The influence of carambola starfruit (Averrhoa bilimbi) and Papaya (Carica papaya) on the quality of the organoleptic properties, vitamin C content, and fiber at jelly candies

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Abstract. Health is a fundamental important thing to be considered by every individual, especially the intake of vitamin C and fiber in adults. High vitamin C needs to make the most people consume supplements or injections of vitamin C. Megadosis consumption megadosis supplementation can provide dangerous side effects if not pay attention to the physical condition, needs, dose, and allergic factors. Unlike the consumption of vitamin C and fiber from fruits no side effects at all. Therefore, soft candy made of processed products made from natural fruit whose production is abundant but utilization is still very lacking. Jelly is made from the balance starfruit and papaya, contain vitamin C and fiber. The purpose of this study to determine the effect of starfruit and papaya counterweight on the quality of the organoleptic properties, vitamin C and fiber in jelly. This is an experimental research design with a total sample of 31 people. Data were analyzed with the organoleptic jelly Kruskal Wallis significance level of \( p < 0.05 \). The results showed no counterbalance starfruit and papaya on the organoleptic properties of the aspects of color and texture, while the organoleptic properties such as taste and aroma stated no counterbalance to jelly. It is advisable to make candy jelly starfruit and papaya with a proportion of 50%:50%, with a content of 35.10 mg of vitamin C and fiber 0.95%. Subsequent research can be developed with a quantitative analysis of nutrients, analysis of moisture, ash, reducing sugar,

Keywords: candy jelly, Carambola starfruit, papaya

1. Introduction
Health is the most fundamental thing for every individual. Health is a healthy state of complete physical, mental and social and not only is free of disease [1]. One way to keep your body in good health is a clean and healthy lifestyle. Health should be the most noticed by the individual. Vitamin is a complex problem that can lead to many other problems. One of the many vitamins that the body needs is vitamin C. This vitamin is essential substances to the body, the human body cannot produce it naturally so we can only get it from their daily food intake.

Vitamin C or ascorbic acid is a water-soluble vitamin. The basic function of vitamin C is to increase the body's resistance to disease, as an antioxidant, improves the function of white blood cells and can increase the absorption of iron, thus preventing anemia [2]. The Nutrition Adequacy Score 2013 recommended dose for adults 75-90 milligrams of vitamin C a day. Individuals are advised to consume vitamin C in accordance with minimum levels per day. It was intended to prevent the disease scurvy.
One of the diseases caused by lack of vitamin C is decreased immunity (susceptible to infectious diseases) in addition to scurvy, which if left untreated can lead to death. Therefore, it is an indispensable awareness of each person to pay attention to the consumption of vitamin C every day, especially in adults to increase endurance.

Based on the survey results in Moewardi showed vitamin C and fiber intake in patients with coronary heart disease less at 68% [3]. Meanwhile, according to [4] of the results of his research stating that they found an insufficient intake of vitamin C of 45.5% in children from high school. Adequate intake of fiber is now recommended the higher is 30-38 mg per day given many lucrative benefits for the body, adequate intake (AI) of dietary fiber as well as a reference to maintain digestive health and other health.

RDA of vitamin C and fiber in the form of supplements in excess can cause hyperoxaluria and have a tendency to kidney stone formation [5]. Unlike the consumption of vitamin C that comes from food that does not cause any side effects at all. Therefore, it is advisable to consume natural foods like fresh fruits and vegetables rich in vitamin C and fiber. One of the natural food ingredients that have a functional value is starfruit and papaya fruit.

Starfruit Wuluh (Averrhoa bilimbi) is a plant native to Indonesia are rich in vitamin c. In 2002, the planted area in Indonesia is estimated at 2,536 ha. But mostly just planted wide in the yard without any special treatment so that the resulting quality is low [6]. Post-harvest handling is not done carefully will result in useless material. The need for post-harvest handling due to fruit starfruit can not be consumed directly because it tastes sour besides a high water content can cause fruit starfruit easily rot if stored in a long time. Thus to increase the shelf life and high selling power, fruit starfruit can be processed into a processed food [7].

While the efficacy of starfruit is able to reduce cholesterol in the blood. Besides the flavonoids, pectin and vitamin C can lower blood pressure [8]. The content of vitamin C in fruit starfruit of 35 mg in 100 grams of fresh fruit. The content of vitamin C is high enough to be used as a reference in the use of fruit starfruit as healthy food.

Papaya (Carica papaya L.) is the fruit of a potential commodity to be processed further because in addition to the abundant production, papaya can be processed into a mature state, partially cooked or uncooked. In addition, papaya contains vitamin C is high enough 78 mg in 100 grams of fresh fruit. Papaya is very abundant production needs to be balanced with the maximum utilization due to the nature of perishable fruits, bruised and rotten.

According to [9] papaya fruit contains pectin. Papaya fruit pectin content at 0.66 to 1.00%, while according [10], pectin on papaya fruit flesh from 0.88 to 2.03% depending on varieties. The pectin content enough to generate a good gel. One processing to extend shelf life and usability value papaya and starfruit is to use it as a raw material in the manufacture of jelly.

Jelly is the preferred snack for all. Jelly is a product processed textured soft which is processed in such a way and is usually mixed with fat, gelatin, emulsifiers and others to produce a product that is loud enough to be formed yet soft enough to be chewed in the mouth so that after the dough is cooked can be directly formed or molded [11]. Jelly making usually using gelling materials that are reversible if the gel is heated to form a liquid and cooled to form a gel when returning [12]. In addition to the material strength of the gel formed because of pectin, acid, sugar, agar and gelatin.

Based on the above, the composition of jelly sweets in general only contains calories and has not a functional value to the body. Starfruit and papaya are rich in vitamin C and fiber and the potential to be an alternative to increase the nutritional value and functional jelly.
2. Research method
This study is experimental, which is then performed experimental activities aimed to know the symptoms or effects arising from variations in the addition of starfruit and papaya. Instruments used in this research are a form of organoleptic (hedonic). Data obtained from the hedonic test panelists on each sample was analyzed using SPSS 15.0 software.

To determine the effect of the balance of your data first be tested for normality, if the data are normally distributed then the analysis followed by One Way Anova analysis with significance level of 95% ($\alpha = 0.05$). To test the difference in treatment then tested Duncan. However, when the data were not normally distributed using Kruskal Wallis test and if there is a difference followed by Mann Whitney test.

3. Results and discussions

3.1. Product description
Jelly is one product that is popular among many people. Jelly candy generally contains only calories and has no functional value to the body. In order to enrich the nutritional value, especially vitamin C and fiber, the researchers used a basic ingredient starfruit and papaya. In this study, a counterweight used is 25%:75%, 50%:50% and 75%:25%. Furthermore, researchers continue organoleptic test by hedonic method. Here is a picture jelly candy product with three different counterweights:

![Jelly Candy](image1)

*Figure 1. Star fruit jelly candy Wuluh and papaya.*

3.2. Assessment of color
Color is one determinant of the quality of foodstuffs, in general, depends on several factors such as flavor, color, texture, and nutritional value, but before the other factors considered, visually colors appear first and sometimes decisive [13]. Color is directly viewable by the senses of vision because the color gives a subjective impression of the objects seen [14].

To determine whether there is counterbalance starfruit (*Averrhoa bilimbi*) and papaya (*Carica papaya*) against jelly candy colors, so the normality test beforehand. The test for normality using the Shapiro-Wilk test and the result $p (0.000) < \alpha (0.05)$. Thus, the data were not normally distributed. Analysis continued using the Kruskal Wallis test and showed statistical $p (0.051) < \alpha (0.05)$, which means there is a counterbalance to the starfruit and papaya jelly candy-colors produced. To find the balance anywhere that there is a difference followed by Mann Whitney test. Mann Whitney test results against jelly candy-colors of three different counterweight can be seen in the following table:

| Balance Carambola starfruit and papaya | Subset for alpha = 0.05 |
|---------------------------------------|-------------------------|
| 25%:75%                               |                         |
| 50%:50%                               | 0.111                   |
| 75%:25%                               | 0.311                   |

Table 1. Results of Mann Whitney jelly candy color against.
Based on the above data it can be concluded that there is a difference in the color of jelly between the balance of 75%:25% with a balance of 25%:75%. There is no color difference between the balance of 25%:75% to 50%:50% and there is no color difference between the balance 50%:50% with the balance of 75%:25%.

3.3. Assessment of taste
The taste is a very important factor because the taste of the food will affect the food to the mouth and react with the metabolic system so that the salivary glands can secrete digestive enzymes. Ratings for each panelist relative sense is not the same as the taste of food is a psychological suggestion to food that determines the value of the gratification of those who eat it [15].
To determine whether there is counterbalance starfruit and papaya to flavor jelly, then resumed normality test data first. The normality test using the test Shapiro-Wilk and the result \(p (0.000) < \alpha (0.05)\). Thus, the data were not normally distributed.
Analysis continued using Kruskal Wallis test and showed statistical \(p (0.063) > \alpha (0.05)\), which means penis feel no counterbalance starfruit (Averrhoa bilimbi) and papaya (Carica papaya) to taste candy jelly produced.

3.4. Assessment aroma
Aroma is a specific substance or component that has several functions in the food, which can be ameliorative, create more valuable or acceptable so the role of aroma here is able to attract consumer preference to that food. Tests on the aroma is considered important because it can quickly provide an assessment of whether or not a product is accepted by consumers [16].
To determine whether there is counterbalance starfruit and papaya on flavor jelly, then the normality test data first. The test for normality using the Shapiro-Wilk test and the result \(p (0.000) < \alpha (0.05)\). Thus, the data were not normally distributed.
Analysis continued using Kruskal Wallis test and showed statistical \(p (0.258) > \alpha (0.05)\), which means there is no counterbalance Belimbing Wuluh (Averrhoa bilimbi) and papaya (Carica papaya) on flavor jelly produced.

3.5. Assessment texture
One quality parameter that was instrumental in showing the characteristics of jelly texture. It has links with taste when chewing the material. One way of deciding the texture of a foodstuff is the preference test method (Test A) to mouthfeel (texture in the mouth). Sensation obtained when taking candy jelly is basically a blend of texture and flavor. Can be felt the sensation of texture was chewy, hard, soft, soft, sticky and a lot more [17].
To determine whether there is counterbalance starfruit (Averrhoa bilimbi) and papaya (Carica papaya) against the texture of jelly, then the normality test beforehand. The normality test using Shapiro-Wilk and the result \(p (0.000) < \alpha (0.05)\). Thus, the data were not normally distributed.
Analysis continued using Kruskal Wallis test and showed statistical \(p (0.002) < \alpha (0.05)\), which means there is a counterbalance to the papaya starfruit with texture produced. To find the balance anywhere that there is a difference followed by Mann Whitney test. Mann Whitney test results on the texture of the jelly sweets height different counterweight can be seen in the following table

| Balance Carambola starfruit and papaya | Subset for alpha = 0.05 |
|----------------------------------------|------------------------|
| 25%:75%                                | 0.01                   |
| 50%:50%                                | 0.048                  |
| 75%:25%                                | 0.33                   |
Based on the above data it can be concluded that there are differences in texture on the balance of 25%:75% and 50%:50%, there is a difference of texture in a proportion of 50%:50% and 75%:25%, but no differences in texture on the balance of 75%:25% to 25%:75%.

3.6. Assays results for vitamin C
Testing levels of vitamin C in jelly starfruit and papaya have been done using iodometry method. This test is performed to determine the levels of vitamin C candy jelly on each counterweight. The result of the levels of vitamin C in the jelly can be seen in the following graph:

![Figure 2. Vitamin C jelly candy.](image)

Based on the chart above on the balance of 75%:25% produced blood levels of vitamin C as much as 42.47 mg, in a proportion of 50%:50% produced blood levels of vitamin C as much as 35.09 mg, in a proportion of 25%:75% produced blood levels of vitamin C as much as 33.56 mg. Vitamin is an organic molecule that is very necessary for the body's metabolism and normal growth. Vitamins can not be produced by the body in sufficient quantities, therefore must be obtained from food consumed. Of all the vitamins are present, vitamin C is a vitamin most easily damaged. In addition to the water-soluble, vitamin C is easily oxidized and the process is accelerated by heat, light, alkali, enzymes, catalysts, as well as by the copper and iron catalysts. Oxidation is inhibited when vitamin C is left in an acidic state, or at low temperature [18].

The content of vitamin C in fruit papaya is high in the amount of 78 milligrams per 100 grams of fresh fruit. While in the starfruit has 35 milligrams of vitamin C content. From both these materials can be concluded that jelly with papaya counterweight 75% had vitamin C content is higher. But in the manufacturing process that includes slicing, crushing, heating and drying can lower levels of vitamin C candy jelly up to 50%. Therefore [17] says that should the slicing and destruction of excess avoided to minimize loss of vitamin C. Some things do researchers to minimize the loss of vitamin C include adding citric acid to lower the pH, and minimize the heating time.

3.7. Results of fiber content
Testing of fiber content in jelly starfruit and papaya have been done using methods Gravimetry. This test was conducted to determine the fiber content jelly on each counterweight. The test results on the fiber content jelly candy can be seen in the following graph:
Figure 3. The content of fibers jelly candy.

The fiber content in starfruit of 2.8 grams per 100 grams of fresh fruit, while the fiber content of 1.8 grams papaya. It is enough to prove that the candy jelly with a basis of starfruit more, have a higher fiber content. Researchers hope jelly made of starfruit and papaya have a high fiber content. However, from the results of laboratory tests results obtained are minimal, many determinants of the loss of the fiber content when the cooking process. Although it has little fiber content, is expected to jelly starfruit and papaya can contribute to increasing fiber intake.

4. Conclusions

The percentage of panelists assessment of the organoleptic properties of color, flavor, and aroma of the most favored panelist is the proportion starfruit and papaya 50%:50%. While the organoleptic properties of texture with the most likes panelist is in a proportion of 50%:50% and 75%:25%.

Kruskal Wallis statistical test of the organoleptic properties showed no counterbalance starfruit and papaya terhadap quality (organoleptic properties) color and texture of jelly while the taste and aroma is no counterbalance to the quality (organoleptic properties) jelly.

Based on the results of the analysis of the content of vitamin C obtained greater results on counterweight starfruit and papaya (25%:75%) with the levels of 42.48 mg of vitamin C per 100 grams.

Based on the analysis results obtained fiber content greater results on counterweight starfruit and papaya (75%:25%) with 0.97% fiber content per 100 grams.

5. Suggestions

Candy jelly starfruit and papaya can be created and developed the formula of 50%:50%, because of the aspects of color, taste and texture more preferred.

It is necessary to modify the addition of flavor essence to scent products without reducing the nutritional value and consistency because the resulting undesirable aroma panelists.

The researchers expect that no further studies on laboratory tests that include moisture content, ash content, reducing sugar, metal contamination and microbial contamination so that the data obtained more accurate.

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