

# Development of Juice Concentrate Utilizing Calamansi, Honey and Ginger

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**Abstract**— This research aims to develop a juice concentrate from Honey, ginger and calamansi. Specifically, it aims to: determine the most accepted formulation of the juice concentrate and determine sensory characteristic of the juice concentrate in terms of color, taste and aroma. Based on the results the most accepted formulation of the juice concentrate is the first formulation, a blend of 50% of the calamansi concentrate and ginger concentrate with 40% Honey. Sensory characteristic of the juice concentrate in terms of color is yellow-orange, taste is Spicy-warm, zesty, sweet, sour with a bit earthy taste and aroma is Spicy-warm, zesty, sweet, sour with a bit earthy taste. It is further recommended to test Physico – Chemical, Microbiological and Shelf life testing of the juice concentrate which indicates that the product is safe to consume.

**Keywords**— covid19, juice concentrate, sensory characteristic, hedonic scale.

## I. INTRODUCTION

The COVID-19 pandemic has demonstrated the interconnected nature of our world (United Nations-DG 2020) and has put the world at a somewhat standstill, and half the world is in lockdown (lifestyleasia,2020). Likewise, Varadharaju (2020) stresses on his article "The Corona care – Prevention is better than cure" that the threat of coronavirus disease caused by a novel coronavirus SARS-Cov2 is becoming a life-threatening situation across the globe. Moreover, this pandemic has affected thousands of peoples, who are either sick or are being killed due to the spread of this disease. The most common symptoms of this viral infection are fever, cold, cough, bone pain and breathing problems, and ultimately leading to pneumonia. This, being a new viral disease affecting humans for the first time, vaccines are not yet available (Haleem,2020).

As of March 24, there are 552 confirmed COVID-19 cases in the Philippines, and 35 deaths, according to the Philippine Department of Health (Ravelo,2020). Numerous measures have been implemented in many countries to reduce the person-to-person virus transmission as well as the outbreak. The focus of prevention is more on the susceptible population of children, healthcare providers, and older people (Rothan, 2020).

Thus, the emphasis is on taking extensive precautions such as extensive hygiene protocol (e.g., regularly washing of hands, avoidance of face to face interaction etc.), social distancing, and wearing of masks ,and boosting immune system (Javaid,2020). Likewise, Tan

(2020) stated that by improving immune system, you are keeping yourself healthy and making yourself less susceptible to viruses and diseases (Tan,2020).

Currently, the COVID-19 pandemic is the leading challenge across the globe, therefore scientists and researchers are attempting to create a specific vaccine for this virus but to no avail so far as stated by Erdman et.al(2003) in their article " A novel coronavirus associated with severe acute respiratory syndrome".

However, Aslam (2017) in his published article "Vitamins:Key role players in boosting up immune response, A mini review " mentioned that even if they were able to find the vaccination method, there is a high possibility that other antimicrobial resistant infections will prevail in society.

Nutritional status is very important to maintain a strong immune system against the virus. Certain factors such as lifestyle, age, health status, sex, and medications affect the nutritional status of an individual.

During the COVID-19 pandemic, the nutritional status of individuals has been used as a measure of resilience toward destabilization. (Bogocho, 2020) Optimal nutrition and dietary nutrient intake impact the immune system through gene expression, cell activation, and signaling molecules modification.

In addition, various dietary ingredients are determinants of gut microbial composition and subsequently shape the immune responses in the body (Erdman et.al,2003).

Yousafzai et.al (2013), on their research "Annual research review: improved nutrition—a pathway to resilience. *J Child Psychol Psychiatry*" suggests that the only sustainable way to survive in the current situation is to strengthen the immune system. An adequate intake of zinc, iron, and vitamins A, B 12, B6, C, and E is essential for the maintenance of immune function. In the current scenario, COVID-19 has imposed a new set of challenges for the individual to maintain a healthy diet.

Niemen (2014) states that the situation today on the state of self-isolation, lockdown, and social distancing are important measures to flattening the curve of the disease, although these measures have severe repercussions on an individual's life. The act of confining to one's home has significant impacts on one's health, including changes in eating patterns, sleeping habits, and physical activity. It would promote sedentary behaviors that affect mental and physical health and lead to an increased risk of obesity.

Accordingly, Miller (2005) on his study "Do negative emotions predict alcohol consumption, saturated fat intake, and physical activity in older adults?" stated that A balanced diet will guarantee a strong immune system that can help withstand any assault by the virus. There is currently no evidence that any supplement can 'boost' our immune system and treat or prevent any viral infections, except Vitamin C.

Moreover, Vitamin C is one of the major constituents of water soluble vitamins which tends to make a strong immune system. The daily recommended dietary allowance for Vitamin C is 90mg/d for men and 75mg/d for women. In the current situation, it is necessary to be aware of the specific types of food that can improve our immune system in order to combat COVID-19 (Haug, 2007)

This research aims to develop a juice concentrate from the three ingredients that has components of Vitamins and minerals. According to Tacio (2019) stated that Calamansi Juice is packed with vitamin C and other beneficial nutrients and has been used as an immune booster for generations. has 12 calories composition, with a bit of fat, 1.2 grams' fiber, 37 milligrams of potassium, 7.3 milligrams of vitamin A 54.4 milligrams, 8.4 milligrams of calcium, and water as stated by Pangerapan (2016). Also, calamansi is commonly used as a condiment for dishes. However, it can also be used in making calamansi juice concentrate which prefers by

most parents in preparing nutritious juice drink for their family. Like other citrus fruits, the calamansi is high in vitamin C (pinoybisnes ,2020)

Similarly, Ajibola (2012) on his study "Nutraceutical values of natural honey and its contribution to human health and wealth" stated that Natural honey is a sweet, flavorful liquid food of high nutritional value. Some of the vitamins found in honey include ascorbic acid, pantothenic acid, niacin and riboflavin; along with minerals such as calcium, copper, iron, magnesium, manganese, phosphorus, potassium and zinc.

Moreover, Ginger contains vitamins and minerals including Vitamin B3 and Vitamin B6, Iron, Potassium, Vitamin C, magnesium, Phosphorous, Zinc and Folate (Goldman, 2019). Likewise, Panpatil (2013) on his study entitled "In vitro evaluation on antioxidant and antimicrobial activity of spice extracts of ginger, turmeric and garlic" stated that fresh ginger contains 80.9% moisture, 23% protein, 0.9% fat, 1.2% minerals, 2.4% fibre, and 12.3% carbohydrates.

Considering the health benefits of these ingredients, the researcher developed the juice concentrate from Calamansi, Honey and Ginger.

## II. OBJECTIVES OF THE STUDY

The aim of the study is to develop a juice concentrate from Honey, ginger and calamansi.

Specifically, it aims to:

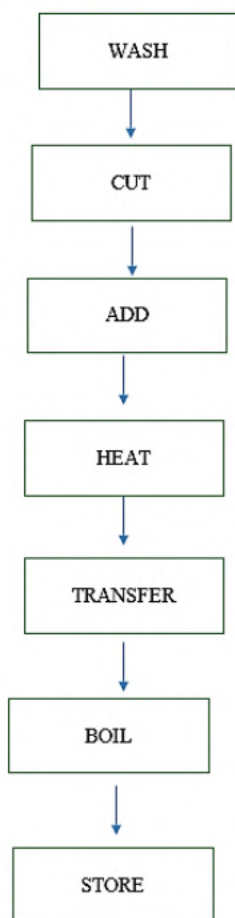
- a. Determine the most accepted formulation of the juice concentrate
- b. Determine sensory characteristic of the juice concentrate in terms of color, taste and aroma.

## III. MATERIALS AND METHODS

In this study three research designs were used, namely: Developmental and Experimental Developmental Design was used since the research aims to create a new product from the combination of locally available source of ingredients such as Ginger, Calamansi fruit and Honey. Likewise, Experimental design was used since it involves trial and error method on the formulation during the development stage of the ready to drink juice in a way that variables are carefully controlled and manipulated.

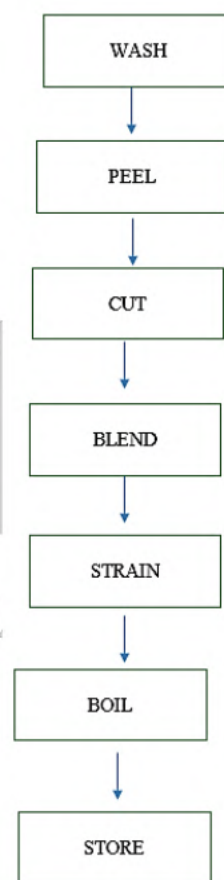
The juice concentrate was developed and formulated in the Food Service Management Laboratory. The trials have three formulations or three combinations. Sensory

evaluation was used to describe the sensory characteristic of the product. Likewise, Hedonic scale scoresheet was used to determine the most accepted formulation. Respondents of the acceptability test were 15 employees of Sorsogon State College, Sorsogon City Campus, specifically twenty faculty members and 15 non-teaching personnel. Throughout the Sensory evaluation, 9-Point Hedonic Scale was used to determine the degree of likeness of the respondents. Similarly, the 9-point Hedonic scale is a form of category scale in which the like/dislike dimension is partitioned into a number of discrete categories (Jaeger, 2010). Furthermore, the main characteristics of the scale are that each category is associated with a verbal descriptor from “dislike extremely” to “like extremely” and that the scale has a neutral category “neither like nor dislike” (Meullenet, 2004). After the sensory evaluation for the seven samples, results were determined with the use of the statistical treatment arithmetic weighted mean. Additionally, the three treatments that have the most accepted product were subjected to palatability test by determining the sensory acceptability in terms of color, taste, aroma and texture.



**Figure 1.** Preparation of Calamansi Juice Concentrate

Figure 1 shows the preparation of the calamansi juice concentrate. First step was washing the fruits carefully with water. Then, cutting crosswise the fruit followed by squeezing the juice through a cheesecloth. Next is adding Honey if necessary. The amount of Honey added is according to taste. Afterwards, mixture was heated up to 75 degree celsius or until the mixture is about to boil. Continue to maintain at this temperature for about 5 minutes while stirring constantly. After which, transfer while hot to sterile bottles and cover the bottles. Then, covered bottles were boiled for 20 minutes. Close tightly and let cool in an inverted position. Lastly, it was wiped dry and store in a cool place.

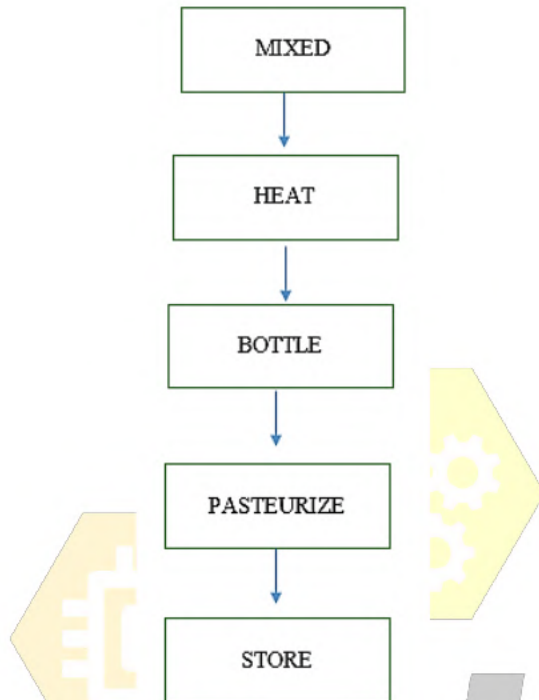


**Figure 2.** Preparation of Ginger Concentrate

Figure 2 shows the preparation of the ginger juice concentrate. First step was washing the ginger carefully with water. Then, peeling the ginger using kitchen knife. Then, cut the ginger prior to blending. Squeezed the juice through a cheesecloth. Next is adding Honey if necessary. Afterwards, mixture was heated up to 75 degree celsius or until the mixture is about to boil. Continue to maintain at this temperature for about 5 minutes while stirring constantly. After which, transfer while hot to sterile bottles and cover the bottles. Then,



covered bottles was boiled for 20 minutes. Close tightly and let cool in an inverted position. Lastly, it was wiped dry and store in a cool place.



**Figure 3.** Preparation of Calamansi, Honey and Ginger

The above figure presents the preparation of calamansi, honey and ginger. The Calamansi and ginger concentrate was mixed with different proportions. Then, it was heated to 75 degree Celsius for 5 minutes. Afterwards, it was bottled to 350ml glass bottle. Then, pasteurized for 15minutes. Lastly, wiped dry with fine cloth and store in dry place and ambient temperature.

#### IV. RESULTS AND DISCUSSION

**Table 1.** Formulation of Juice Concentrate Utilizing Calamansi, Honey and Ginger

Ingredients	T1	T2	T3
	%	%	%
<b>Calamansi Concentrate</b>	30	36	42
<b>Ginger Concentrate</b>	30	24	18
<b>Honey</b>	40	40	40
<b>Total</b>	100%	100%	100%

Presented in Table 1 are the three formulation in the development of the juice concentrate utilizing calamansi, honey and ginger. Different proportions show in decreasing value for the base, and increasing value for the other ingredients. As a whole, proportions

for the three treatments are as follows: Treatment 1 (T1) composed of 50% of the base (Calamansi Concentrate, 30% and ginger Concentrate 30%).

For Treatment 2 (T2), it increases to 60% of the base (Calamansi Concentrate, 36% and ginger Concentrate 24%).

Then for For Treatment 3 (T3), it increases to 70% of the base (Calamansi Concentrate, 42% and ginger Concentrate 18%) while Honey (40%) is constant.

**Table 2.** Acceptability Test Result of Juice Concentrate Utilizing Calamansi, Honey and Ginger

9 Point Hedonic Scale	T1	T2	T3
<b>Like extremely (9)</b>			
<b>Like very much (8)</b>	/		
<b>Like moderately (7)</b>		/	
<b>Like slightly (6)</b>			/
<b>Neither like nor dislike (5)</b>			
<b>Dislike slightly (4)</b>			
<b>Dislike moderately (3)</b>			
<b>Dislike very much (2)</b>			
<b>Dislike extremely (1)</b>			

Table 2 shows the Acceptability test result of the juice concentrate utilizing calamansi, honey and ginger Acceptability test was used determine whether the consumer accepts the product being developed or not.

The nine (9) point hedonic scale was used by the fifteen (15) respondents in evaluating the three samples. In connection to this, the products acceptability test was conducted after having the seven trials to come up with the most acceptable product, however trial one is considered as the controlled sample.

There are some qualifications in choosing the sensory panelists who will be evaluating the product such as: willingness to taste the product, availability during the conduct of the evaluation, free from any allergies, should not be hungry, in good physical condition and non-smoker.

After which, the evaluation was conducted, the overall acceptability of the juice concentrate utilizing calamansi, honey and ginger shows that trial 1 got the highest level of acceptability which is like extremely. Weighted mean was used in computing the score of the sensory panelists.

**Table 3.** Sensory Properties of the Juice Concentrate Utilizing Calamansi, Honey and Ginger

Sensory Parameters	Method	Result
Color	Organoleptic Method	yellow-orange
Aroma	Organoleptic Method	Sweet ginger-spicy aroma with a slight sour scent
Taste	Organoleptic Method	Spicy-warm, zesty, sweet, sour with a bit earthy taste

Table 3 presents the Sensory properties of the juice concentrate utilizing calamansi, honey and ginger in three different parameters: color, aroma and taste. Sensory properties of food products are commonly perceived as one of the main driving motives for consumers to purchase them (Bushong et al., 2010).

Subsequently, one method was used in defining the sensory parameters of the ready to drink juice, and it is Organoleptic Method. This method are the aspects of food, water or other substances that an individual experience via the senses—including taste, sight, smell, and touch.

#### V. CONCLUSION AND RECOMMENDATION

Based on the results the most accepted formulation of the juice concentrate is the first formulation, a blend of 50% of the calamansi concentrate and ginger concentrate with 40% Honey. Sensory characteristic of the juice concentrate in terms of color is yellow-orange, taste is Spicy-warm, zesty, sweet, sour with a bit earthy taste and aroma is Spicy-warm, zesty, sweet, sour with a bit earthy taste. It is further recommended to test Physico – Chemical, Microbiological and Shelf life testing of the juice concentrate which indicates that the product is safe to consume.

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