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Wuluh Star Fruit (Averrhoa bilimbi Linn) and Pineapple (Ananas comosus L.) Formulations on the Quality of Fruit Syrup

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Abstract

Syrup is an alternative processed food derived from fruits. Fruit syrup is produced from starfruit and pineapple juice formulations. This study aims to get the best quality of fruit syrup from starfruit juice extracts and pineapple. The study design used a Randomized Block Design with one treatment factor consisting of the ratio of starfruit and pineapple juice that is 3: 1; 2: 1; 1: 1; 1: 2; 1: 3 of a total of 300 mL of juice. The results showed that the more pineapple ratio added to the manufacture of fruit syrup, it can increase the pH value, vitamin C, total dissolved solids, viscosity, total sugar and sensory appearance.

Keywords: starfruit, quality, pineapple, syrup

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INTRODUCTION

Starfruit is a plant originating from Indonesia and mainland Malaya. Star fruit wuluh (Averrhoa bilimbi Linn.) Commonly found as garden plants are very easy to plant because they do not require special care. According to Tohir (1981), the ability of starfruit plants to bear fruit throughout the year is not comparable to its use, so that a lot of fresh fruit is wasted. The optimal growth of starfruit can produce up to 300 fruits / trees, so that often the fruit decomposes if not utilized.

Pineapple (Ananas comosus L. Merr) is known by the people of Indonesia for its interesting aroma, taste and appearance. Pineapple is consumed in fresh form. Pineapple texture is soft so that during storage it is easily damaged physically, chemically and biologically. Based on Indonesian statistics pineapple production in West Kalimantan is 86,530 tons and the average is 157.57 tons / ha. Pineapple is in third place with a production of 1,835,483 tons or around 9.27% of the total fruit production in Indonesia (Anonymous, 2014). With a large amount of pineapple production in West Kalimantan, it is necessary to preserve methods through advanced processing to extend the shelf life.

Finished products made from starfruit and pineapple fruit commonly found in Indonesia are pineapple jelly, candied starfruit jelly, pineapple jam, dodol, syrup and other powdered drinks. In West Kalimantan, pineapple products have been found in the market such as jam, powder drink, and pineapple syrup. But fruit syrup from a combination of starfruit and pineapple fruit has not been found so far.

Syrup is an alternative processed food derived from fruits. The definition of syrup according to SNI (No.01-3544-1994) is as a solution of concentrated sugar (sucrose: High Fructose Syrup and or other invasive sugars) with or without the addition of permitted food additives. Starfruit has a strong sour taste that can be used as syrup, and to improve the taste of syrup from starfruit, it is necessary to do a combination with other fruits such as pineapple which has a sweet and slightly sour taste and has a distinctive aroma. The addition of pineapple in starfruit syrup combination can reduce sugar levels in making syrup because it already has a sweet taste from the fruit itself. This study aims to get the best quality of fruit syrup from starfruit juice extracts and pineapple.

RESEARCH METHOD

Materials and Equipment

The ingredients used in the manufacture of fruit syrup are ripe starfruit fruit based on size and slightly yellowish green color, queen fruit, pineapple, sugar, water, and CMC. The materials used for the analysis are aquades, filter paper, NaOH, HCL, iodine, buffer pH 4 and buffer pH 7, indicators for PP and starch.

The tools used are measuring cups, temperature thermometers, analytical scales, hand refractometers, volume pipettes, erlemeyer funnels, burettes, beaker cups, pH meters, filter cloths, drop pipettes, stationery, documentation tools, knives, cutting boards, basins, filters, pans, blanders, stirrers, stoves, analytical scales, measuring cups and bottles.

Research Design

This research was conducted using the Group Random Design (Gasperz, 1991), with one treatment factor consisting of 5 levels of treatment that is the amount of fruit juice combined into five treatments. Each treatment was repeated 5 times where the grouped combination was repeated, so that 25 samples were obtained. The star fruit and pineapple formulation ratio is 3: 1; 2: 1; 1: 1; 1: 2; 1: 3 of a total of 300 mL of juice.

Fruit Juice Preparation

Juice is obtained through several stages of treatment namely sorting, washing, cutting, crushing fruit, and filtering. The obtained juice is then measured in volume according to treatment.

Fruit Syrup Preparation

The volume of fruit that has been measured according to the next treatment is put into a pan and added with sugar and CMC. Each treatment uses sugar as much as 65% and 0.5% CMC of the total volume of fruit juice as much as 300 ml, then pasteurized at 65ºC for 30 minutes. During pasteurization stirring was carried out to obtain homogeneous syrup.

Determination of Acidity Degree (pH)

Determination of pH levels is done according to the workings of Apriyantono *et al.* (1989). The pH meter is calibrated first using a standard buffer solution of pH 4 and pH 7. Adjust the pH meter standardizer (calibration button) until a pH figure is found that matches the measured pH buffer temperature. After the pH meter is calibrated, the pH meter electrode is then dipped in the sample solution until a stable reading is obtained.

Analysis of Vitamin C

Analysis of total vitamin C used according to AOAC (1995), vitamin C levels were determined by iodine titration. As much as 5 ml of fruit syrup is put into 100 ml

erlenmeyer. Added 20 ml distilled water and a few drops of starch solution as an indicator. Then it is titrated with 0.01 N Iod solution until the solution is blue. Each ml of Iod solution is equivalent to 0.88 mg of ascorbic acid. Vitamin C levels can be calculated as ascorbic acid.

Determination of Total Dissolved Solids (° Brix)

Determination of total dissolved solids (° Brix) of tapus fruit using according to the method of Tranggono *et al.* (1990). measurements are carried out using a hand refractometer. The juice sample is first homogenized and then filtered through a filter cloth. The filtered filtrate is dripped on a refractometer prism. The scale read is then recorded.

Viscosity Test

The viscosity test was carried out with a viscosimeter (Yuwono & Tri, 1998). Fruit syrup samples were placed in a viscometer until the spindle was submerged. The spindle is set at 50 rpm, then the viscosity of the fruit syrup will be read.

Total Sugar Analysis

Analysis of total sugars used according to Apriyantono *et al*. (1989), where the anthrone reagent was 0.10% in concentrated sulfuric acid. Standard glucose solution is 0.20 mg / ml glucose solution in 100 ml distilled water. Take 10 ml dilute to 100 ml (1 ml = 0.20 mg glucose). Pipette into test tubes blank 0, 0.20, 0.40, 0.60, 0.80, and 1 ml of standard glucose solution. Add distilled water to the total volume of each 1 ml test tube. Quickly add 5 ml of Anthrone reagents to each test tube. Cover the test tube and shake it. Heat with boiling water for 12 minutes. Cool quickly using running water. Transfer to the cuvette and read the absorbance at λ = 630 nm. Make a curve of the relationship between absorbance and glucose concentration. Weigh the sample and add 100 ml of distilled water, strain with a filter cloth then take 1 ml of the sample and dilute in 9 ml of distilled water until 100 times dilution.

Sensory Analysis

The sensory test was conducted by 30 panelists consisting of a mixture of men and women who came from the Faculty of Agriculture at Tanjungpura University using the Hedonic Scale Scoring according to the method of Setyaningsih *et al.* (2010). Sensory test parameters observed appeared (clarity), taste and aroma. The hedonic scale used was 7 numerical scales (7) very very like, (6) very like, (5) like, (4) rather like, (3) rather dislike, (2) dislike, (1) very dislike like it.

Data Analysis

The results of research observations were statistically analyzed with the F test (ANOVA) at the 5% level, if it had a significant effect it would be followed by further tests at the 5% level (Hanafiah, 2003). Each treatment was repeated 5 times.

RESULTS AND DISCUSSION

Determination of Acidity Degree (pH)

The pH analysis is an important parameter that must be carried out because the stable acidity of the syrup shows the process of distributing the basic ingredients in the syrup evenly (Mukaromah *et al.,* 2010). The pH value of starfruit and pineapple syrup tends to be acidic in the range of 2.75-4.07 (Figure 1). Starfruit and pineapple syrup formulations significantly affected the pH value based on Anova ($p < 0.05$). The more ratio of star fruit wuluh added, the pH value will decrease.

Vitamin C

Vitamin C is an important parameter and acts as an antioxidant that can prevent oxidation and is a good nutrient for maintaining health. In addition, Vitamin C can extend the shelf life of syrup at certain concentrations (Reinoviar, 2010). The mean value of vitamin C in starfruit and pineapple syrup formulations produced ranged between 15.48 - 23.76 mg / 100 (Figure 2). Star fruit and pineapple syrup formulations significantly affected vitamin C levels based on Anova ($p < 0.05$). The more the ratio of starfruit and pineapple fruit ratio added, the vitamin C levels increase.

Total Soluble Solids (° Brix)

The average total value of dissolved solids of the Wuluuh and pineapple starfruit syrup formulation ranged from 48.32 to 53.58 0Brix (Figure 3). Star fruit and pineapple syrup formulations significantly affected the total dissolved solids based on Anova ($p < 0.05$). The more ratio of pineapple added, the total value of dissolved solids increases. According to Gusmalawati & Mayasari (2017), the total dissolved solids is influenced by the amount of sugar in the fruit used as raw material.

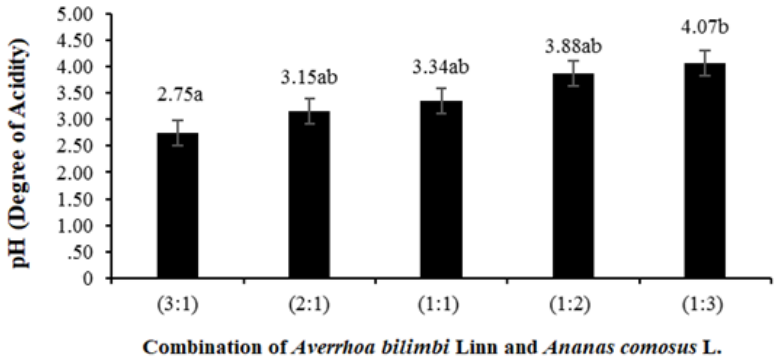

Figure 1. Average Graph of pH Levels of Star Fruit and Pineapple Syrup Formulation Syrup. The number followed by the same letter means that it is not significantly different in the 5% BNJ test.

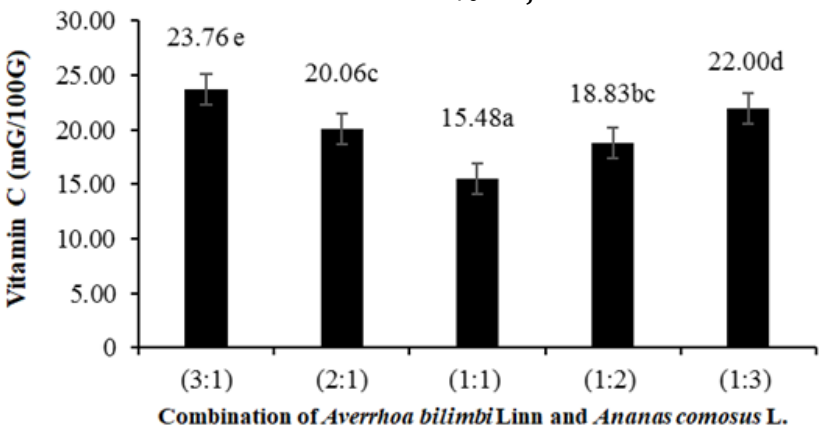

Figure 2. Graph of Average Vitamin C for Starfruit and Pineapple Fruit Syrup Formulations. The number followed by the same letter means that it is not significantly different in the 5% BNJ test.

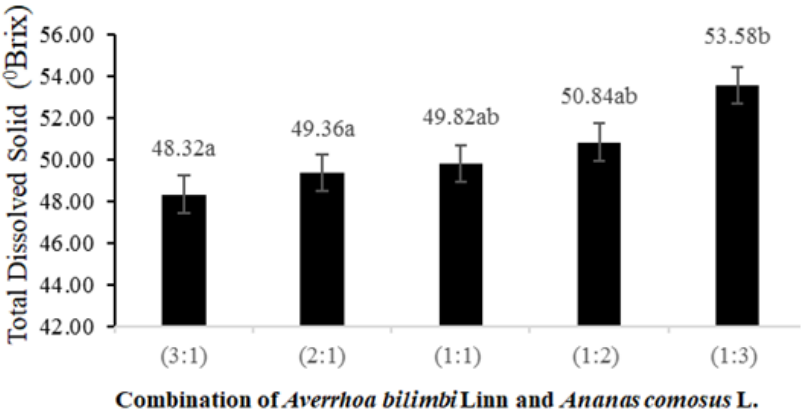

Figure 3. Graph of Total Dissolved Solids of Belimbing Wuluh and Pineapple Fruit Syrup Formulation. The number followed by the same letter means that it is not significantly different in the 5% BNJ test.

Viscosity Test

The average viscosity value of wuluh star fruit and pineapple syrup formulations ranged from 0.59 to 1.79 cps (Figure 4). Star fruit and pineapple syrup formulations significantly affected the viscosity value based on Anova ($p < 0.05$). The more ratio of pineapple that is added, the viscosity value increases. This is because the amount of pineapple sugar content is higher than that of Wimbung. The viscosity value of syrup circulating in the market is 1.81 cps (Pratama *et al.*, 2011), thus the viscosity value of star fruit and pineapple syrup formulations does not differ much from fruit syrup on the market. According to Buckel *et al,* (1985) the viscosity of the resulting syrup depends on the heating time. The higher the heating temperature, the higher the solubility of sugar. Sugar will bind more water, so the viscosity increases.

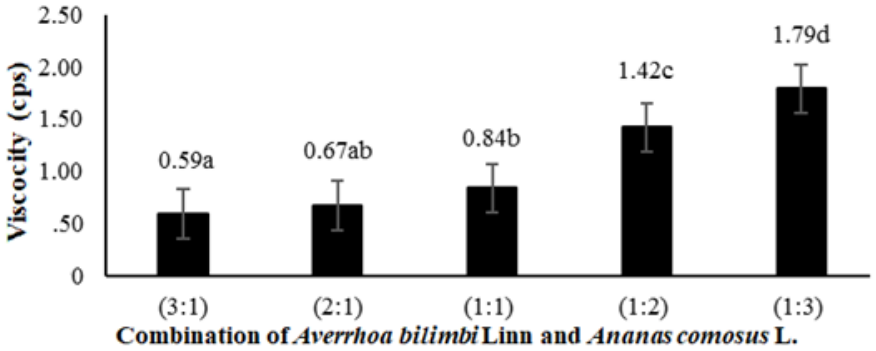

Figure 4. Average Viscosity Graph of Star Fruit and Pineapple Syrup Formulation Syrup. The number followed by the same letter means that it is not significantly different in the 5% BNJ test.

Total Sugar

The average value of total sugar in the formulation of starfruit and pineapple syrup formulations ranged from 44.81 to 63.47% (Figure 6). Star fruit and pineapple

syrup formulations significantly affected the total sugar value based on Anova ($p < 0.05$). The more ratio of pineapple added, the total value of sugar increases. This is due to the fact that pineapple contains sugar, namely, glucose 2.32% fructose 1.42% and sucrose 7.89% (Irfandi, 2005).

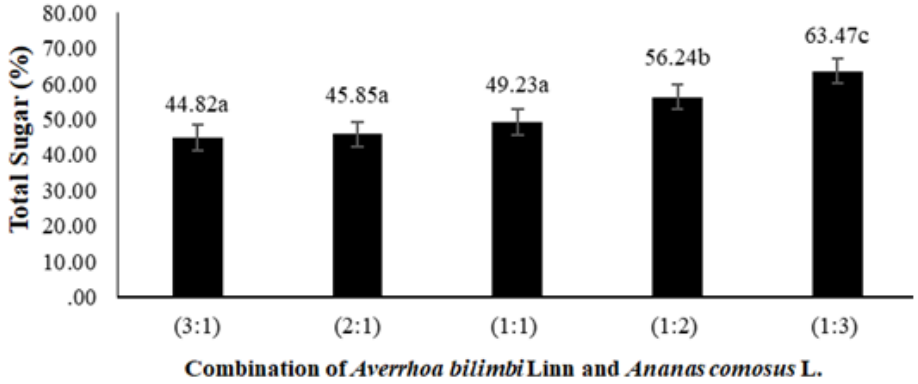

Figure 6. Graph of Total Sugar of Belimbing Wuluh and Pineapple Fruit Syrup Formulation. The number followed by the same letter means that it is not significantly different in the 5% BNJ test.

Taste Sensory

The average value of taste sensory preference scale from starfruit and pineapple syrup formulation ranged from 4.84 to 5.48, i.e. like (Figure 7). The starfruit and pineapple syrup formulations did not significantly affect the preference scale based on Anova ($p > 0.05$). Thus the ratio of addition of starfruit and pineapple does not affect the taste of fruit syrup.

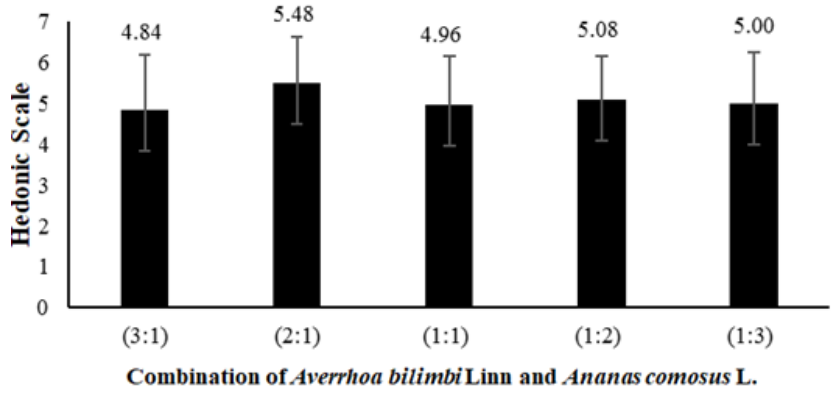

Figure 7. Mean Sensory Graph of Taste of Belimbing Wuluh and Pineapple Fruit Syrup Formulation.

Aroma Sensory

The average value of the sensory preference scale of aroma from the formulation of star fruit and pineapple syrup formulations ranged from 3.95 to 4.56, which is somewhat like-like (Figure 8). The starfruit and pineapple syrup formulations did not significantly affect the preference scale based on Anova ($p > 0.05$). Thus the ratio of addition of starfruit and pineapple does not affect the aroma of fruit syrup.

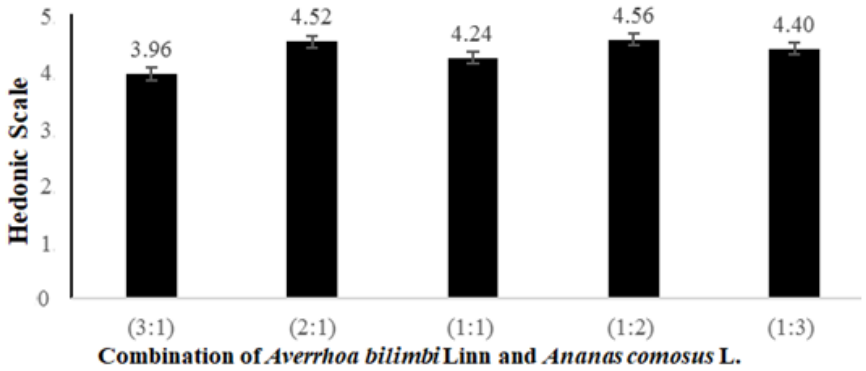

Figure 8. Mean Sensory Graph of Aroma of Star Fruit and Pineapple Syrup Formulation Syrup.

Appearance Sensory

The average value of sensory preference scale of aroma from the formulation of starfruit and pineapple syrup formulations ranged from 4.36 - 5.64 which is rather like - very like (Figure 9). The formulation of starfruit and pineapple syrup formulations significantly affected the preference scale based on Anova ($p < 0.05$). The more ratio of pineapple added, the more the panelists will like it. Panelists prefer golden yellow fruit syrup. According to Nugraheni (2014), pineapple contains carotenoid pigments which contribute to yellow, orange and red.

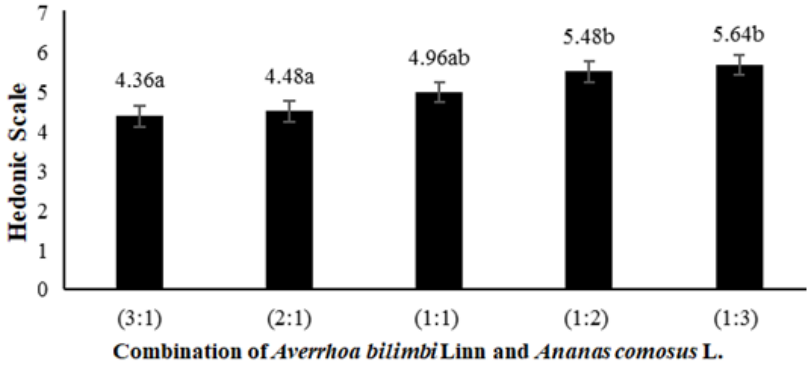

Figure 9. Sensory Average Graph of Appearance of Starfruit and Pineapple Fruit Syrup Formulation. Numbers followed by the same letter mean that there is no significant difference in Duncan's 5% test.

CONCLUSION

Based on the results of the study, it can be concluded that the starfruit and pineapple formulations affect the pH value, vitamin C, total dissolved solids, viscosity, total sugar and sensory appearance. The more ratio of pineapple added to the manufacture of fruit syrup, it can increase the pH value, vitamin C, total dissolved solids, viscosity, total sugar and sensory appearance.

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