International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

# Development of Pulverized Balimbing (Averrhoa Carambola) Fruit: A Potential Food Enhancer

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**ABSTRACT:**
The balimbing (*Averrhoa carambola*) fruit is known for its unique star shape and reach in golden color. The fruit varies widely in its composition during maturation. Hence, this study aimed to develop a pulverized Balimbing (A. carambola) as a potent food enhancer. This study also determined the level of sourness of a pulverized A. carambola fruit sour spice at different maturity levels (unripe and ripe). Phytochemical screening was done in the Balimbing (A. carambola) fruit to determine its chemical components, secondary metabolites, and toxicity. The study utilized a descriptive research method. This design was deemed appropriate because in this study, the researcher could set up an experiment to determine the level of pH value of the pulverized *A. carambola* at different maturity levels, ripe and unripe. The experiment was conducted to determine the quantitative and qualitative characteristics of the pulverized Balimbing. The set-up consisted of two maturity levels: unripe and ripe. Each maturity level has three replicates. Each replicate contains a mass of 20 grams. All the replicates were evaluated for their quantitative characteristics, such as pH level. Findings revealed that *A. carambola* fruit differs in its pH concerning its maturity levels, with an average pH in mature green fruit (unripe) and ripe *A. carambola* fruit, respectively. It was found that the developed *A. carambola* food enhancer showed a very acceptable result in terms of texture, appearance, and flavor/taste. At the same time, its aroma was described as acceptable. Further, the moisture, strip, and pH of *A. carambola* show significant differences with respect to its maturity levels (ripe and unripe) at 0.01 significance level.

**Keywords:** Pulverized Balimbing, Food Enhancer, Development, Philippines

## I. INTRODUCTION

With the inevitable uprising of different industrial innovations, such as in food manufacturing industries, and with the nature of the people to create new products made from local resources, the researcher was determined to create a potential food enhancer made from a fruit that was locally found and is native in the area. Balimbing (*Averrhoa carambola*), commonly known as Star fruit, is a firm, oval-shaped tropical fruit with ridges resembling a star. A raw Balimbing's color is green but will eventually turn to dark yellow when it becomes ripe. The taste it produces is a mixture of sweet and sour.

The study done by Johnson and Peterson and Hartwig and McDaniel (2010) showed that the chemistry of a sour taste appears to be relatively simple since it has been associated only with acids. Acids are found in foods such as baked goods, beverages, confections, gelatin desserts, jams, jellies,

dairy products, processed meats, fats, and oils. Furthermore, Hartwig and McDaniel stated that their primary use is to provide and enhance the flavor of foods and beverages. In addition to contributing to flavor, acidulants are commonly used for pH control to inhibit microbial growth in food products.

Balimbing has demonstrated its utility in industrial applications as well. According to a 2012 study by Avinash et al., previous evaluations of *A. carambola* primarily focused on its botanical and cultivation characteristics, traditional applications, and specific pharmacological properties.*A. carambola* juice contains different acid types used to clean and polish metals, particularly brass.

This study focused on developing a pulverized Balimbing (*A. carambola*) as a potent food enhancer. This study also determined the level of sourness of a pulverized *A. carambola* fruit sour spice at different maturity levels (unripe and ripe).

### 1.1 Literature Review

#### Morphology and Etymology of *Averrhoa carambola*

According to a study by Hitesh and Tejpal (2016), the *Carambola* comes from the Sanskrit word *Karmaranga*, meaning "food appetizer." An 'Oxalidaceae family' member- *Averrhoa carambola*, well-known as Starfruit, is an age-old plant. Starfruit is a tropical fruit characterized by its star-shaped appearance and a taste that combines sweetness and sourness.The Starfruit is about 2 to 6 inches in length. The two major distinct classes of *Carambola* are the smaller kind with a sour taste and the larger type with a sweet taste. In a study conducted by the National Tropical Botanical Garden (2012), researchers characterized Balimbing as a small tree that grows to a height of up to 6 meters or less. The flowers are red and white and commonly appear on the bare branches or leaf bases. The leaves of a Balimbing tree are pinnate and measure about 15 centimeters long. The leaflets are smooth, usually in 5 pairs, and in the shape of an ovate-to-ovate-lanceolate. The fruit is fleshy, green to greenish-yellow, with sharp, angular lobes. The seeds are arillate and the seedlings have been known to bear in 3 years during the seasons around August up until March.

#### Geographical Distribution of *Averrhoa Carambola*

A research study done at the University of Florida (2012) asserted that *A. carambola* is believed to have originated in Ceylon and the Moluccas. Still, it has been cultivated in Southeast Asia and Malaysia for centuries. It is commonly grown in Southern China, Taiwan, and India. It is also popular in the Philippines, Queensland, and Australia, and moderately so in some South Pacific islands, particularly in Tahiti, New Caledonia, Netherlands, New Guinea, Guam, and Hawaii. Research conducted by Hai (2015) unveiled that *Averrhoa carambola* is a petite tree grown in tropical and semi-tropical areas for its edible fruits and medicinal purposes. *Carambola*, commonly recognized as Starfruit, is the produce of Averrhoa carambola, a tree species indigenous to the Philippines.

#### Phytochemical Properties and Toxicity of *Averrhoa Carambola*

The study of Thomas et al. (2008) revealed that the preliminary phytochemical analysis of *A. carambola* fruit showed the presence of saponins, alkaloids, flavonoids, and tannins. Shah et al. (2011) also added that *carambola* fruit juice had been tested to contain active constituents such as vitamins, amino acids, ascorbic acid, carbohydrates, fats, and proteins. The examination of the physicochemical attributes of *A. carambola* fruit juice, both from ripe and unripe fruits, revealed a pH trend indicating an

increase with the progression of maturity. Specifically, the pH values were 2.4 for green mature fruits, 2.7 for half-ripe fruits, and 3.44 for ripe fruits.

Several studies have analyzed the nephrotoxic and neurotoxic effects of two components of this fruit: carambola acid and oxalic acid. These may cause kidney damage and stimulate the GABAergic system, the principal inhibitory system of the central nervous system (Cairasco et al., 2013). Moreover, Tsi et al. (2003) explained the clinical manifestations of patients suffering star fruit poisoning, which include hiccups, altered states of consciousness, vomiting, psychomotor agitation, epileptic seizures, coma, and death. Several studies have described the toxic effects of star fruit and provide evidence to suggest a recommendation against the consumption of this fruit by patients with chronic kidney disease (CKD. With the rising accessibility and global popularity of star fruit, it becomes crucial to promote awareness regarding the detrimental impact its consumption can have on kidney function. This pertains not only to individuals with pre-existing renal issues but also to seemingly healthy individuals.

**Efficacy of *Averrhoa carambola***

The study of Shah et al. (2011) revealed that they had carried out the anthelmintic assay with the aqueous extract of *Averrhoa carambola* leaves at various concentrations (10,50,100mg/ml) using albendazole as reference standard at the same concentration as the extract. It was found that the leaves of *Averrhoa carambola* displayed a significant anthelmintic activity in a dose-dependent manner, showing the time of paralysis in 10 minutes and death in 16 minutes at 100mg/ml concentration. In other studies, Ahmed et al. (2012) studied the analgesic activity of *Averrhoa carambola* fruit extract by writhing test and radiant heat-tail flick test. The study indicated that *when Averrhoa carambola* fruit was given to Swiss-Albino mice at 200 and 400 mg/kg doses, it displayed significant central and peripheral analgesic effects in the acetic acid-induced writhing model. The inhibition of writhing reached 37.13% and 42.76%, respectively.

Soncini et al. (2011) also investigated the hypotensive effect of aqueous extract of *Averrhoa carambola* leaves and its underlying mechanisms in the isolated aorta of rats. The AEAc (12.5-50.0 mg/kg i.v.) induced dose-dependent hypotension in normotensive rats. Cabrini et al. (2010) reported that upon the topical application of the ethanolic extract of *Averrhoa carambola* leaf and its butanol, ethyl acetate, and hexane fractions, croton oil-induced ear edema and cellular migration in mice were both reduced effectively. A similar study by Cabrini et al. (2011) posited that ethanolic extracts from *A. carambola* leaf and its ethyl acetate, butanol, and hexane fractions were useful in reducing croton oil-induced ear edema and cellular migration in mice. These results justified the traditional use of this plant for skin inflammatory disorders. The analysis of the Potential Topical Anti-inflammatory Activity of *Averrhoa carambola* in mice was reported by Daniela et al. (2010).

The hypoglycemic activity of this study reported that the insoluble fiber-rich fractions isolated from the pomace of the Carambola contain potential effects, as demonstrated by a study on several in-vitro methods. The fiber also effectively absorbs glucose, retard glucose diffusion, postpones the release of glucose from starch, and inhibits amylase activity to a certain extent (Shah et al., 2011).

**Food Enhancer Produced from Different Tropical Fruits**

Food enhancers made from fruits were familiar to the research scene. Many researchers have given time and effort in conducting research; for instance, the study by Rodeo (2016) presented that *Calamondin*, locally known as *calamari*, is a member of the citrus family valued for its distinct sour

taste. This small round fruit extract has a wide range of food and non-food applications. It is used in making refreshing drinks and hot beverages for the common cold, as flavor enhancers and souring agents to main dishes, and candied or preserved.

The study by Gupta and Prakash (2014) showed that *Tamarindus indica* was utilized in Indian spice blends as a souring agent to impart the preferred level of acidity in various food recipes. In the Philippines, it accompanies stews, soups, and some popular Filipino dishes, particularly *singing* and *singing na isda*. Additionally, Paul's (2011) study indicated that *kamias* has been reported to have applications in both medicinal and industrial contexts.

***Synthesis.*** The studies above and research conducted by several researchers and authors were clear explanations and arguments on the Morphology and Etymology of *Averrhoa Carambola,* its geographical distribution, phytochemical properties, and efficacy of Balimbing (*Averrhoa carambola).* The referenced studies emphasized the uses and the potential chemical attributes of the Balimbing (*Averrhoa carambola)* that can benefit society. In addition, the literature cited by the researchers provided detailed and profound information regarding the study. The prior input of knowledge and research information by the researchers and authors provided a better understanding of terms, scientifically and descriptively, improving the academic and background knowledge of the researchers.

This study is anchored on the study of Hitesh and Tejpal (2016); the word *Carambola* comes from the Sanskrit word *Karmaranga,* meaning "food appetizer". An 'Oxalidaceae family' member-*Averrhoa carambola*, well-known as Starfruit, is an age-old plant. Starfruit is a tropical fruit shaped like a star and possesses a taste that combines sweetness and sourness. The two major distinct classes of *Carambola* are the smaller kind with a sour taste and the larger type with a sweet taste.

According to a study conducted by the University of Florida (2012), *A. carambola* is believed to have originated in Ceylon and the Moluccas. Still, it has been cultivated in Southeast Asia and Malaysia for centuries. It is commonly grown in Southern China, Taiwan, and India. It is also popular in the Philippines, Queensland, and Australia, and moderately so in some South Pacific islands, particularly in Tahiti, New Caledonia, Netherlands, New Guinea, Guam, and Hawaii. The study of Thomas et al. (2008) revealed that the preliminary phytochemical analysis of *A. carambola* fruit showed the presence of saponins, alkaloids, flavonoids, and tannins. Shah et al. (2011) also added that *carambola* fruit juice had been tested to contain active constituents such as vitamins, amino acids, ascorbic acid, carbohydrates, fats, and proteins. In other studies, Ahmed et al. (2012) studied the analgesic activity of *Averrhoa carambola* fruit extract by writhing test and radiant heat-tail flick test.

The investigation revealed that *the Averrhoa carambola* fruit displayed notable central and peripheral analgesic effects in the acetic acid-induced writhing model in Swiss-Albino mice when given in quantities of 200 and 400 mg/kg, resulting in inhibitions of writhing at rates of 37.13% and 42.76%, respectively. In the study, Gupta and Prakash (2014) described the processes of making a food enhancer using Tamarind fruit. In their study, they powderized the tamarind fruit extract and used it as an agent to elevate the sour taste of the food.

### 1.2 Research Questions

The study's main objective was to develop a potential food enhancer from a pulverized Balimbing (*Averrhoa carambola*) fruit. Specifically, this study determined:

**1. What is the pH of the pulverized *A. carambola* fruit as a potential food enhancer at different maturity levels in terms of:**

1.1 color;
1.2 strips; and
1.3 moisture.

**2. What is the acceptability of the product as assessed by the food experts/costumers of the developed *A. carambola* food enhancer as to:**
2.1 appearance;
2.2 aroma;
2.3 taste/flavor; and
2.4 texture?

**3. What is the significant difference between pulverized *A. carambola* fruit as a potential food enhancer at different maturity levels in terms of pH?**

## II. METHODS

The study utilized a descriptive research method. This design was deemed appropriate because in this study, the researcher could set up an experiment to determine the level of pH value of the pulverized *A. carambola* at different maturity levels, ripe and unripe. The experiment was conducted to determine the quantitative and qualitative characteristics of the pulverized Balimbing. The set-up consisted of two maturity levels: unripe and ripe. Each maturity level has three replicates. Each replicate contains a mass of 20 grams. All the replicates were evaluated for their quantitative characteristics, such as pH level. The experimental set-up was conducted in the Food Technology Innovation Center at Surigao State College of Technology, Main Campus (Plate 1). It is a state college in the CARAGA Region, Philippines, with over 10,000 students. It must teach academic, professional, technical, vocational, and technological instruction and competencies by providing high-quality training in Education, Engineering, Computer, and Technology courses. Hence, the institution also offers graduate school programs, specifically a Master of Arts in Education major in food technology. A waiver was filled out because the respondents needed to intake the developed sample scones for tasting. The survey instrument was also attached with a phytochemical analysis of the Balimbing *(Averrhoa carambola)* fruit to ensure that no toxic chemicals were present and that the food was safe to be eaten.

The fruits of Balimbing (Averrhoa carambola) were gathered at the Municipality of Sison, Surigao del Norte. The collected Balimbing (Averrhoa carambola) was placed in a plastic container. The gathered Balimbing fruits were grouped from the unripe and ripe fruits. The quantity of the fruits was not evaluated as long as the pulverized amount would result in 60 g in each maturity level of ripe and unripe Balimbing (Averrhoa carambola) fruits. Preparation of Balimbing (Averrhoa carambola). The preparation method was based on the experiment by Narain et al. (2009). In their study, after the harvest, the mature Balimbing (Averrhoa carambola) was washed with running water, dried with a towel, and classified into three apparent maturities according to their firmness and skin color.

The eatable part of the fruit was manually isolated from the seeds using a stainless steel knife and then blended in a household mixer to create a uniform mixture. For this study, the ripe and unripe Balimbing was all washed under running water. A fruit knife was used to remove the fruits' green thin edges. The fruits were sliced into small pieces for the efficiency of space for the fruits to be easily dried.

The sliced pieces of Balimbing were placed in a metal screen that faces directly to the sun to absorb heat easily.

The total time for sun drying the sliced Balimbing (Averrhoa carambola) lasted approximately two days, depending on the weather. The fruits were monitored constantly to avoid disturbances or spontaneous errors. The fruits of the sun-dried Balimbing (Averrhoa carambola) were collected and prepared to be pulverized. A blender was used to break down solid substances from the sun-dried fruits. A strainer was also used to achieve a refined pulverized form of the fruits of Balimbing (Averrhoa carambola). A triple-beam balance was utilized to measure the mass of the pulverized Balimbing. For the unripe and ripe pulverized Averrhoa carambola, each of the six replicates was measured and achieved a mass of 20 grams—processing and Testing of the pH value of the Pulverized Balimbing (Averrhoa carambola).

A total of six 25 mL vials were used to store the pulverized Balimbing (Averrhoa carambola). Three vial samples were used for the two maturity levels, the unripe and ripe pulverized Balimbing (Averrhoa carambola). The three jars containing 20 g of pulverized unripe Balimbing (Averrhoa carambola) fruits were used for the unripe maturity level. The same mass was based on the ripe maturity level of pulverized Balimbing. Using a 250 mL beaker, a 20-gram pulverized Averrhoa carambola was dissolved with 100 mL of hot water and then stirred. Based on the methods Jusayan (2015) used in her study, the acidic or basic nature of materials was usually determined using a pH meter and commercially sold or synthetic indicating means. An eco-friendly pH indicator was prepared from the aqueous and ethanolic extract of kamias (Averrhoa bilimbi L.) flowers. In this study, a pH meter and a buffer solution were utilized. The pH meter's glass electrode was first immersed in the buffer solution to neutralize the pH meter. Then, the pH meter was wiped clean and immersed in each of the replicate concentrations of Averrhoa carambola to determine the pH values of the replicates.

The pH scale was used to determine the sourness of pulverized Averrhoa carambola fruit as a potential food enhancer in different maturity levels, ripe and unripe. The following parameters and descriptions were used:

| **Parameter (pH level according to acidity value)** | **Description** |
|---|---|
| 6.0-6.9 | Less Acidic |
| 4.0-5.9 | Moderately Acidic |
| 2.0-3.9 | Acidic |
| 0-1.9 | Very Acidic |

The concentration of each replicate was subjected to the pH value evaluation. The determination of the level of sourness was based on the results in correspondence with the pH scale. If the results in the pH scale were within the range of 1 to 6, it indicates that the concentration is acidic. Therefore, the sample is valid for sourness. If the results in the pH scale are within the range of 8 to 15, it would indicate that the concentration is a base; therefore, the sample is invalid for sourness. To analyze the quantitative data of this study, the following statistical tools were also utilized: Mean and Median were used to determine the acceptability of developed A. carambola food enhancer based on the qualitative preferences (appearance, aroma, taste, and texture) of the food experts/consumers and The Independent Sample T-test was employed to assess the variations in the developed A. carambola food enhancer concerning pH, strips, and moisture across distinct maturity levels categorized into ripe and unripe groups.

## III. RESULTS AND DISCUSSIONS

**Table 1** presents the pH of the pulverized *A. carambola* at different maturity levels.

| | pH for ripe fruit | pH for Green mature fruit(unripe) |
|---|---|---|
| **Trial 1** | 3.46 | 2.45 |
| **Trial 2** | 3.47 | 2.39 |
| **Trial 3** | 3.45 | 2.45 |
| **Trial 4** | 3.42 | 2.47 |
| **Trial 5** | 3.46 | 2.42 |
| **Mean** | **3.452** | **2.436** |

Using a pH meter, the table shows the different pH levels for five trials of the ripe and unripe climbing fruit. It can be seen that the pH of the ripe climbing fruit has a mean of 3.452, while the pH of the green mature fruit (unripe) is recorded as 2.436. pH measurements are commonly conducted at 25 °C (or a specified temperature) using a calibrated pH meter, indicating the acidity or alkalinity of an aqueous solution. The pH stability profile of the active ingredient within the formulation, combined with the safe pH range for the product in use, will define the acceptable limits for the formulation (Kulkarni & Shaw, 2016). The pH of the fruit increased with the advance in maturity. Ripe fruits were significantly less acidic (pH 3.44) than green mature (pH 2.40) and half-ripe (pH 2.71) fruits (Holschuh, 2001).

**Table 2.** ***Color of A. carambola after five days Air-dry***

| | Ripe fruit | Green mature fruit(unripe) |
|---|---|---|
| **Color** | Dry light brownish | Dry light brownish |

The table shows the final color suitable for using the product when the air drying method was applied after five days. It can be observed that there is not much difference in color between ripe and unripe climbing fruit. When exposed to air, the fruit undergoes a reaction triggered by the contact of a cut piece with oxygen, leading to the browning phenomenon. This is called enzymatic browning. The name enzymatic browning comes from an enzyme in the fruit reacting with oxygen from the air to turn the fruit brown (University of Maine, n.d.).

**Table 3.** ***Strips of the A. carambola before air drying***

| | strips for ripe Fruit(grams) | strips for Green mature fruit(unripe)(grams) |
|---|---|---|
| **Trial 1** | 26.4 | 22.4 |
| **Trial 2** | 29.8 | 25.3 |
| **Trial 3** | 25.4 | 20.8 |
| **Trial 4** | 28.1 | 20.4 |
| **Trial 5** | 27.3 | 22.5 |
| **Mean** | **27.4** | **22.28** |

The table shows the five sample strips of the A. carambola. It can be seen that the strips for ripe fruit resulted in a mean of 27.4 grams per strip, while the strips for Green mature fruit(unripe) had a mean of 22.28 grams before the air drying method. The fresh weight of the young green fruit was

29.12 gm, which increased gradually to 41.03 g and 59.91 g in half-ripe and full-ripe fruit, respectively (Patil et al., 2010).

**Table 4.** *The moisture content of the pulverized A. carambola*

| | **Moisture content for Ripe Fruit(%)** | **Moisture content Green mature fruit(unripe)(%)** |
|---|---|---|
| **Trial 1** | 86.3 | 71.2 |
| **Trial 2** | 84.4 | 70.8 |
| **Trial 3** | 85.6 | 72.5 |
| **Trial 4** | 84.8 | 72.1 |
| **Trial 5** | 86.2 | 71.2 |
| **Mean** | 85.46 | 71.56 |

*****Note that wet basis moisture content can range from 0 to 100 percent.

Wet basis Moisture content

Mw = $\frac{\mathbf{Ww}}{\mathbf{Wt}}$ x 100 = $\frac{\boldsymbol{Ww}}{\boldsymbol{Ww+Wd}}$ It is apparent that the moisture ratio decreases continuously with drying time.

The table reveals that the moisture content for ripe fruit has a mean of 85.46%, while the moisture content of green mature fruit(unripe) has a mean of 71.56%. According to Sharma & Shantaram (2013), the moisture content in greenish-yellow Averrhoa carambola is about 94.22 ± 1.75%, near the value found in their current study.

**Table 5.** ***Sensory Acceptability of the A. carambola Food Enhancer***

| | **Item** | **Median** | **Qualitative Description** |
|---|---|---|---|
| Appearance | 1 | 4 | Very Acceptable |
| | 2 | 3 | Acceptable |
| | 3 | 4 | Very Acceptable |
| | 4 | 4 | Very Acceptable |
| **Average Median** | | **3.75** | **Very Acceptable** |
| Texture | 1 | 4 | Very Acceptable |
| | 2 | 4 | Very Acceptable |
| | 3 | 4 | Very Acceptable |
| **Average Median** | | **4** | **Very Acceptable** |
| Taste/Flavour | 1 | 3 | Acceptable |
| | 2 | 4 | Very Acceptable |
| | 3 | 3 | Acceptable |
| **Average Median** | | **3.33** | **Very Acceptable** |
| Aroma/Smell | 1 | 3 | Acceptable |
| | 2 | 3 | Acceptable |
| **Average Median** | | **3** | **Acceptable** |

The table shows the different responses perceived by the expert participants for developing pulverized balimbing *(Averrhoa carambola)* fruit as a potential food enhancer. The table reveals a mean of 4, which is acceptable regarding texture. Similarly, a mean of 3.75 and 3.3 are also

very acceptable in terms of appearance and taste/flavor, while the aroma with a mean value of 3 is rated as acceptable as perceived by the participants.

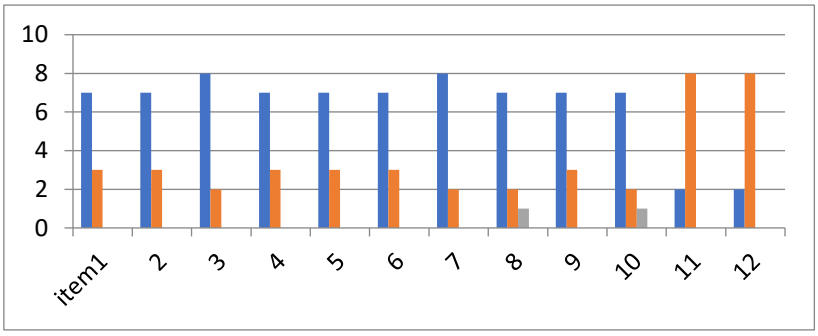


**Figure 2.** *Sensory Acceptability of A. carambola as a Food Enhancer*

The bar chart shows the distribution of ten (10) food experts' responses concerning each item in the sensory survey questionnaire. The majority of the food expert participants involved in this study accepted the product. This entails that the product as a food enhancer has met the criteria specified in its sensory acceptability.

| | df | t-value | Sig. (2-tailed) | Decision |
|---|---|---|---|---|
| **Moisture** | 8 | 28.244 | 0.000 | Significant |
| **Strip** | 8 | 4.476 | 0.002 | Significant |
| **pH** | 8 | 61.832 | 0.000 | Significant |

**Table 6.** *Difference of A. carambola in pH, Strips, and Moisture as to Different Maturity Levels*

Legend: 4 3 2 1

Significance level α= 0.01

The table shows the difference between the developed *A. carambola* food enhancer in terms of pH, strips, and moisture and different maturity levels, which are grouped as ripe and unripe. It can be seen that moisture, strip, and pH significantly differ when ripe and unripe. It reveals that all the computed p-values are lesser compared to the 0.01 level of significance. This means that the moisture content, strip in mass, and pH of *A. carambola* varies as the fruit matures. The evaluation of the physicochemical characteristics of *A. carambola* fruit juice derived from both ripe and unripe fruits indicated a rise in pH with increasing maturity. Precisely, the pH levels were measured at 2.4 for green mature fruits, 2.7 for half-ripe fruits, and 3.44 for ripe fruits, as reported by Borel et al. in 2014.

## IV. CONCLUSIONS AND RECOMMENDATIONS

Based on the study's findings, the following conclusions were drawn: Unripe and ripe *A. carambola* fruits have different pH levels. Differences in strips and moisture were also prevalent, while the color had no difference. *Averrhoa carambola* fruit is a potent food enhancer based on sensory acceptability. There is a significant difference in pulverized *A. carambola* fruit as a potential food enhancer at different maturity levels in terms of pH. On this basis of the conclusions, the following recommendations were offered: Further analysis on the other chemical and physical characteristics of pulverized *Averrhoa carambola* may be conducted, utilize the developed food enhancer in other Filipino

cuisines to examine its efficacy and applicability to other delicacies or viands, the future researcher may also use other parts of the plant such as the leaf or bark to derive a new potential product, and researchers may also want to explore other products that can be developed out from the Balimbing fruit other than food enhancer.

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