

ENRICHMENT PROGRAM REPORT

Development of Rosella Mint Syrup for
Flores Flavors Project in PT. Sekolah
Seniman Pangan

STUDY PROGRAM
**Food Science
& Nutrition**

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Development of Rosella Mint Syrup for Flores Flavors Project in PT. Sekolah Seniman Pangan

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Development of Rosella Mint Syrup for Flores Flavors Project in PT. Sekolah Seniman Pangan

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ABSTRACT

PT. Sekolah Seniman Pangan is a creative entrepreneurship school focusing on the food sector. It strives to support local heritage by developing products from local food ingredients while raising awareness about the stories behind them. The author is an intern of the Research & Development department but has experienced other internship activities such as production, event preparations, farm & garden tour, training sessions, and boot camp. Flores Flavors is the main project of the author during the internship period. Flores Flavors is an initiative of the company, together with other stakeholders, to raise the value of Flores's local food ingredients along with the culture and traditions. In the said project, the author focused on product research and development of several products, mainly Rosella Mint Syrup. The main ingredient, roselle (*Hibiscus sabdariffa L.*), can grow well in low moisture & fertility, high temperatures, and drought climates which is suitable for Flores soil conditions. The calyces of roselle were used with the leaves and stem of mint (*Mentha piperita L.*). The syrup was developed artisanally with the resulting final formulation consisting of water (56.9%), cane sugar (38.0%), fresh roselle (3.8%), mint (3.2%), and dried roselle (1.9%) with the Brix Value of 68 °Brix, and a shelf life of 6 months. The syrup met the desired texture, color, and flavor standard, which should benefit the farmers, women, and young fellows involved in current and future productions. Different local food ingredients and product combinations should be researched as there are high potentials in Flores agriculture.

Keywords: Roselle, Hibiscus sabdariffa L., Mint, Syrup Development, Flores, Local Ingredients

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LIST OF ABBREVIATIONS

SSP	Sekolah Seniman Pangan
KKI	Kampung Kearifan Indonesia
R&D	Research and Development
PO	Purchase Order
SO	Stock Opname
BV	Brix Value
UMKM	Usaha Mikro, Kecil, dan Menengah
WFO	Work From Office
COGS	Cost of goods sold
Q&A	Question & Answer
SNI	Standar Nasional Indonesia
CMC	Carboxy Mehtyl Cellulose

1. INTRODUCTION

1.1. Description of Sekolah Seniman Pangan

Sekolah Seniman Pangan, abbreviated as SSP in this report, was initially an initiative of Javara Culture Indonesia (PT. Kampung Kearifan Indonesia or further abbreviated as KKI) to build a Javara Academy with the primary purpose of training, supporting, and connecting with local farmers and young fellows. It was later transformed into an independent company in 2018 as PT. Sekolah Seniman Pangan, which is located in Bekasi, West Java. The headquarters in Bekasi consists of the head office, food lab, and farm garden. In addition, another SSP food lab is located in the Javara Culture store & office, Kemang, South Jakarta, which functions as a secondary plant.

SSP is a creative entrepreneurship school focusing on the food sector, dedicated to guide and build entrepreneurship networks for young fellows, women, and villagers from rural areas around Indonesia. The company's vision is to create an entrepreneurial environment that facilitates the growth of potential world-class creative entrepreneurship rooted in nature and local culture. The missions uphold but are not limited to sustaining local food commodities heritage, local wisdom and knowledge, innovation, strong branding, and smart marketing. SSP strives to support local heritage by developing products from local food ingredients while raising awareness about the stories behind them.

1.2. Products of SSP

The company provides food services, food entrepreneurship consultation, product R&D, fine-tuning, product repackaging, and branding. SSP has developed different products in past projects. The project is usually region-based, in which the product development is based on the local food ingredients found in the region of interest. The team would visit the region and research local people's food diversity, culture, and characteristics. The collected data would then be used to create concepts and stories related to product development. Previous projects informed to the author are the Papua project and the Borobudur Heritage project. During the internship period of the author, the project of interest was the Flores project, which is also the main project of the author, to be explained further in chapter 3.

SSP products are artisanally produced and natural, free from preservatives, artificial food additives, and made from local Indonesian food ingredients. Most of the products are vegan, gluten-free, or low GI, with the intended target market of people with autoimmune, celiac disease, and those seeking a healthier lifestyle. The materials used for production are harvested from the SSP farm garden or trusted suppliers. Product R&D and production can be completed in the headquarters food lab in Bekasi, West Java and the food lab in Javara Indonesia Store in Kemang, South Jakarta. However, most of the activities are done in the headquarters, while the Kemang food lab is the supporting facility and is only utilized for certain occasions.

1.3. Departments in SSP

SSP's primary focus is to provide consultancy services for food and farm entrepreneurship, such as product development, fine-tuning, product branding, and product packaging. In addition to that, there are farm tours with interactive activities such as edible plant tasting, plant introduction, seedling, harvesting, and others. SSP has several departments that work in unity to fulfill each responsibility. The Partnership directorate department is responsible to manage events and collaborations as it involves external parties, and also the one to notify the needs related to the

event to the other departments. For example, product requirements will be delivered to the R&D manager and Education Coordinator to organize the production schedule, which will then be executed by the Production team and Culinary Development team. The Food Lab & Production team mentioned previously would work with both the Finance department and Accounting & Administration department to handle the procurement. Product Commercial department is responsible for product sales.. A similar workflow would occur when there is a Purchase Order (PO). The Finance team would notify the Food Lab & Production team and then the Product Commercial department would handle the sales.

Besides the general flow, the Education Coordinator is also responsible for managing employee training, intern supervising, and handling the farm tour program with Farm Manager by creating modules and curriculum for the program. In addition, the Farm Managerial is responsible for farm and garden's production, maintenance, utilization, as well as events related to the farm garden, such as tours. Last but not least, the author is an intern of the Research and Development department under the supervision of the Education Coordinator. During the internship, the author got to work and interact with every department and was not just limited to the R&D scope.

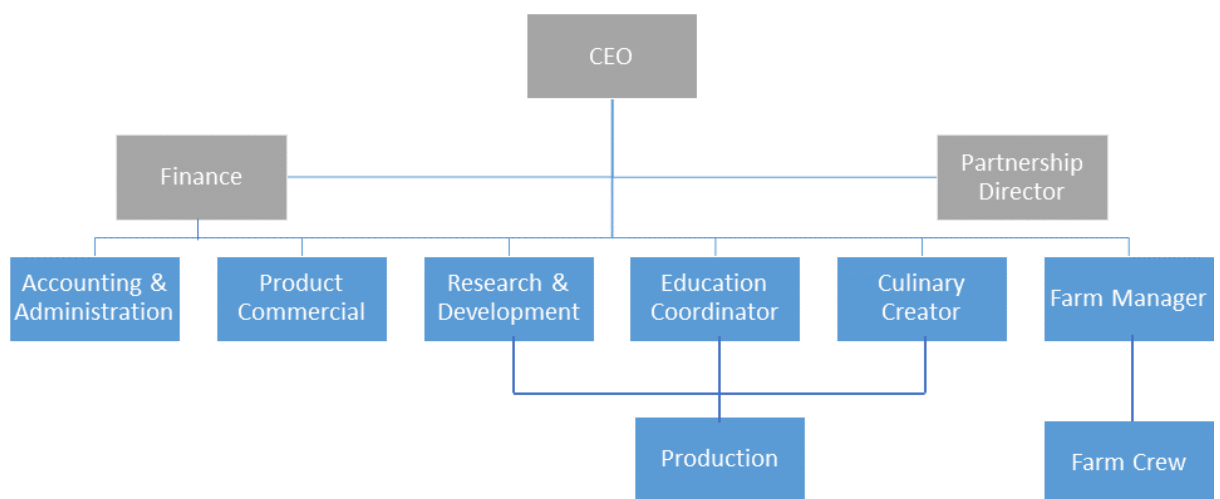


Figure 1. The Organizational Structure of PT. Sekolah Seniman Pangan

1.4. Product Research and Development Department

The author is a Research and Development intern under the supervision of the Education Coordinator of SSP. The author worked according to the instructions given by either the field supervisor or the R&D Manager. The main task given during the internship is to conduct product trials. Before the trial, the team would have a meeting to discuss the schedule, materials, equipment, and formulation. On some occasions, the author would have to search for a formulation or recipe on the internet and literature as the references. The author would also be responsible for listing the materials and equipment needed. Materials that need to be bought first would be written down on a procurement form to be submitted to the Finance department to obtain the fund for the materials. After all materials were collected, the author would start doing the trial. After a trial, the team would

2. INTERNSHIP ACTIVITIES

2.1. General Activity and Internship Schedule

During the internship, the author worked based on WFO (Work From Office) in the headquarters office and food lab in Bekasi, West Java. The working hours are from 09.00 AM to 06.00 PM on Monday until Friday, as shown in **Table 1**. There were some cases in which the author had to work overtime, which was then returned as paid leave allowances based on the total number of hours.

Table 1. General Weekly Schedule of the Internship Activity

Time	Monday	Tuesday	Wednesday	Thursday	Friday
Morning (09.00 AM - 11.59 AM)	Task Preparation	Task Preparation	Task Preparation	Task Preparation	Task Preparation
Break Time (12.00 PM - 01.00 PM)	Lunch Break & Prayer Time				
Afternoon (01.01 PM - 04.00 PM)	Task Execution	Task Execution	Task Execution	Task Execution	Task Execution
Evening (04.01 PM - 06.00 PM)	Prayer break, Task finishing, & Evaluation	Prayer break, Task finishing, & Evaluation	Prayer break, Task finishing, & Evaluation	Prayer break, Task finishing, & Evaluation	Prayer break, Task finishing, & Evaluation

Task refers to, but is not limited to any work assigned by the Field Supervisor to the author, e.g., trials, production, or working on documents. Training and other activities may be done during the same time slot as task preparation & task execution.



Figure 3. The General Timeline during the Internship

The internship period started on the 8th of August 2022 until the 9th of February 2023. During the first month of the internship, the agenda was doing product development for the Flores Flavors project, participating in a product development project with KKI, and assisting in production for the first time. Trials for four products were done in August, along with several trials of Blue Boba with the Research and Development team of KKI, and production which includes packing and labelling the products. Besides that, Halal and P-IRT certification training was delivered by the Quality Management team of KKI and was attended by the author.

The first half of September was spent doing intense product development for five products for the Flores Flavors project, and learned how to do Stock Opname (SO). The second half of the month was focused on working on the preparation of IKRA Indonesia 2022 Pre-Incubation. It is a platform initiated by Bank Indonesia dedicated for gathering small to medium-scale enterprises (UMKM). SSP was hired to manage the boot camp for the Food sector, which included training sessions relevant to the UMKM in the food industry. Continuing IKRA boot camp, the first half of October was spent working as an operator for the training sessions. The second half of October was dedicated to the Flores Flavors Pre-Launch event in Kemang, South Jakarta, as in the preparation of the event, the production, product finalization, and the rundown of the event.

The agenda for the whole of November revolved around the Flores Flavors Launch event in Flores, East Nusa Tenggara. The author took major part in production since the product line increased from 13 products in Pre-Launch to 25 products in total. At the end of the month, the author cooperated with the team to finalize the accountability report of IKRA Indonesia 2022 Pre-Incubation to be submitted to Bank Indonesia.

2.2. Product Research and Development

SSP's Bekasi headquarters consists of two buildings and a plot of land used for farming and gardening. The first building is the office for the Finance team, Administration team, Partnership Director, meeting rooms, and storage rooms for finished goods and inventories. The second building is where the food lab and production plant take place. There is also a classroom used for the Education team and daily discussions with Research and Development team, Production team, and Culinary Creator team. The author mainly works in the production plant to do product development and classroom to discuss with the supervisor and co-workers.

As a part of the Research and Development team, the author's main task is to conduct product trials. The trial is done to find the best formula, processing method, type of packaging, and shelf life of a product. During product development, trials could be done multiple times until the desired outcome is obtained. Product development involves creating a trial plan, searching for references, group discussion, submitting procurement needs to the Finance team, collecting materials, conducting the product trial(s), evaluating the results, and recording the whole process in the form of a report for the supervisor.

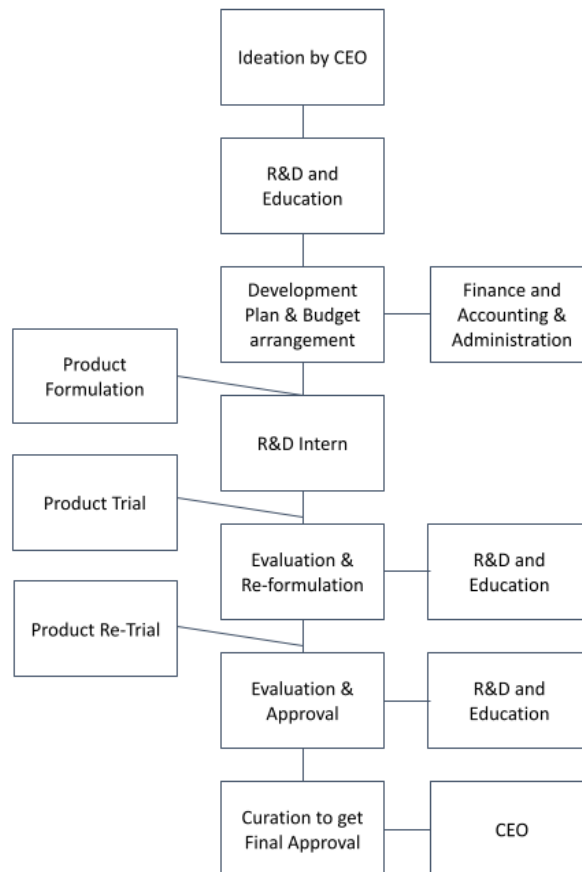


Figure 4. The General Scheme of a Product Development process in PT. Sekolah Seniman Pangan

During the four months duration of the internship, the author was involved in developing several types of products such as Spreads, Jams, and Syrups. For the most part, the author conducted the trials and later submitted the result to the supervisor for feedback and approval. When a product gets approval from the supervisor, it is further delivered to the CEO for final approval to determine whether the product can be launched to the market. For the Flores Project, which will be further elaborated in Chapter 3, the author has developed several products, namely Rosella Mint Syrup, Chunky Choco Peanut Butter, Rosella Spiced Jam, Ginger Syrup, Ginger Lemongrass Syrup, and Ginger Marmalade. Two products were approved from the list, and launched in November 2022 in Flores. SSP is establishing a branch production plant in Flores called “Seniman Pangan Flores”. The team consists of women, young fellows, and farmers local to Flores. They were trained to obtain the skill and knowledge necessary to produce the Flores Flavors products developed in the Bekasi food lab.

The first thing the author learned from working on product development is the understanding of the flow of work that involves many parties and stakeholders, whether it’s internal or external. Every department within an institution is connected to each other, and one cannot essentially function without the other, which leads to the importance of communication in a working environment. If one department fails to communicate the situation to another, the expected end result will be disrupted. For example, a case may require extra funds or time to finish the work. The author got the chance to be involved in the development of Blue Boba Pearl together with the Research and Development team of KKI and learned how to communicate with the external team.

The second but equally important is applying theoretical principles learned in the academy to the practical process. The key points in developing spread, jam, and syrup are relatively simple in

theory, such as color and texture. However, in practical creation, there are challenges that cannot be conveyed solely from theories. Moreover, SSP focuses on developing artisanal products made from natural ingredients originated from or endemic to regions in Indonesia, without food additives, and mostly have vegan, low GI, and gluten-free properties. Although those properties serve as good selling points, they create another challenge on producing good quality products that are still comparable with industrial products, with all limitations previously mentioned.

As a part of the Research and Development team, problem-solving was critical as a skill that was trained well during the internship experiences. After every trial, troubleshooting should be done to analyze what could be improved from the product. In most cases, altering a simple variable such as a step in the method, processing duration, or the number of materials used could change the end result. In rare cases, alternative materials must be used to produce the desired product. After multiple trials, the author learned how to analyze the products and observe what is still lacking from the desired properties, especially in syrup, spread, and jam products. One of the examples is the development of Chunky Chocolate Peanut Butter, which the author first developed using chocolate bars. The end result was rather runny as a spread product, with the color of light brown, and the chocolate taste wasn't dominant enough. After several evaluations, the author re-developed it using cocoa powder, resulting in thick yet spreadable peanut butter with darker brown color and greater flavor intensity. Cocoa powder is pure and solid, which could thicken the butter mixture. Meanwhile, a commercial chocolate bar has other ingredients mixed with it, such as sugar, cocoa butter, and fat which reduces the cocoa intensity. When the bar is melted, it turns into runny consistency, contributing to the peanut butter's end texture.

2.3. Production Line

Besides product development, the author engaged in the production line for Purchase Orders (PO) or event requirements. The production team would lead the process, assisted by the author based on the schedule organized by Research and Development together with Education Coordinator. However, there were also times when the author led the production several times for products that the author developed, such as Rosella Mint Syrup and Rosella Spiced Jam for the Pre-Launch and Launch event of the Flores Flavors project. Because the author had prior experiences with the product during the trials and development process, the supervisor felt confident in entrusting the author with the lead. The scope of work may consist of producing the product from scratch to the end result, starting from the procurement submission, purchase of materials, preparation of materials, processing & production, packaging, filling, and labeling. The author was also assigned to create a product narration to be put on the label for several products, such as Blue Pea Vanilla Syrup, Rosella Mint Syrup, and Rosella Spiced Jam.

2.4. Preparation of Events

Another point of interest in this internship period was when the author engaged in the preparation of events. The author participated in several meetings with both internal and external parties, getting acquainted with new people and connections, and working with new environments. In accordance with the previous statement, the author learned from those experiences to assemble a team, plan an event, and appreciate the effort of many parties to make the event successful. For example, during the preparation and execution of the Flores Flavors Pre-Launch event, the author got to work and had direct discussions with the Tourism and Gastronomy Consultant of SSP, the

Partnership Director of SSP, the Business Development Executive of Javara, and other employees in Javara store & office during the event.

2.5. Farm and Garden Tour

The author also got to work together with the farm crew multiple times as the author frequently visited the farm garden. The farm crew taught the author on how to harvest plants such as the blue pea flower, roselle calyx, chili, and green roselle. Plant seedlings were also taught because they are an essential part of the farm garden and serve as a form of plant regeneration. The farm garden was built with the concept of "Food Biodiversity"; hence it has a wide variety of plant collections, ranging from edible flowers, cereals, herbs, nuts, and vegetables planted organically. The plant assembly was done in such a way that it is suitable for educational purposes and farm tours, which is also a service provided by SSP. The author has participated in several farm tours as a tour guide assistant, responsible for introducing and explaining the educational material of interest to the students or participants, demonstrating the materials, and interacting with the group.

2.6. Training Sessions & Bootcamp

Last but not least, the author gained more than just internship activities or work experience at SSP. The author got several training sessions to enhance skills, knowledge, and experiences. The Quality Management manager of KKI gave Halal and also P-IRT training about the steps of registering Halal certificates for products and the marketing authorization in the form of P-IRT according to government regulation. The author learned about it during Food Safety & Toxicity class and Quality Management & Food Legislation class, but what the author learned directly from the work field was different from the theory during class. Furthermore, the Finance department of SSP gave a training session regarding pricing. The author learned about the cost of goods sold (COGS), margins, and the variables involved within each element.

There were also multiple training sessions from the IKRA Indonesia 2022 boot camp. IKRA Indonesia is a platform initiated by Bank Indonesia and other stakeholders to gather small to medium enterprises (UMKM) in the fashion and food & beverage sectors. The annual event's objective is to select several UMKMs to be further supported and funded for various activities such as branding, product fine-tuning, re-packaging, and product export. The selection process is divided into several phases, starting from the registration which involves up to hundreds of UMKM in food sectors only, to the Pre-Incubation period, which has almost a hundred participants consisting of selected UMKM, until the Incubation period which is a continuity of the selected UMKM from Pre-Incubation.

Bank Indonesia entrusted SSP to manage the boot camp of the Pre-Incubation phase specific to the food sector. During the boot camp preparation, the author was assigned to do a SWOT analysis of the UMKMs, which means the strengths, weaknesses, opportunities, and threats. As a result, SSP obtained the data of almost a hundred UMKM from the Bank Indonesia consisting of confidential information regarding the UMKM starting from the product, the cash flow, the certifications, etc. Based on the data, the team did the SWOT analysis of each one of the UMKM.

The boot camp was filled with training sessions related to the food industry by expert guest speakers. The materials of the sessions delivered by the guest speakers were relevant and brought new knowledge to the author, especially technical and practical knowledge that wasn't discussed in academic such as terms used in export activities, food regulations issues in Indonesia, naming and branding strategies, consumer persona, and also marketing & sales pitch. The author worked as

Operator 3 in the Zoom meeting. Operator 3 was responsible for recording the Q&A session in each meeting, summarizing the materials, and assisting Operator 2 in watching over the participants.

Afterwards, the author was also assigned to participate in writing the report to be submitted to Bank Indonesia. Only particular employees obtained the access to the report, even amongst the team members who worked during the boot camp, due to a lot of confidential information in the report. The author learned how to write a report that is acceptable to Bank Indonesia's standard and handle confidential information.

3. PROJECT DESCRIPTION

3.1. Introduction to Flores Flavors Project

3.1.1. Background

Flores Flavors is the main project of the author during the internship period. Flores Flavors is an initiative of SSP together with District Government, Forestry Preservation Agency, Private Sectors (hotels, tour operators, travel), and Non-Governmental Organizations to raise the value of local food ingredients from Flores along with the culture and traditions kept by its people. Flores is an island in the East Nusa Tenggara, rich with cultural and agricultural biodiversity. Despite its high potential, the people still lack of the knowledge and skills to make the most out of Flores's potential. Their agriculture has its own local heritage and tradition. The farmers usually work together in land clearing and plant assorted crops on the same plot of land. For example, sorghum is usually planted on the edge of land as bait so the birds would eat it instead of the rice crops. Grass and twigs from the clearing are left to dry in the middle of the land to fertilize the soil. Planting assorted crops in one land is done to sustain and preserve the various food ingredients local to Flores. The project works with local farmers, women, and young fellows.

In the said project, the author focused on product research and development of several products, mainly the Rosella Mint Syrup product. According to the Indonesia National Standard (SNI), a syrup is defined as a concentrated sucrose solution or other inverted sugar syrup. Another definition is a beverage in the form of a concentrated solution with various flavors that usually contain a minimum of 65% sugar. SNI 01-3544-1994 stated that 65% sugar was required to function as a preservative in the syrup product and not solely a sweetener. RMS development relied a lot on sugar as the thickener, sweetener, and also preservative, as there are no additional materials used besides water, cane sugar, fresh roselle calyces, mint, and dried roselle calyces. Melisa & Mardesci (2016) used Carboxy Methyl Cellulose (CMC) as a thickener in the development of their Kelubi syrup (*Eleiodoxa conferta*). Hamid et al. (2017) developed a Mulberry syrup with no artificial preservative and observed the shelf life under ambient and refrigerated conditions. The syrup with Brix Value (BV) of 70 could last up until six months in both ambient and refrigerated temperature. This finding is supported by SSP's experience and observation of their previous syrup products, with BV ranging from 68 to 70. Syrup products with BV less than 68 will have a higher chance of fungal contamination, and BV higher than 70 will cause crystallization of the product, usually at the bottom of the packaging. The cause of mold growth is due to the sugar content that is not adequate to function properly as a preservative. While crystallization occurred because the sugar content had already reached its saturation point when the BV was too high.

The main ingredient, roselle (*Hibiscus sabdariffa*) is a flowering plant from the family Malvaceae, one of the most widely cultivated flowering plants in tropical and subtropical regions of the world (Islam et al., 2016). The plant has thin branches, fibrous stems, and bright red sour-tasting calyces (Toukara et al., 2011 as cited in El-Sayed et al., 2019). Due to its low moisture & fertility requirements, tolerance to high temperatures, and drought-resistant, roselle can grow well in such unfavourable climates and conditions (Gadwal & Naik, 2015) which is suitable to Flores soil condition, based on the food mapping conducted by SSP team. The "Seniman Pangan Flores" branch production plant will cultivate Roselle as well as Mint in the location. Roselle is a good source of protein in any part of the plant, whether it's the seed, calyces, or leaves (Atta et al., 2013; Salami & Afolayan, 2020).

The roselle calyces were used in product development as the most common part of the plant used for food production (Salami & Afolayan, 2021). It contains a high amount of vitamins such as vitamin A, C, and E, riboflavin, and minerals such as calcium, potassium, magnesium, copper, iron, phosphorus, zinc, manganese, and a low amount of sodium (Balarabe, 2019; Salami & Afolayan, 2021). The calyces also contain 9x higher vitamin C content than *Citrus sinensis* (Al-Okbi et al., 2017) and carry a good amount of fiber (Salami & Afolayan, 2021). Roselle also contains antimicrobial and antibacterial properties. The study conducted by Salami & Afolayan (2021) found that the calyces of red roselle were potent against fungal species such as *Candida albicans* and *Penicillium aurantiogriseum* and bacterial species such as *Escherichia coli*, *Pseudomonas aeruginosa*, *Streptococcus pyogenes*, *Bacillus subtilis*, *Streptococcus aureus*, and *Klebsiella pneumoniae* which is also supported by a study from Sulaiman et al. (2014). The study also discovered that the fat content of red roselle calyces was low as it was reduced during the young age to the mature stage. The calyces were harvested during maturity; hence it contains a low amount of fat and makes it beneficial to be consumed by people with obesity. It has been used as a traditional medication to prevent diabetes, cancer, hypertension, and obesity (Ashaye, 2013).

Peppermint (*Mentha piperita L.*) or famously known as mint is the name of a plant from the Lamiaceae family. Mint has been used as an herbal remedy from its leaves, stem, until the roots (Hadi et al., 2017; Khan et al., 2011). The leaves and stem are commonly used in food applications, typically combined with food and beverage, while the essential oil that is derived from the leaves could be used in confectionary or as it is (Bouyahya et al., 2020; Khan et al., 2011; Saqib et al., 2022). The aromatic and flavor compound in mint are comprised of distinct phenolic compounds such as phenols, terpenes, flavonoids, quinines, and polysaccharides which is the main reason behind its wide usage in food application (Khan et al., 2011; Saqib et al., 2022). Mint contains antimicrobial & antifungal properties and cytotoxic constituents which is related to its anticancer property (Jeya et al., 2019; Saqib et al., 2022). Studies found that the extract of mint showed antibacterial properties against *Pseudomonas aeruginosa*, *Shigella flexneri*, *Klebsellia pneumoniae*, *Staphylococcus aureus*, *Acinetobacter baumannii*, *Salmonella enteritidis*, *Campylobacter jejuni*, and *Acetobacter sp.* (Hussain et al., 2010; Chagas et al., 2020; Zhang et al., 2015). Mint was also studied for its high antioxidant content. Singh et al. (2015) found that mint extracts contain 73-91% antioxidant activity and 70.3 - 92.6% free radical scavenging activity which are both beneficial against cardiovascular diseases.

3.1.2. Problem Formulation

It is a common practice for local farmers in Indonesian regions to sell the harvested produce at a low price as it is or rely upon middlemen. The role of middlemen in agriculture is typically unfavorable as they usually purchase harvest produce from the farmers at such a low price and sell them for double and even multiple prices. On the other hand, it is undeniable that the dependency of local farmers on middlemen is due to the lack of access and knowledge on their part to sell or distribute their produce. Flores Flavors project comes in to find a way that could increase the value of these local food ingredients produced by Flores local farmers by conducting product development with quality that meets the standards.

3.1.3. Objective

Develop a syrup product that is free of preservatives, free of artificial additives, and vegan made from Roselle plant with end result that reach the SSP standards of texture, colour, and taste.

3.1.4. Scope of Work

Product research and development of Rosella Mint Syrup, including the creation of development plan, product formulation, and product trial to achieve the desired quality according to standard and fulfil the objectives.

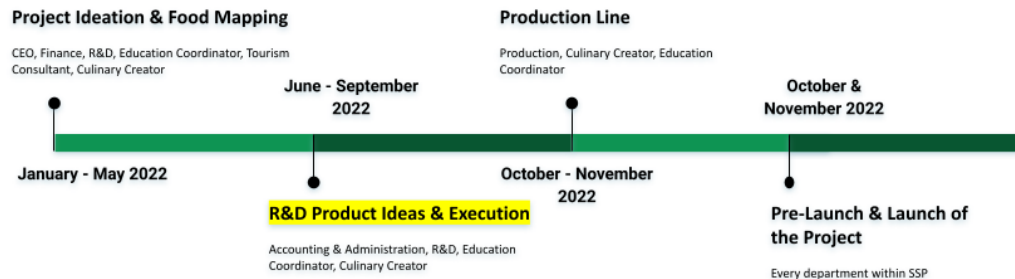


Figure 5. The Flow of Flores Flavors Project

3.1.5. Methodology

The benchmark of a product to be called “developed” for the author is the approval from the field supervisor. During the trials of Rosella Mint Syrup, the product was made artisanally using rather conventional equipment. Based on the Oxford Dictionary, artisanal means made in a traditional and non-mechanized way in the context of food and beverage. The artisanal method was done to ensure the production is replicable in the Flores production plant by the local farmers, women, and young fellows with limited availability of advanced machinery and training. The only step involving machinery is the process of bottle capping to seal the bottle and maintain the quality of the content along with the shelf life.

The general procedure of the RMS production method is shown in **Table 2**. However, the detailed procedure and the step sequences could not be revealed in the report as it is part of the product recipe, which is confidential to the company.

Table 2. Methodology of the RMS Production

Materials Preparation	Product Processing	Product Packaging
<ul style="list-style-type: none"> ● Materials collection: Purchase & Harvest ● Dehydration of fresh roselle ● Preparation: washing, deseeding, chopping, weighing 	<ul style="list-style-type: none"> ● Making roselle extract ● Incorporate all materials ● Cooking process involving heat ● Parameter: Brix Value 	<ul style="list-style-type: none"> ● Filling to packaging ● Capping seal ● Sterilization of the bottle in water bath

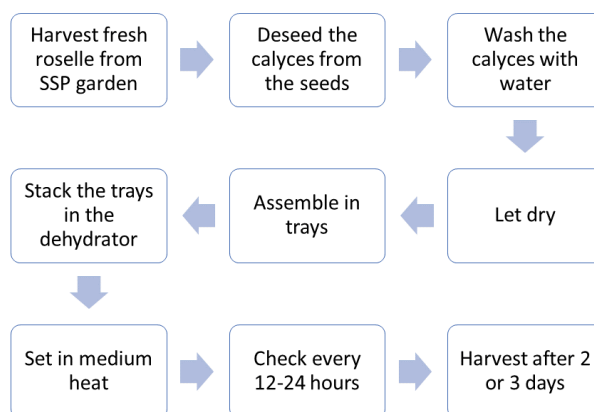


Figure 6. Methodology of Dried Roselle Production

3.2. Result

3.2.1. The Formulation of Rosella Mint Syrup

The first trial was conducted on the 1st of September 2022, together with the field supervisor. After each trial, there would be an FGD conducted with the field supervisor and R&D manager, occasionally with other co-workers to discuss parameters to be improved or changed for the next trial. The second and third trial was conducted on the 5th of September 2022 and followed by the final trial on the next day, the 6th of September 2022. The Rosella Mint Syrup got approved after four trials, curated based on the taste, aroma, texture, and color.

The final result of Rosella Mint Syrup achieved the desired sweet and sour flavor with hints of mint taste. During the earlier trials, the BV was set at 70; however, the desired texture was achieved on the BV of 68 in the final trial. The earlier trial used only fresh red roselle calyces, which produce a low-intensity red color. The final trial combined the fresh with dried red roselle calyces and succeeded in producing the dark intense red color. The final formulation of the Rosella Mint Syrup is shown in **Table 4**. The materials used meet the objective of developing a vegan, free of artificial preservatives, and natural product.

Table 3. Development in Each RMS Trial

Trial 1	Trial 2	Trial 3	Trial 4
<p>Ingredient:</p> <ul style="list-style-type: none"> ● Fresh roselle ● Mint leaves ● Sugar ● Water <p>Brix: 70</p> <p>Evaluation:</p> <ul style="list-style-type: none"> ● Use mint from different supplier 	<p>Ingredient:</p> <ul style="list-style-type: none"> ● Fresh roselle ● Mint leaves ● Sugar ● Water <p>Brix: 70</p> <p>Evaluation:</p> <ul style="list-style-type: none"> ● Use 80 mesh ● Use dried roselle ● Use mint stems 	<p>Ingredient:</p> <ul style="list-style-type: none"> ● Dried roselle ● Mint leaves ● Sugar ● Water <p>Brix: 70</p> <p>Evaluation:</p> <ul style="list-style-type: none"> ● Stop at BV 68 ● Combine both fresh and dried 	<p>Ingredient:</p> <ul style="list-style-type: none"> ● Fresh roselle ● Dried roselle ● Mint leaves ● Sugar ● Water <p>Brix: 68</p> <p>Evaluation:</p> <ul style="list-style-type: none"> ● The desired texture, color, and flavor achieved

Table 4. The Final Formulation of Rosella Mint Syrup Development in Percentage (%)

Materials	Percentage (%)
Water	56.9
Cane sugar	38.0
Fresh red roselle calyces	3.8
Mint leaves	3.2
Dried red roselle calyx	1.9

After the approval from field supervisor, the product was later analysed by the CEO based on the taste, aroma, texture, and colour. It was approved and got into the list of production line for the Pre-Launch and the Launch event of Flores Flavors project.

3.2.2. The Shelf Life of Rosella Mint Syrup

The data of fresh roselle's shelf life was obtained from SSP's experience and observation. Meanwhile, the shelf life of RMS was obtained from SSP's past experience with other syrup products and supported by literature.

Table 5. The shelf life of fresh roselle compared to RMS

	Fresh Roselle	RMS
Room Temperature (Sealed)	3 days	6 months
Chiller Temperature (Sealed)	1 month	6 months

3.3. Discussion

3.3.1. The Quality Analysis of Rosella Mint Syrup

The Rosella Mint Syrup product was developed after multiple trials using the red cultivar roselle. Roselle, specifically the red cultivar, was chosen because the plant is easy to be cultivated in dry soil and tropical to subtropical climates (Gadwal & Naik, 2015; Islam et al., 2016), which is similar to Flores soil condition. In the product development, the calyces of the roselle and the leaves & stem of the mint were used. The final formulation used a combination of fresh and dried red roselle; both can be obtained from the SSP farm garden and warehouse, respectively.

Syrup is a concentrated product, meaning that the consumer will dilute it prior to consumption, reducing the color intensity of the product as the dilution process occurs. The standard color of the syrup is an intense dark red, while fresh roselle only produced red color that turned into fading pink when diluted with water. On the contrary, the dried roselle gave the desirable intense dark red color that turned red when diluted with water.

However, dried roselle costs much more than fresh roselle because it undergoes a dehydration process using electric food dehydrator that requires an enormous electric current and a

long processing time of 2 to 3 days. The food dehydrator is able to maintain the red color of roselle calyces with the optimum temperature range between 70°C to 100°C and with a shorter dehydration time. Higher temperatures than the optimum range will cause degradation of anthocyanin pigments, not just in roselle but also in other plants with anthocyanin content, such as blue pea flower and sweet purple potato (Heydari et al., 2014; Sánchez-Feria et al., 2021). As the moisture content reduced during dehydration, the color pigment became more concentrated inside the calyces. The final trial combined both fresh and dried roselle to produce the desired result along with lower production cost, which was proven to succeed and formulated as the final formulation. The dried roselle was produced by SSP. The fresh roselle was harvested, deseeded, and weighed. The calyces were obtained and washed with flowing water. Afterward, the calyces would be assembled on trays and then stacked in the electric food dehydrator. After the calyces were dried, they were harvested and packed in a sealed container.

The balanced sweet and sour taste of roselle syrup was already achieved since the second trial. The highlight of evaluation in the flavor aspect is the desirable mint taste. The mint was desired to be present yet subtle and not overshadowing the sour roselle taste. The first improvement was using the mint stems in addition to the leaves. Although mint leaves contain the highest menthol compound, the stem still produces a good amount of menthol (Nazim et al., 2020). The second improvement was chopping the mint before processing. The act of chopping causes cell disruption, which triggers the release of flavor compounds.

During the trials, the BV of the syrup was measured using a portable refractometer. The refractive index of a solution may be used to estimate other parameters, such as viscosity. It is commonly used to determine the concentration of sugar in food products like fruit juices, syrups, and jams as the BV, which is the degree of solids, in this case sugar, dissolved in a liquid (Hidayanto et al., 2010). The same study found that the increase in sugar concentration of sucrose solution would result in an increase of viscosity. The study by Benítez et al. (2009) found that in apple juice, the increase of sugar (glucose, sucrose, lactose, maltose) leads to linear increase of viscosity with decreasing water activities. Another study by Kim (2010) found that the two possible relations between sugar concentration and viscosity are linear and exponential relationships in sugar solution. Based on the final formulation, it can be observed that the cane sugar content did not reach 65%, which is the standard from SNI. The number was set by SNI to ensure the sugar function as a preservative inside the syrup product. Although the RMS did not fulfill the SNI standard, the BV of the syrup was measured based on the standard from the literature and SSP database to ensure the shelf life and quality despite the sugar concentration that isn't compatible with the SNI standard.

The standard BV of syrup varies based on the ingredients, which is 68 °Brix for roselle syrup. The BV was measured to analyze the texture as well as estimate the viscosity of the syrup. During earlier trials, it can be observed that the BV was set to be 70 and later revised as 68 in the final trial because after the syrup cooled down and set, the BV of 70 resulted in thick gel-like consistency which is undesirable as it made the syrup difficult to be poured out of the packaging. The result of final trial with a BV of 68 showed the improved texture and was approved. The thick gel-like consistency was due to the natural pectin contained in roselle (Esparza-Merino et al., 2019). Although BV does not measure pectin content, it can give a rough estimation of the cooking duration. As heat is introduced into the syrup, moisture loss occurs, and the sugar content increases, increasing the BV. Based on the trial results, BV at 70 showed that the cooking process had already reached a point where the gelling process had already occurred, observed based on the texture of the syrup. When the BV was set to 68, a similar result was not found, which means that the gelling process has not occurred yet.

3.3.2. The Increased Shelf Life of Rosella Mint Syrup

The BV was also an important parameter to ensure the safety and shelf life of the syrup, as BV lowered than 68 °Brix could lead to the growth of mold and BV higher than 70 °Brix could result in crystallization at the bottom of the bottle. Excessive heating of the syrup during production will lead to saturated sugar, which increases the chance of crystallization. While BV lower than 68 is not adequate for the sugar to function as a preservative. The shelf life of RMS was found to be 6 months based on the SSP database and past observations on the other syrup products with BV ranging from 68 to 70. However, this is also supported by Hamid et al. (2017) which found that syrup products with BV 70 could last up to 6 months in ambient temperature. Although the RMS has a BV of 68, components such as sugar, natural acids, and antimicrobial agents contained in roselle help to preserve the quality of the syrup. Besides that, mint has also been discovered to have antimicrobial properties, which further support the shelf life (Jung et al., 2013).

3.4. Conclusion & Recommendation of the Project

The result fulfilled the objective stated in the report to develop a syrup product with particular qualifications such as free of preservatives, artificial additives, and vegan from roselle that reaches the standard texture, color, and taste of SSP. The RMS was found to have an increased shelf life compared to the raw material, which brings a storage benefit. The product development of RMS would benefit the farmers, women, and young fellows involved in the production later.

Researching different local food ingredients and product combinations should be done and as there is high potential for Flores agriculture, the research should not be limited in the flowering plants and herbs category made into syrup product but also branch to different points. Calculation of the cost of production, COGS, and the end price should be done to estimate the economic benefit that the RMS may produce.

4. SELF REFLECTION

The internship experience at SSP was my first working experience. I learned a lot of workflow in professional environment. Throughout my internship as an R&D intern, I learned how to do product formulation, product trials, and analysis of trial results. I understand the general flow of product development in a startup company, which is interesting for me and intrigued me to learn more about R&D field. As I worked on my daily task, I came to realization that I am capable of working punctually and meet deadlines. However, I require clear and systematic instructions to work which could limit my improvisation and flexibility to act, which are important traits in product development. I do think that i3L environment contribute to my way of thinking and acting. My field supervisor mentioned that interns from i3L always have certain traits that differentiate them from other interns, such as responsibility, sense of belonging, curiosity, and initiative.

In the field of work, lessons I obtained from classes started to make a lot more sense. During a product development, I had to recall lessons from classes such as food chemistry class to understand the nature of ingredients and the reaction occurred during processing, food processing class, and food safety & toxicology class. SSP works with plant ingredients a lot to produce vegan product; hence I feel relieved that I have taken the plant food science class so I could understand better about grains, cereals, and others. In addition, community involvements that I done in campus helps me to be more confident in stating my opinions, making decisions, and working in a team.

5. CONCLUSION & RECOMMENDATION

The author has learned a lot from this past 4 months of working as a Research & Development intern at PT. Sekolah Seniman Pangan. As this was the author first experience to work in professional working environment, the exposure to new culture and environment would help with integrating the writer in the future. Professionalism is absolutely essential in working environment, however maintaining a good relationship with the co-workers are important as well to create a conducive and supportive environment which will in return improve the performance and team work. Besides social purposes, the author also learns the actual application of theories learned on the academy during the tasks involving product development, production, regulation, and sale. The author also learned more about terminologies in food industry that wasn't well taught solely in class, including economic terms used in sales, pricing, sales pitch, and export. Lastly, the author learned the importance of personal branding and how to manage one's skills to become the better version of themselves.

There are pleasant and unpleasant aspects in every journey. As enthralling as it was, the number of overtime work done by the author should be one thing to be improved for the next intern in the company. Aside from the company, looking back to several months prior to the internship period, the author was struggling to find an internship placement. The academy could form partnerships with companies of the field of interest to broaden the spectrum and chance for students to get an internship placement. Based on the author experience, the academy gave little support regarding internship placement, aside from the administrative purposes. If this matter to be improved, students will have higher chance of getting recruited and lower chance to spend the semester unrecruited for the course.

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APPENDICES



Appendix 1 – Documentation of Rosella Mint Syrup Processing during Trial



Appendix 2 – The Color Comparison between Dried + Fresh formula (left) and Fresh formula (right) after dilution of Rosella Mint Syrup during Trial



Appendix 3 – The Rosella Mint Syrup as End Product



Appendix 4 - Operators during IKRA Indonesia 2022 Bootcamp



Appendix 5 - Documentation of Farm Tour



Appendix 6 - Documentation of Flores Flavors Pre-Launch event "TGIF: Thank God It's Flores"

Internship Final Report (2)

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