

Maya Nut in the Modern Market

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Introduction

One aspect of USAID and Guatemala's initiative Climate, Nature and Communities in Guatemala (CNCG), which is administered by the Rainforest Alliance, is focused on development of forest products that can be sustainably harvested. A non-timber forest product (NTFP) gaining attention is the Maya Nut or *ramón* seed, as it is known in Guatemala, which has a variety of prospective uses for regional and international markets. Strengthening the seeds' value chain has the potential to not only protect the forest, but also support human development—a sector of particular importance for the rural population of Guatemala. Vulnerable groups, specifically girls and women, children and youth, and indigenous populations have the opportunity to benefit from the commercialization of the *ramón* seed.

From May 23rd to August 1st 2016, a team of three graduate students from the University of Minnesota and Emory University—with support from Dr. Dean Current from the Center for Integrated Natural Resource Management (CINRM) at the University of Minnesota—worked with the Committee for the Value Chain of the Ramón Seed in Petén, Guatemala. The team's objective was to conduct research in support of the commercialization of *ramón* seed and produce information and practical tools for the use of the committee and its members. With help and guidance from the Rainforest Alliance and the Association of Forest Communities of Petén (ACOFOP), the team developed a robust report of which the following abridged aspects are included in this paper:

- Overview of Forest Governance Strategy and Ramón Seed Value Chain
- Nutrition and Consumption of Ramón Seed
 - Pre-evaluation of school snack pilot program
 - Nutritional research
- Market Opportunities
- Recommendations
 - Organizational structure
 - Stabilization of *ramón* seed production
 - Strategic alliances

The research methodology utilized began with a review of NTFP and *ramón* seed literature, including identifying studies conducted throughout Central America on the seeds' nutritional properties and wildlife consumption of the seed, which may have implications on sustainable harvesting practices. Key stakeholder interviews were conducted over a ten-week period in the Petén with primary sources comprising: school communities, *ramón* seed collectors, foresters, archeologists, and national and international wholesalers and retailers. Financial models and analyses were developed for two key *ramón* seed producers, ANSA and OMYC, which provided

the basis for many of the recommendations included in this report. Due to space limitations, and considerations of privacy, the financial analyses are not included in this document. Finally, for some topics within the report where a specific methodology was applied it is described in the introduction of the topic.

Overview of Forest Governance Strategy and Ramón Seed Value Chain

The Maya Forest is the largest tropical jungle in Central America, shared by Guatemala, Mexico and Belize. It is the cradle of the ancient Mayan civilization, and home to hundreds of ruins and a high amount biodiversity. In 1990, the Guatemalan government established the Maya Biosphere Reserve in order to protect their piece of the forest and thousands of ancient Mayan sites, including Tikal, Uaxactún, Yaxhá and El Mirador, in the Petén region. Supported by UNESCO's Man and Biosphere Program, the reserve's 2.1 million hectares has been divided into protected areas, multiple-use zones, and a buffer zone where some agriculture and development for housing and industry are permitted. This model is found in 120 countries, with a total of 669 reserves, aiming for "the harmonious integration of people and nature for sustainable development."¹ In practice, this means managing forest resources sustainably so that existing communities—and the state—can share natural capital and promote crucial conservation.

Within the reserve, 800,000 hectares contain communities represented by ACOFOP that—with the support of entities including the Rainforest Alliance, Heifer International, *Defensores de la Naturaleza*, and GIZ—depend on natural resources within the multiple-use zones for their livelihood.² With little else available in these rural areas, the primary economic pursuits are based upon such activities as harvesting timber, xate—an ornamental palm used in flower arrangements and Palm Sunday ceremonies—chicle, allspice, wild honey and the ramón seed. A network of 23 rural and indigenous communities are given government concession permits to use the reserve's land for 25-year periods, so long as they adhere to strict management plans per resource extracted.³ These plans outline sustainable management techniques and must meet rigorous certification requirements, like those demanded by the Forest Stewardship Council (FSC), among other certifying entities. This not only guarantees high-quality forest management, but it also facilitates entry into an international market that values sustainably-sourced forest products, such as those sold by Home Depot and Gibson Guitars, along with other brands.

Due to the Petén's location bordering Mexico and Belize in the north of Guatemala the region in the past has served as a vital route for drug trafficking.⁴ The territory is controlled largely by the Zetas cartel and can be a dangerous zone for criminal activity not limited to drug trafficking, but also sex and human trafficking, as well as illegal timber harvesting, wildlife trade, the misappropriation of land, and a high number of homicides and vigilante justice.⁵ The Petén communities' vulnerability to these activities is, in large part, countered with equitable economic development and the provision of alternative employment opportunities, which—if successful—may also increase access to and quality of health, education, and other services.

¹ UNESCO 2016; UNESCO 2016

² Rainforest Alliance

³ ACOFOP 2016; Equator Initiative, UNDP 2012

⁴ OSAC 2015

⁵ Godoy, A. S. 2002; Human Rights Watch 2015; *Organización Internacional para las Migraciones* (OIM) 2002; OSAC 2015

Value Chain Map

To support livelihood development and natural resource conservation within the Reserve, the Rainforest Alliance, and its partners, have worked closely with the community concessions to develop market-interventions for the ramón seed to support its production, processing and distribution.

Key steps within the harvesting and sale of the ramón seed, involve:

- Collection of the wild seed as it falls to the ground from the tree. This environmentally low-impact activity is relatively easy to conduct, as collectors enter the forest and forage the fallen seed, without affecting the tree in any way. Unlike agricultural work that often uses hazardous chemicals, intensive water-use and dangerous equipment, ramón seed collection is particularly appealing for groups of women, of all ages, as well as youth. The activity provides a rare economic and employment opportunity for a segment of the population that has often been excluded from natural resource harvesting and management.
- Once collected, the ramón seed undergoes a drying process to convert it into a hard coffee-like bean, which prevents spoilage.
- The dried seed can then be ground into flour and granules used in baking and as a substitute for tea or coffee. In Guatemala, females primarily manage the food processing, which provides additional year-round employment and economic activity for rural women.
- Further value-added products and final goods, such as bakery items and beverages can also be created using the ground seed. In Petén, the ramón seed is primarily processed by a women-owned community enterprise called *Alimentos Nutrinaturales S.A. (ANSA)*, which is also supported by ACOFOP and the Rainforest Alliance.

The value chain map (page 5) was developed to document the current and potential future actors and flows involved in the ramón seeds' cultivation, processing and distribution. It was developed using a prior report, *Oportunidades con la Nuez de Ramón* created in 2013 by students from the University of Minnesota, and LINK Methodology from CGIAR and CATIE (*Centro Agronómico Tropical de Investigación y Enseñanza*). The goals of this methodology are to: define relationships and connections between actors; understand the flow of products and services; enhance communication between different actors and identify leverage points to improve the value chain.⁶

Actors

- The value chain diagram begins with the Input and Service Providers who primarily deliver various types of support to the community concessions. The services they provide vary in scale from large amounts of funding to logistical support for small projects.
- The Collectors are the community concessions within the Petén. They have been separated in the diagram based on which organization primarily processes their seeds. OMYC exclusively sells their harvest of organic certified green seeds to CAFINTER. The other cooperatives—which manage less land within the concessions, but include more members of the ramón committee—primarily process their seeds through ANSA and AMUL.
- Processors perform a key function of transforming the seeds into a variety of products. CAFINTER is a private company based in Cobán and Guatemala City, which dries and

⁶ CGIAR 2012

grinds seeds into different forms for export. ANSA serves this function on a smaller scale regionally and nationally, though its final products have different characteristics than those produced by CAFINTER.

- Wholesalers look for opportunities to sell ramón seed products to different markets and retailers. Teeccino served this role by selling the ground seed to other food and beverage companies in the U.S. There is also room for additional wholesalers to join this part of the value chain. Teeccino, AMUL and ANSA all sell directly to retailers and consumers as well, and their main customers are identified under Retailers/Consumers.

New Actors

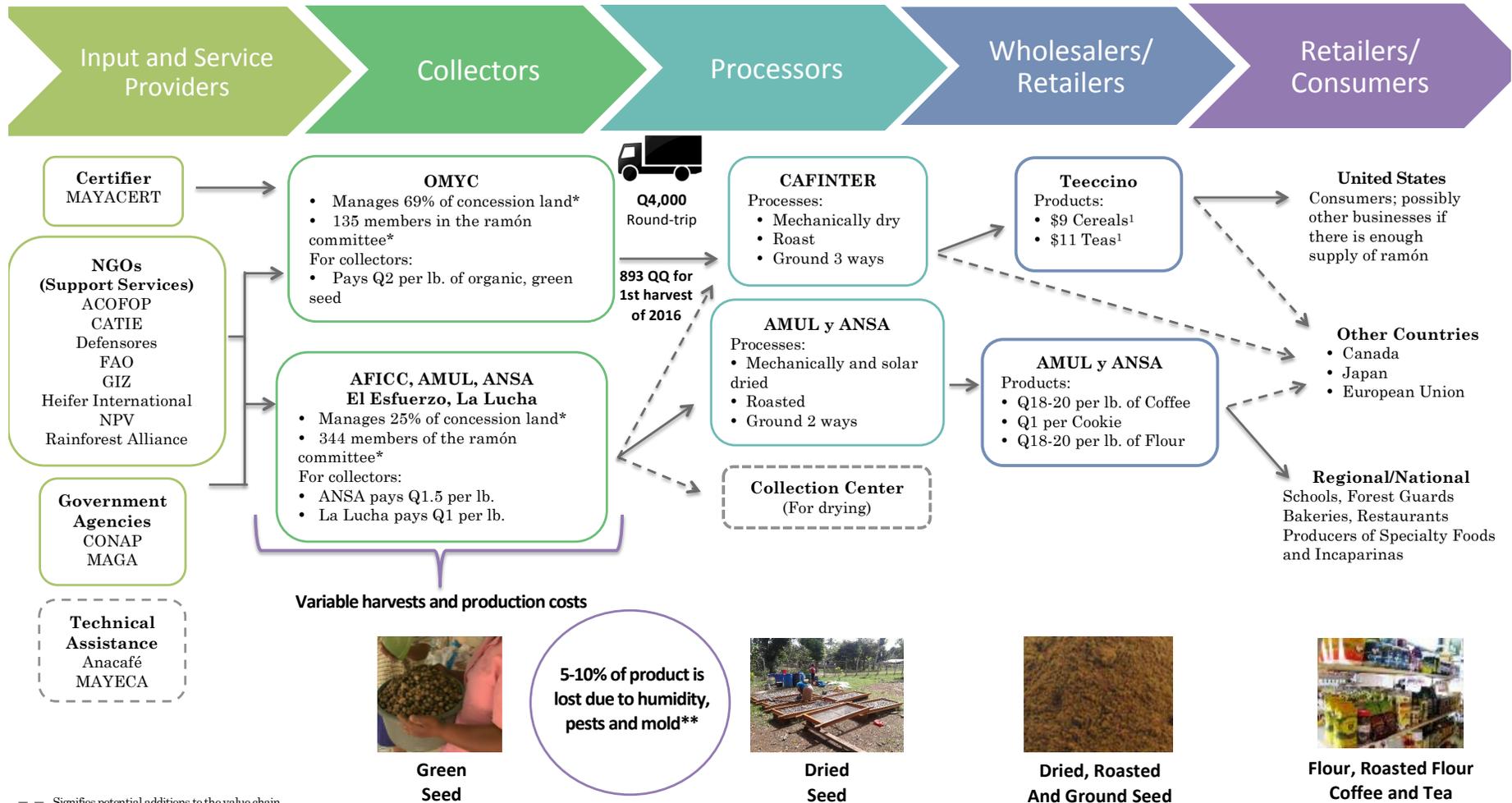
In anticipation of new mechanical dryers being established by ACOFOP, Anacafé and MAYECA have been identified as potential new actors who will likely provide future technical assistance once the dryers are in place. Additionally, the new Collection Center at ACOFOP will serve as a new actor in the drying portion of the process of the seeds.

An important qualification of the diagram is that the ramón committee is not explicitly identified. This is because the committee encompasses many actors from various sectors that have multiple roles, and therefore it is problematic to identify only one function that the committee serves within the value chain.

Flows

Established connections, or flows, between actors are designated with a direct line, while potential future flows are designated with a broken line. Future flows may include:

- A change in the flow of green seeds to the new Collection Center when it is established, because the communities will have the opportunity to dry their ramón seeds themselves with the establishment of the new dryers.
- Combining the entire supply of ramón seeds from the cooperatives and selling the product to CAFINTER for drying, grinding, or both. This approach is described in greater detail in the recommendations section.
- Expanding sales to retailers and consumers in different countries. Currently, Teeccino is the only company selling ramón products from the Petén to the US, and AMUL and ANSA sell most of the product within the region and nationally.



--- Signifies potential additions to the value chain

* From the presentation "COMITÉ DE LA CADENA DE VALOR DE LA SEMILLA DE RAMÓN DE LA ACOFOP, DENTRO DE LA RESERVA DE LA BIOSFERA MAYA -REM"

** From interviews with Uuxacún y Fión Góngora, Andrea Lucrecia. (2014) *Protocolo pre-industrial de Secado de Nuez de Ramón en las comunidades de Petén, miembros de la cadena de valor*. Petén, Guatemala.

¹ From the website of Teecceino

Nutrition and Consumption of Ramón Seed

Currently, 15.6 percent – about 2.5 million people— of the Guatemalan population is undernourished, making it one of the hungriest countries in the whole of Latin America.⁷ In Guatemala, 48 percent of children under 5 are moderately or severely stunted, which is one of the highest stunting prevalence rates in the world.⁸ Furthermore, food insecurity is exacerbated in marginal households due to Guatemala’s vulnerability to climate change and natural disasters, including severe droughts and floods, which impact the rural poor most severely.⁹

Though the ramón seed grows abundantly in Guatemala, the general population does not consume it widely, even though it is known to have high nutritional content. In the U.S., European and Japanese markets, ramón seeds are a specialty food product used primarily as a gluten-free flour option or in specialty drinks. For Guatemala, the ramón seed represents an organic, nutritional food option for a country with persistent malnutrition and food insecurity.

As part of the seeds’ commercialization strategy—supported by ACOFOP and the Rainforest Alliance—the use of ramón seed in school lunches to improve child nutrition and food security is under development. The effort is taking careful consideration to ensure that both, local producers and consumers benefit from the commercialization and consumption of the seed, although the international market currently offers greater opportunities for market growth and financial returns.

Pre-Evaluation of School Snack Pilot Program

In support of a pilot school snack program utilizing products with ramón seed in the community of La Lucha, a baseline assessment was conducted to explore the perceptions, and acceptance of the use of the seed in three key groups: students, parents, teachers and/or administrators of the school. Group and individual interviews, as well as surveys, were conducted to measure: 1) knowledge of the seed; 2) perception of the seed 3) frequency of consumption and desired frequency of consumption; 4) capacity to use and prepare foods with the seed; and 5) support for the creation of the program. This assessment was conducted in the school in La Lucha June 16th and 17th of 2016.

Following the interviews and surveys, a list of key perceptions was developed (Table I) and analyzed to identify obstacles, opportunities and recommendations to support the launch of the pilot in the specific context of La Lucha. Following the trial period another assessment was planned to capture feedback, which would be incorporated into a longer-term program. Additionally, as this school pilot was viewed as a first step to expansion across the region, and country, the interviews revealed a number of factors that should be addressed in advance of such expansion, including:

- Stabilization of ramón seed production in order to meet the demands of school populations within all of Guatemala’s regions.
- Education on about the nutritional properties and health benefits of ramón consumption.
- Adapting culturally preferred foods by incorporating the ramón seed into recipes to facilitate the inclusion and acceptance of the product.

⁷ FAO, IFAD, and WFP 2015

⁸ UNICEF 2013

⁹ USAID 2014

- Training school volunteers to know how to prepare foods with ramón seed. In many regions, training would need to be provided using the local indigenous language, as well as Spanish.
- Reviewing the laws and policies of the regional governments that may limit the use and application of ramón seeds as food for student populations.
- Clarifying the locations where ramón seed and its products can be purchased for use within the school snack program.
- Collaborating with the Ministries of Health and Education to promote the product and find alliances with private companies who can help expand and market the available products within Guatemala.

Table I. Summary of Perceptions from La Lucha

	School Snack Program	Ramón Seed
Students	<ul style="list-style-type: none"> · Of the 15 students interviewed, all indicated negative physical and emotional feelings when they do not receive a snack in school, especially when they are tired and hungry after recess. · 86.7% indicated that they buy a snack at the school either some days or everyday. · When they are hungry, students: “endure it,” go home for a snack or buy a snack from the store. 	<ul style="list-style-type: none"> · 66.6% of students described that they eat ramón seed, while 33.3% have never tried it. In general, they are agreeable to the flavor and use of ramón in the school snacks. · They perceive food with ramón to have a sweet flavor, which the children like.
Parents	<ul style="list-style-type: none"> · Indicated a preference for nutritious and locally produced products. · Want the snack program served on a fixed schedule and prepared hygienically. · Need training to know how to prepare school snacks that incorporate ramón. · If the parents provide money to their children in order to buy a snack, which does not occur each day, they provide between Q1-Q2 or \$0.13-\$1.57. 	<ul style="list-style-type: none"> · Half of the parents interviewed explained that they do not consume ramón seed in their homes. Many parents do not know its nutritional properties or how to prepare the seed. · Stressed the necessity to find foods with ramón that the children would like to eat. · Mentioned that there is not a culture of ramón seed consumption – in the past it was used for animal feed or consumed in times of shortage. · 81.3% said they would like their child to consume products with ramón in the school snack program.
Teachers	<ul style="list-style-type: none"> · Affirmed that school snacks are a form of important nutrition for the students, which also provide motivation to attend school for the whole day, and that helps students focus and complete their schoolwork. · Recognize the necessity to train the volunteer parents who prepare the food, so that they can know how to use ramón seeds. 	<ul style="list-style-type: none"> · Although two teachers described a lack of familiarity with the nutritional benefits of ramón, all of the teachers interviewed supported the program due to positive perceptions of the nutritional value of ramón seed. · Explicitly requested that the foods should be adapted to the specifications and eating habits of the school. · Recommended that foods with ramón seed be served 3 times each week.

Nutritional research

Collaboration with nutrition and food science experts is an important strategy in strengthening the value chain for ramón seeds. A body of documented research on ramón seeds' nutritional qualities can facilitate access to new markets, and remove regulatory barriers for inclusion into food products. Data can also support marketing efforts, and ensure public health through implementation of safe food-handling practices.

Researchers from the Department of Food Science and Nutrition (FSCN) at the University of Minnesota began a study of the properties and potential uses of the ramón seed in August 2016. In order to facilitate this work and help identify the areas of greatest need for research, a memo was prepared based on field interviews and a literature review of published nutritional research. Within the memo, the following subjects were identified for nutrition and food science experts to contribute to, or consider for future research:

- Evaluate the available nutritional data and advise whether it's substantial enough for use in the Central American and global market or whether further research is recommended.
- Conduct a study on the digestibility and bioavailability of ramón seeds. A 2013 glycemic index study noted that it could not recommend processed ramón seeds for human consumption until further studies were performed.¹⁰
- Perform a nutritional analysis on the varieties of ramón seed that are produced in the Petén. It may be valuable to know the qualities of the ramón seeds locally cultivated, and if it would differentiate the seed within the market.
- Determine whether a GRAS study needs to be resubmitted for FDA review. Lack of GRAS approval may be a barrier to expansion within the U.S. market.
- Provide recommendations to improve quality and food safety standards for handling and drying protocol. Currently, the protocol does not include any criteria related to transportation of the seeds, and it appears that not all drying methods have undergone microbiological testing.
- Develop flour mixtures using affordable and commonly available ingredients in Central America, such as corn, plantain, rice, wheat, and oatmeal, as well as gluten-free flour mixes for specialty markets. One interviewee has experimented with the following mixture of flours: rice (52.7%), yucca (26.3%), potato (10.5%), ramón (10.5%).
- Test different flour grinding methods for small-scale and remote flour production. Currently, small-scale processors are limited in their ability to efficiently produce quality flour, because of motors that don't function well and grinders that do not sufficiently refine the flour.
- Contribute research to support a novel food application to the European Food Safety Authority. Reportedly, there is interest in importing ramón to Europe, but a novel food study must be completed first and the costs are prohibitive. With limited supply of ramón, this research is better suited to the longer-term.

Market Opportunities

Ramón seed is a versatile product. After making improvements to stabilize production of the seed and its collection process, there is great opportunity to expand sales to new and existing markets. Based on fieldwork interviews and data collection, current markets being reached by Petén producers are summarized in Appendixes A and B.

¹⁰ Arévalo, A. 2013

While there are great opportunities for future markets for ramón seeds, in order to access them there needs to be research to support market segmentation of various grades of ramón seeds, development of new products, and marketing materials to reach different types of customers. Some key opportunities have been identified in Appendix C. These ideas are recommended for further analysis as they may support entry into new markets.

Recommendations

Organizational structure

Currently, the ramón seed is collected by the six community concessions with sustainable management plans that allow them to harvest the resource from the Maya Biosphere Reserve. Each concession collects ramón seed in their corresponding area and identifies processors to sell it to for further distribution. During the course of the field experience two clients of the concessions, ANSA and CAFINTER, were identified. Although all of the concessions that collect seeds participate in the Committee, each one operates independently and there are no clear strategies in conjunction with other concessions. Most significantly, there is no agreement among the concessions to search for customers, or to meet the demand for ramón seed that other concessions cannot fulfill.

A key challenge in improving the value of chain of ramón seed is difficulty-meeting customer demand. This is because the production of the seed is highly variable, and it differs between the concessions. Uncertain harvests have prevented concessions from being able to commit to specific sales volumes. Likewise, the current market demands organic certification, but only two of the eight concessions, Uaxactún and El Esfuerzo, have obtained this certification.

There have been efforts by NGOs to build joint strategies between the concessions. These approaches include the purchase of machinery for drying ramón seed, establishing a building for drying and storage of seeds, and pursuing group organic certification. While these initiatives will certainly be beneficial, more attention should be paid to developing a strategy around centralizing the concessions organizational structure. For example, it has not been defined how the concessions will mutually share in the benefits from the machinery, or how the concessions will contribute to the drying process at the new site, or how they will each handle fulfillment demands utilizing the new site where ramón seeds will be processed.

One restructuring strategy the concessions could consider is centralizing management and merging the total supply of collected ramón seed for group ownership. Combining the supply into one inventory would provide the following advantages:

- Reduce the risk of failure due to lack of supply.
- Centralize effort of all concessions to search for customers/markets.
- Increase bargaining power.
- Provide greater opportunity to achieve homogeneity in the product and greater quality control.
- Simplify management of inventory at the new drying site.

A combined, larger supply of ramón seed would also make it easier for concessions to pursue a “push” versus “pull” strategy for fulfillment of customer orders. A “push” strategy is utilized when the product is produced prior to receiving orders. One of the main advantages of this strategy is

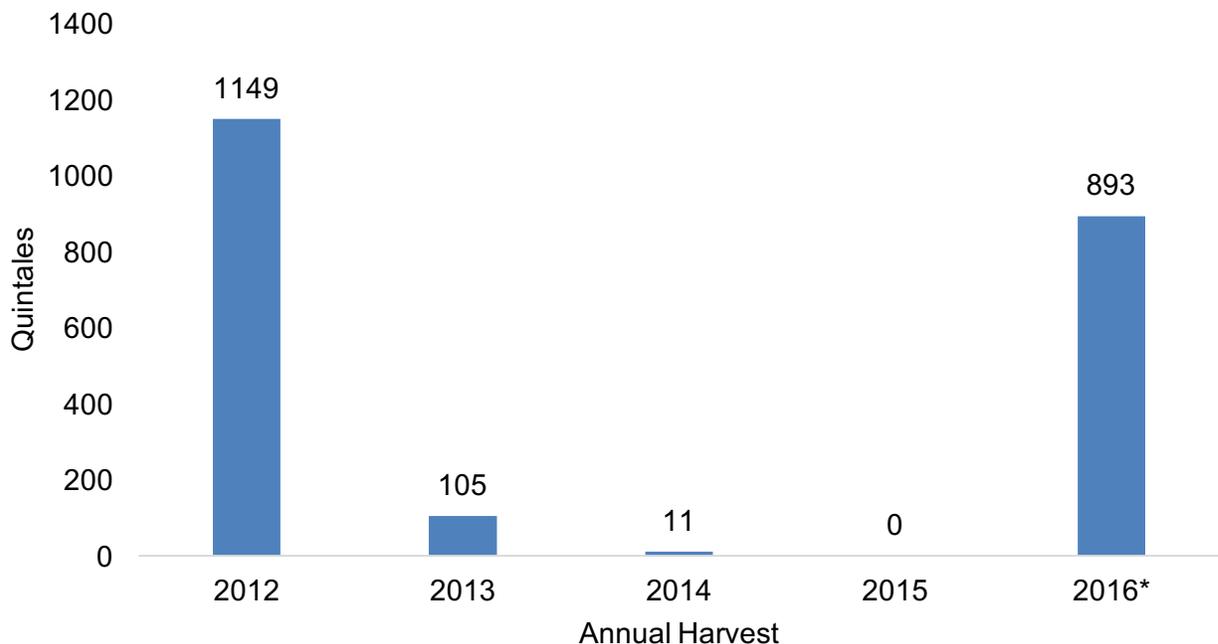
that inventory is the total availability of product is known in advance and available for quick fulfillment.¹¹

Additional organizational changes that could strengthen the value chain for ramón is to invest in capacity building for the concessions, so they can take on more leadership and management roles throughout all levels of ramón seed production, processing, negotiations and sale. Building this capacity is important for the concessions resiliency in the event of financing, policy or organizational changes to partners, which may impact their support of the concessions. Two tactics to consider for building leadership capacity are 1) dedicating time at the regular Committee meetings for members to raise issues faced by their communities for group discussions and problem-solving; 2) seek training for highly-skilled community and committee members who would like to take on greater leadership roles. The Committee already includes a number of strategic partners that may offer such training programs.

Stabilizing production

During an interview with Caroline MacDougall, founder and CEO of Teecino, she shared that she had previously shipped samples of ramón seed flour to various food manufactures in the U.S. Some of these companies, such as the tea company Nutritional Medicinals and the natural foods company, Mary's Gone Crackers, decided to incorporate ramón seed into their product lines. However, because of the lack of supply due to poor harvests (Fig. 1), and product lost to mold and pests the companies chose to reformulate their products without the ramón seed. This story illustrates the risk of volatile supply, and in order to secure more market opportunities, the ramón committee should consider stabilization strategies.

Fig. 1 Volumn of Ramón Seed from OMYC



*Volume for 2016 only reflects collection from the first harvest of the year.

¹¹ Cheng, T. 2010

The following includes approaches, which may support stabilization of ramón seed in the Petén organized by perceived risk and required investment:

- Low Risk
 - Incentivize collectors to return with their full carrying capacity; for example, collectors that return with yields of 30-40 lbs. (near max capacity) could be paid a bonus. By providing a slightly higher value to the collector who returns with their full capacity, collectors may be willing go further distances or collect for longer periods of time.
 - Create an annual collection goal for each cooperative. Collectors could be incentivized to work toward the goal by receiving a bonus if reached. Similarly, a goal could be established for the entire ramón committee to work towards together.
 - Establish more efficient practices for drying, transporting and storing the seeds, so that what can be collected is not lost to mold, pests or other damage.
 - Donate supplies, such as boots and gloves, which could facilitate easier seed collection for harvesters and offer protection from animals and insects.
 - Share information with community members about the opportunity ramón seed harvesting can provide as an additional income stream, as a way to recruit more collectors.
- Medium Risk
 - Utilize the *parcelas permanentes de manejo* (PPMs) that have been developed, through César Mendoza's work to evaluate the production capacity of the tree (*Brosimum alicastrum*), by expanding their role for collection. By using the PPMs for harvesting in each concession, tracking and sharing seed and collection data would be simplified, and collectors would benefit from having a known location they could access during the harvest seasons. If PPMs were established far from the community, temporary housing could be constructed to facilitate maximum capacity collection. This idea is supported by historical research on foraging and rural harvest in the region. (Dr. A. Ford, personal communication, July 14, 2016)
 - Restructure the drying process through partnership with CAFINTER to learn how the company achieves less loss of product in production.
 - Look for efficiencies in the grinding process, which could include investment in new technology that reduces product loss, or by having one entity specialize in grinding, which should result in greater efficiency.
- High Risk
 - Pursue ecological restoration through an agroforestry model that incorporates production of ramón trees and other forest products. Guatemala has committed to restoration of degraded land through *Initiative 20x20*, which has the goal to restore 20 million hectares of land in Latin American and the Caribbean by 2020.
 - Planned farm models offer the opportunity to experiment with strategies like grafting, which could result trees producing seeds at a younger age thereby boosting overall production. These models may also allow for the use of collection nets, which could greatly increase the yield collected, and possibly, improve working conditions of collectors.
 - Establish a network of Forest Gardens. This method of sustainable agriculture, as identified by Dr. Anabel Ford, is a land management strategy similar to permaculture, which relies on traditional farming knowledge and plant diversity. By developing a network of gardens, this approach could feasibly support stabilization of the ramón production in the region.¹²

¹² Ford, A.

Given that a key goal of the ramón seed initiative is to provide employment opportunities for community members, as well as conserving the forest, it is important to consider the impact of each stabilization strategy. These models will also impact employment; changing who is engaged in the work, who benefits, and, ultimately, who profits. These, and other considerations, are important to consider as stabilization strategies are implemented.

Strategic alliances

In order to strengthen the value chain for ramón seed there are several strategic alliances the committee should consider building with allies in the private, public, and third (academia and NGOs) sectors. It is recommended to form a working group within the committee to establish strategies to approach potential partners.

- Private Sector
 - At present, there are two immediate opportunities with the private sector that can be pursued 1) strategic alliances for improved processing of the ramón seed according to market requirements with CAFINTER, S.A.; and 2) seek new relationships with national and international companies that may be interested in including ramón seed in the formulation of their products, particularly those focused on dietary health.
- Public Sector
 - Form partnerships with the Ministry of Education, Ministry of Health and the Ministry of Environment of Guatemala. These government bodies lead public programs and promotional campaigns at regional and national levels, which could be used to educate and generate public interest in ramón seed potentially increasing demand for the product. The government is generally inclined to support programs that assist women, rural communities, and address malnutrition—ramón seeds deliver opportunity in all of these areas and is well positioned to earn support from government programs. Additionally, several ministries have already shown an inclination to support the product through their involvement in the school snack program in Petén, and the inclusion of ramón seed in the list of products that can be purchased for consumption by the organization of forest guards.
- Third Sector
 - To expand the ramón seed market it is important to continue nutritional research in order to address market demands and comply with food sector regulations. Academic institutions have the appropriate infrastructure and expertise and, therefore, are allies to cultivate. Universities can also provide valuable human capital as many students, at various levels and disciplines, seek to contribute to rural livelihood development, and could provide valuable support to communities while they pursue training.
 - Establishing strategic alliances with academia (universities and/or technical colleges) could also provide education resources for important skills that must be strengthened within the concession, including managerial, financial and trade capacities, which are currently fulfilled by NGO partners.

By strengthening relations with each of these sectors, the concessions are likely to build greater support for the ramón seed's value chain. Market development, an increased body of research on ramón seed, and more alliances are essential to achieving the development envisioned by the concession communities.

Appendix A: Summary of Current Markets

Company	Products	Appealing Qualities	Challenges	Status as of July 2016
<i>Teeccino</i>	Teas and specialty beverages, coffee-substitute	<ul style="list-style-type: none"> • Antioxidants • Robust flavor • Supports Guatemalan communities 	<ul style="list-style-type: none"> • Insufficient and unstable supply • Costs 	Active
<i>CAFINTER</i>	Dry seed, flour and powder	<ul style="list-style-type: none"> • Widely available organic, local product • Supports Guatemalan communities • Certified organic for the ramón seed processing 	<ul style="list-style-type: none"> • Insufficient and unstable supply of raw product • High costs of certification, market development, and distribution • Strong scent and respiratory health hazards due to dust • Loss of product due to mold and pests • Restrictions into the European market 	Active
<i>ANSA</i>	Dry seed, flour, coffee-alternative and baked goods	<ul style="list-style-type: none"> • Local ramón seed processor for the Petén region • Supplies and distribute to local vendors 	<ul style="list-style-type: none"> • Lengthy drying processes dependent on the weather that could lead to mold and product loss • Lack of storage capacity • High certification costs • Uncertified for the organic processing • Lacking branding, marketing and business development strategies that would improve sales 	Active

Appendix B: Petén Local Market

Products	Flour, café, specialty beverages, and baked goods like pancakes and cookies
Appealing Qualities	<ul style="list-style-type: none">• Local, organic product• Sustainably-produced• Supports Guatemalan communities and forest conservation• Used for local recipes• Appealing food with sweet, cocoa-like taste• Attractive souvenir for tourists
Challenges	<ul style="list-style-type: none">• Lack of awareness of what the product is, or how it is used• Insufficient knowhow on how to create meals and goods with ramón• Uncertainty of taste and nutritional value• Difficult to find or buy Cost can be prohibitive
Status as of July 2016	Active in direct sales: <ul style="list-style-type: none">• ANSA (Ixlu)• Restaurant El Arbol (El Remate)• Restaurant Mijaro (Santa Elena)• Hotel La Casona del Lago (Santa Elena)• Artesanias Flores (Flores)• Tienda Castillo de Arizmendi (Flores)• Restaurant San Telmo (Flores)• Hotel La Casona de La Isla (Flores)• Tienda La Selecta (Santa Elena)• Bakery La Isla (Flores)• Hotel Las Gardenias (El Remate)• Hotel and Restaurant El Muelle (El Remate)

Appendix C: Summary of Potential Markets

Market & Products	Appealing Qualities	Challenges	Status as of July 2016
<p><i>Japan</i></p> <ul style="list-style-type: none"> • Dry seed for beverage market 	<ul style="list-style-type: none"> • Antioxidants • Robust flavor • Coffee-alternative • Organic certification does not seem important 	<ul style="list-style-type: none"> • Difficulty maintaining contact • Unengaged entity • Inconsistent orders • Communication 	<ul style="list-style-type: none"> • Sporadic
<p><i>Europe</i></p> <ul style="list-style-type: none"> • Dry seed, flour and powder, others 	<ul style="list-style-type: none"> • Organic, sustainably-sourced product with multiple uses • Promotes forest conservation • Benefits local communities 	<ul style="list-style-type: none"> • Entry requires Novel Food study for the ramón at a cost of more than \$100,000USD • Fair Trade and other certifications, beyond organic, will be important 	<ul style="list-style-type: none"> • Inactive
<p><i>Animal Feed</i></p> <ul style="list-style-type: none"> • Seed and leaves as an alternative soy- and grain-free feed for livestock, uses for luxury pet food 	<ul style="list-style-type: none"> • Traditionally used to feed livestock in forested areas • Said to produce strong, healthy animals • Certain ramón qualities are good for animal nutrition • Organic and sustainably-sourced valued by organic meat producers 	<ul style="list-style-type: none"> • Few formal studies about animal nutrition and ramón • Insufficient knowledge of the market requirements of this industry • Product needed in large quantities and at low-cost 	<ul style="list-style-type: none"> • Interest, but inactive
<p><i>Gluten-Free Specialty Goods</i></p> <ul style="list-style-type: none"> • Flour is used in the elaboration of gluten-free products, including pizza, cakes and pastas 	<ul style="list-style-type: none"> • Gluten-free • Nut-free • For Guatemala, it is a locally-produced food that costs less than other products used as gluten-free substitutes 	<ul style="list-style-type: none"> • Ready-made gluten-free flour with ramón needs to be developed • Cost of the ramón flour is expensive for the average Guatemalan consumer 	<p>Interest, but inactive</p>
<p><i>Sports Nutrition</i></p> <ul style="list-style-type: none"> • Seed used in the elaboration of dietary supplements and nutritional and/or weight-loss bars and beverages 	<ul style="list-style-type: none"> • Low-fat • High-protein • Cocoa-like taste 	<ul style="list-style-type: none"> • Formal research on the benefits of ramón consumption for sports nutrition and weight-loss needed 	<p>Inactive</p>

<p><i>Cosmetics</i></p> <ul style="list-style-type: none"> • Scent and taste may have uses in the elaboration of beauty products. 	<ul style="list-style-type: none"> • Cocoa-like taste • Cocoa-like scent • Organic, sustainably-sourced product • Supports local communities 	<ul style="list-style-type: none"> • Research and development is needed for these uses • Insufficient knowledge of the market requirements of this industry 	Inactive
<p><i>Ecotourism and Educational Opportunities</i></p> <ul style="list-style-type: none"> • Ecological tours and environmental education courses provided by ACOFOP communities covering various forest products 	<ul style="list-style-type: none"> • Extensive knowledge on forest products and successful natural resource management • Proximity to Flores, Tikal and other tourism hotspots • Can build off existing ecotourism efforts, particularly in Uaxactún • Opportunity for cultural exchange 	<ul style="list-style-type: none"> • Requires development of tours and courses • Logistics and access • Needs promotion and advertising 	Inactive

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