 4.73% of the Mindanao production or 3% of Philippine production (**See Exhibit 1**).<sup>8</sup>

Although 21 provinces in Mindanao had seaweed production, only 14 of these provinces had production volume above 100 MT per year. About 85% of Mindanao's production came from the top 5 seaweed producing provinces, namely: Tawi-tawi, Sulu, Zamboanga Sibugay, Maguindanao, and Zamboanga City. In 2013, Tawi-tawi and Sulu accounted for 57% of the seaweed production in Mindanao.<sup>9</sup>

### Seaweed Crackers

Seaweed crackers were made of flour and seaweed mixed together with other ingredients (spices, salt, etc.). The crackers did not require refrigeration, so they could be eaten as part of a sack lunch or for a snack away from home.

Seaweed crackers were fat-free, low in sodium, and had dietary fiber, providing health benefits against high cholesterol, high blood sugar levels, and high blood pressure.<sup>10</sup> Seaweed crackers were safe for consumption by children and adults alike.

### Seaweeds

Seaweeds or macroalgae are multicellular eukaryotic algae. They are classified as algae because they are plants in the sea that have no true roots (rhizoids), stems and leaves. They are classified into four main groups: the red algae (Rhodophyceae)<sup>xiv</sup>, brown algae (Phaeophyceae)<sup>xv</sup>, green algae (Chlorophyceae)<sup>xvi</sup>, and the blue green algae (Cyanophyceae).<sup>xvii</sup> Among these varieties, *Eucheuma* or red seaweeds were the most economically important variety in the Philippines, accounting for 98% of the total Philippine production. *Eucheuma* was the source of carrageenan, one of the world's foremost food and industrial additives on the market in 2014. (**See Exhibit 2**).<sup>11</sup> Some of the products that could be prepared from *eucheuma* were seaweed pickles, seaweed noodles, and seaweed crackers.

This food was high in iodine, calcium, magnesium, iron, vitamins C and A, protein, Vitamins B, fiber and, alpha linoleic acid, EPA, and much more.<sup>12</sup>

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xii RDS stands for Raw Dried Seaweed

xiii ARMM stands for Autonomous Region in Muslim Mindanao

xiv Red algae, a large group of algae that includes many types of seaweed that is mainly red in color. Some kinds yield useful products (agar, alginates) or are used as food (laver, dulse, carrageen).

xv Brown algae, is an algae belonging to a large group that includes many seaweeds, typically olive brown or greenish in color. They contain xanthophyll in addition to chlorophyll.

xvi Green algae, is photosynthetic algae that contain chlorophyll and store starch in discrete chloroplasts. They are eukaryotic and most live in fresh water, ranging from unicellular flagellates to more complex multicellular forms.

xvii Blue-green algae are most often blue-green in color, but can also be blue, green, reddish-purple, or brown, generally grow in lakes, ponds, and slow-moving streams when the water is warm and enriched with nutrients like phosphorus or nitrogen. Also known as Cyanobacteria.

### **Seaweeds Planting**

The seaweed planting started with the setting of lines made of nylon where the seaweeds cultivars<sup>xviii</sup> (seedlings) would be tied up. Sources of cultivars could come from cuttings of the other mature seaweeds or from other sources. The seaweed was then grown for two months.

During the two-month growing period, daily or frequent washing/cleaning had to be done to remove dirt attached to the seaweed. Too much dirt or debris would prevent good growth due to poor photosynthetic activity.<sup>xix</sup>

### **Harvesting**

When the seaweed reaches two months of age, it is ready for harvesting, to be processed as either dried or fresh seaweed. Other seaweed farmers who wish to expand their production could buy the fresh seaweed to use the freshly harvested seaweed as their cultivar..

## **Processing Equipment, Functions and Process Flow**

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### **Processing Equipment and Functions**

Processing of seaweed into seaweed crackers required eight types of equipment. First, an electric blender was needed to mix, puree or emulsify the food. The blender consisted of a blender jar with a rotating metal blade at the bottom, powered by an electric motor in the base. (See Exhibit 3a.) Second, a fabricated Dough Mixer homogenized the mixture for the seaweed crackers without any trace of a stagnant region. The dough mixer was a vertical spindle type machine with a coupled agitator to the lower end of shaft driven by an electric motor. (See Exhibit 3b.) Third, a Fabricated Dough Roller Machine kneaded the dough to make it smoother and finer. The machine was made of heavy materials, cast iron rollers and parts, being effective as well as economical. (See Exhibit 3c.) Third, a Fabricated Dough Cutter -- which was a forming machine with a full-width cutting apron -- was used to cut shapes of dough and remove scrap. (See Exhibit 3d.)

The final four types of equipment were used in the cooking and packaging of the seaweed crackers. First, a Stainless Steel Steamer was used to cook the crackers with steam heat. The steamer was made a sturdy and durable metal and had a three-ply base with aluminum or copper core bonded together to provide even heat distribution and make base thicker and more durable. (See Exhibit 4a.) Stainless Steel Trays were used to lay the seaweed crackers out to dry in the sun before frying. The trays had stain- and corrosion-resistant properties that made them easy to keep clean and be lightweight for carrying. (See Exhibit 4b.)

Sun-dried seaweed crackers were put into a Stainless Steel Wok (see Exhibit 4c) for frying prior to seasoning and packaging. The wok was highly responsive to burner input, had nonstick surface, and was durable and inexpensive. Finally, an Electric Hand Sealer was used to seal and package the products with thermoplastic materials using heat. (See Exhibit 4d.)

### **Process Flow**

First, the seaweed was ground into a fine, watery dispersion (thin batter) by using electric blender. Next, flour, fine salt, water and other spices were added and mixed thoroughly in a dough mixer to a homogenized mixture. Then the dough was rolled in the dough roller machine until the desirable texture

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xviii Cultivars, is a plant variety that has been produced in cultivation by selective breeding.

xix Photosynthesis is a process used by plants and other organisms to convert light energy into chemical energy that can later be released to fuel the organisms' activities (energy transformation).

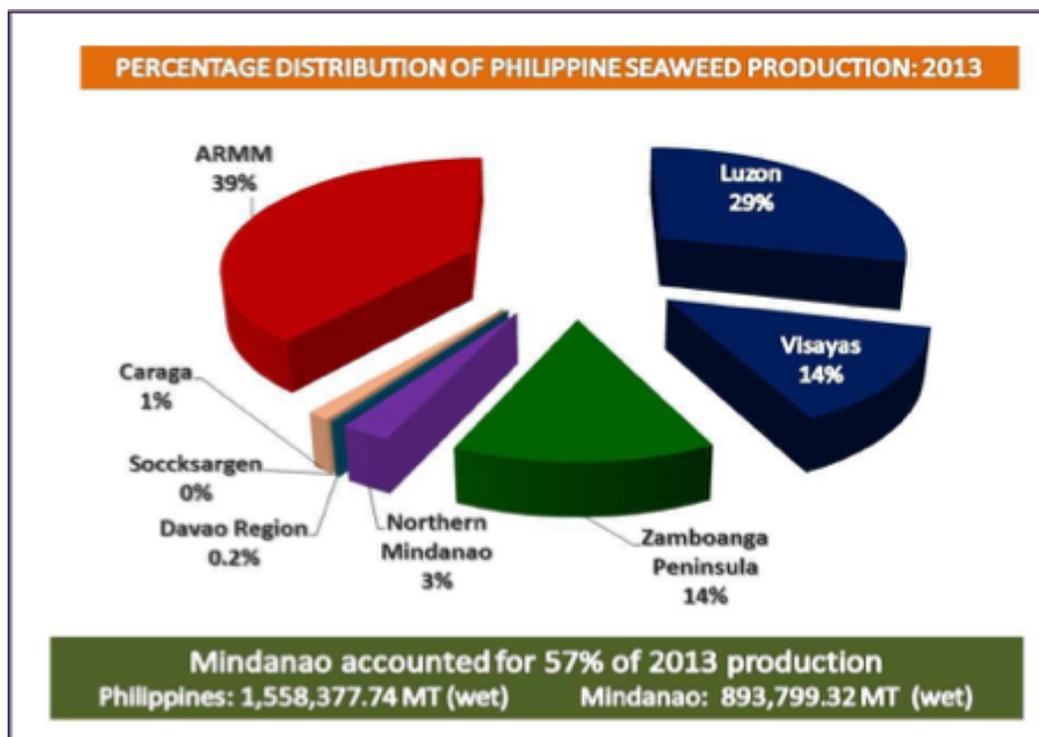
and appearance was acquired. The dough was then put into the dough cutter to reduce and sheet the dough to a typical thickness and then cut it into bite size pieces (2.5 to a 5 cm square). Finally, the crackers were steamed for at least two minutes and then laid out on trays to dry under the sun for six hours or until crisp. Finally, the crackers were fried in hot oil until golden brown and placed on paper napkins to remove excess oil. The final touch was a sprinkling of salt, and then the crackers were packaged, labeled and sealed, ready for market distribution.

Typically, the above processing took place when the Bulan Women's Association received an order. When orders were received, the organization held a meeting with its members to assign when to process the order. The production was based on demand. The association's plan was to establish a buyer all year round, so that production could be done throughout the year.

## The Dilemma

Inso, together with the members of the Bulan Women's Association, produced the seaweed crackers to serve as an alternative for the residents, because the profit in fishing wasn't always enough to support them. With this alternative source of income, Inso was left wondering, was she planting and producing enough seaweed such that she could continue with the cracker business? If so, were the crackers that the association produced able to meet a certain quality standard that would make them saleable and be a product that the consumers would continually demand?

**Exhibit 1**  
**Domestic Production of Seaweed**



Source: Department of Agriculture Mindanao Regions, Philippine Rural Development Project (PRDP) I-PLAN Component Mindanao Cluster; Value Chain Analysis and Competitiveness Strategy: Carrageenan Seaweed Mindanao. October 2014

**Exhibit 2**  
**Eucheuma**



*Source: Department of Agriculture Mindanao Regions, Philippine Rural Development Project (PRDP) I-PLAN Component Mindanao Cluster; Value Chain Analysis and Competitiveness Strategy: Carrageenan Seaweed Mindanao. October 2014.*

**Exhibit 3**

**Equipment used by Buluan Women Association for their Seaweed Cracker Production**



Source: Buluan Women Association. Sept. 11, 2016.

**Exhibit 4**

**Equipment used by Buluan Women Association for their Seaweed Cracker Production**



Source: Buluan Women Association. Sept. 11, 2016.

**Exhibit 5**  
**Finished Product: Seaweed Crackers**



Source: Buluan Women Association. Oct. 23, 2016.

## Endnotes

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- 1 Interview with Rosalie A. Inso: Sept. 11, 2016
- 2 Interview with Felix Badon (LGUs Officer, Ipil, Zamboanga Sibugay): Aug. 30, 2016
- 3 Interview with Bureau of Fisheries and Aquatic Resources (BFAR) personnel: Sept. 30, 2016, source: Seaweeds Industry in Region IX, May 23, 2012.
- 4 Interview with Felix Badon (LGUs Officer, Ipil, Zamboanga Sibugay): Aug. 30, 2016
- 5 Ibid.
- 6 Nobleza, Jonah S., Department of Agriculture Philippine Rural Development Project enabling communities...expanding opportunities: Value Chain Analysis for Seaweeds. 2014.
- 7 Ibid.
- 8 Department of Agriculture Mindanao Regions, Philippine Rural Development Project (PRDP) I-PLAN Component Mindanao Cluster; Value Chain Analysis and Competitiveness Strategy: Carrageenan Seaweed Mindanao. October 2014.
- 9 Ibid.
- 10 Stein, Natalie. Nutrition for Seaweed Cracker Snacks. October 30, 2011. Accessed 22 October 2016. <http://healthyeating.sfgate.com/nutrition-seaweed-cracker-snacks-1115.html>
- 11 Department of Agriculture Mindanao Regions, Philippine Rural Development Project (PRDP) I-PLAN Component Mindanao Cluster; Value Chain Analysis and Competitiveness Strategy: Carrageenan Seaweed Mindanao. October 2014.
- 12 Wolfe, David. Seaweed Health Benefits. 2010. Accessed 22 November 2016. <http://www.thebestofrawfood.com/seaweed-health-benefits.html>