

# The utilization of red seed guava and rosella flower as sources of vitamin C

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**Abstract:** The research aimed at making instant drinks by using red seed guava and roselle flowers as sources of vitamin C using a vacuum oven. The research was conducted in Laboratory of Processing and Management of Agricultural Products and Instrument Laboratory, Faculty of Agriculture, Universitas Katolik Santo Thomas Indonesian. This research was conducted with factorial random design with two treatments, namely: Factor I. The concentration of dextrin with K code consisting of 4 levels, namely: K<sub>1</sub> is 40%; K<sub>2</sub> is 50%; K<sub>3</sub> is 60%; and K<sub>4</sub> is 70%. Factor II. Drying with L code, consisting of 4 levels, namely: L<sub>1</sub> is 15 hours; L<sub>2</sub> is 20 hours; L<sub>3</sub> is 25 hours and L<sub>4</sub> is 30 hours. Parameters analyzed were rendement, vitamin C content, total acid, organoleptic value and water content. The best quality was obtained from rendement, vitamin C content, total acids, organoleptic value and water content with 60% dextrin concentration in 25 hours drying time.

**Keywords:** red seed guava, rosella flower, sucrose, dextrin, instant powder

## 1. Introduction

Along with the high need for nutrition, which is sourced from fruits and the increasingly busy people, the need for Vitamin C is needed to maintain body fitness. Red guava contain lots of vitamin C. Based on the results of the study, guava fruit contains vitamin C sweet oranges. The content of vitamin C is most abundant in the skin and flesh, especially after the fruit will mature. Other benefits of guava for health include weight loss, diabetes medications, lowering high blood pressure, reducing the risk of cancer, swollen gums and loose teeth, as a remedy beyond wound healing, convulsions, epilepsy, bacterial infections and constipation. Guava is also able to lower levels of cholesterol in the blood and is very useful for patients with dengue fever. Rosella flowers have the benefit of preventing diseases as useful to prevent cancer and inflammation, controlling blood pressure, blood circulation and launching a bowel movement. In the experiment also found that the extract of roselle reduce the effects of cancer, prevent the formation of kidney stones, and slow the growth of fungi/bacteria/parasites cause high fever. Rosella can also be used as a natural red dye, both in the food industry and cosmetics. Roselle are part of the plant that can be processed into various food products. The flower petals of this plant are dark red, thick, and watery. Roselle flowers that taste very sour is usually processed into jelly, sauce, tea, syrup, jam, pudding, and sweets [1 - 10].

The previous research that sucrose has been done in the manufacture of instant passion fruit essence but the result is formulated and when drying takes a long time, so the natural color of passion fruit can not be maintained. Dextrin is a group of high molecular weight carbohydrates which is a modification of starch with acids. Dextrin is easily soluble in water, faster dispersed, not viscous and more stable than starch. The function of dextrin is as an active food carrier such as flavor and dye which require water soluble and filler as it can increase product weight in powder form. With respect to the properties of dextrin, it can be used to make instant juice from a mixture of guavas and rosella



flowers of high quality. With the growing and increasingly busy society, the need for food products and instant drinks of higher quality [1,4- 22].

The research is expected to answer the problem of providing or making instant fruit powder from a mixture of red guava and rosella flower. The purpose of this research is to determine the effect of dextrin concentration and drying time to the quality of instant fruit powder with the use of red guava and rosella flower as a source of vitamin C. The purpose of this study is to determine the manufacture of instant drink from red guava with rosella flower to be instant drinks as a source C and overcome the abundant fruits and flower rosella, it can be made in the form of instant so it can last for one year, then the selling price can be maintained normally.

## 2. Materials and Methods

The ingredients used in this research were red guava, rosella flower, jodium, NaOH, indicator and dextrin and the tools used are biuret, measuring cup, blender, measuring flask, filter paper, erlenmeyer, funnel, vacuum oven, vacuum pump, stainless plate, analytic scales, desiccator, spoon, refrigerator and filter.

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This research was conducted with Randomized Complete Design (RAL) Factorial with two treatments, namely: Factor I. The concentration of dekstrin with the code K, consisting of 4 levels namely: K<sub>1</sub> is 40%; K<sub>2</sub> is 50%; K<sub>3</sub> is 60%; and K<sub>4</sub> is 70%. Factor II. The drying with code L, consists of 4 levels, namely: L<sub>1</sub> is 15 hours; L<sub>2</sub> is 20 hours; L<sub>3</sub> is 25 hours and L<sub>4</sub> is 30 hours [5 - 7].

### *Data analysis*

The data of instant fruit powder quality analysis of a mixture of red seed guava with rosella flower which includes rendement, vitamin C content, total acid, organoleptic value and moisture content. Rendement on the drying completed the constant weight is measured and the rendement percenge. Analysis of vitamin C by 10 ml powder material is taken and then inserted into flask (100 mL pluss distilled water up to the mark tera while shaken, and then filtered with filter paper). The filtrate was taken 10 mL erlenmeyer and then inserted into 3 drops of 1% starch. Then it was Titrated with 0.01N iodine solution until the color changes into a bluish. 1 mL iodium 0.01 N = 0.88 mg vitamin C and analyzed according to the methode of AOAC. Total acids on determination of total acids can be done by 10 mL sample plus 2-3 phenolftalein indicator drops 1% and then titrated using 0,1 N NaOH until the titration end point is reached, in which pink is formed permanently. The total acids is calculated as percentage of lactic acid. Organoleptic value on organoleptic assesment value is based on the sensory value based on the senses (appearance and flavor). Organoleptic assesment is performed on weighing as much as 5 g material and dissolved in 150 mL of water. In the organoleptic test sample for color and flavor on using hedonic test methode (hedonic with scale 1-5), where samples are presented randomly to the panelists determines the quality of material being tested. Value given are the following panelists. Water content on water content was analyzed according to methode of AOAC [2].

Implementation of research



Figure 1. Flow chart of research

3. Results and discussion

In general, the results showed that the results of research on the effect of drying time on the quality of instant fruit powder from the mixture red seed guava and rosella flower can be seen in Table 1.

Table 1. The effect of drying time on quality of instant fruit powder from red seed guava and rosella flower

| The effect of             | Rendement | Content | Total acid | Oganoleptic | Water |
|---------------------------|-----------|---------|------------|-------------|-------|
| L <sub>1</sub> (15 hours) | 92.50     | 19.15   | 2.94       | 4.94        | 3.93  |
| L <sub>2</sub> (20 hours) | 90.40     | 17.81   | 2.83       | 5.46        | 3.10  |
| L <sub>3</sub> (25 hours) | 89.91     | 16.04   | 2.69       | 6.47        | 1.94  |
| L <sub>4</sub> (30 hours) | 89.23     | 13.94   | 2.58       | 7.63        | 0.88  |

The result of the research of the effect of dextrin concentration on quality of instant fruit powder from the mixture of red seed guava and rosella flower can be seen in Table 2.

Table 2. The effect of dextrin concentration on quality of instant fruit powder from red seed guava and rosella flower

| The effect of         | Rendement | Content | Total acid | Oganoleptic | Water |
|-----------------------|-----------|---------|------------|-------------|-------|
| K <sub>1</sub> (40%)  | 88.43     | 17.85   | 3.01       | 5.94        | 2.14  |
| K <sub>2</sub> (50 %) | 89.33     | 17.03   | 2.80       | 6.46        | 2.25  |
| K <sub>3</sub> (60%)  | 91.04     | 16.35   | 2.70       | 6.47        | 2.49  |
| K <sub>4</sub> (70%)  | 93.25     | 15.72   | 2.54       | 6.63        | 2.96  |

The treatment of L<sub>2</sub> is very different from L<sub>3</sub> and L<sub>4</sub>. The treatment of L<sub>3</sub> differed significantly with L<sub>4</sub> treatment. While the highest yield was found in L<sub>1</sub> treatment which was 92.50% and the lowest rendement was L<sub>4</sub> treatment which was 89.23%. The relationship between the length of drying and the recovery of instant drink from the mixture of red guava with rosella flower followed the regression equation is presented in Figure 2.

The Figure 2 shows the longer drying then the rendement of instant fruit powder from a combination of red guava with rosella. The amount of yield produced is influenced by the amount of flour formed. Rendement instant fruit powder red guava flower with rosella flower are composed of various components-components that form like solids, water, and other components such as ash and minerals. Water and volatile compounds present in the flour affect of the yield. Evaporation of water and volatile compounds will further decrease the yield of instant flavor of instant red guava with rosella flower [1,8].

The K<sub>2</sub> treatment different very significantly with K<sub>3</sub> and K<sub>4</sub>. The treatment of K<sub>3</sub> differed significantly with K<sub>4</sub> treatment. While the highest yield is in K<sub>4</sub> which is 93.25% while the lowest yield is at K<sub>1</sub> that is equal to 88.43%. The relation between dextrin concentration with sucrose yield of instant juice of mixture of red guava with rosella flower following the regression equation as presented in Figure 3.

The Figure 3 shows the higher concentration of dextrin, the higher yield yield. The value of instant fruit powder extract from the mixture of red guava and rosella tends to rise with the higher concentration of dextrin. This is because the higher the concentration of the filler in this case added dextrin the concentration of essence juice of instant juice from the mixture of red guava with rosella less. The increased concentration of dextrin can increase the yield and density of pollen rendement instant red guava drink with rosella flower. Rendement of guava powder with rosella flower is increasing with increased concentration of filler material. It is assumed that the more fillers are added then the total amount of solids in the juice of instant from the combination of red guava and rosella flower increased high so did the increase in the amount of rendement. The higher the total solids on the dried material then the resulting yield will also be higher [1,23].

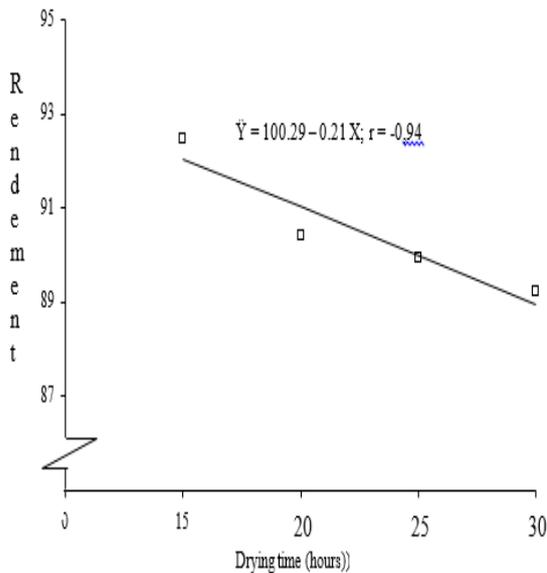


Figure 2. The relationship of drying with rendement of instant fruit powder from red seed guava and rosella flower.

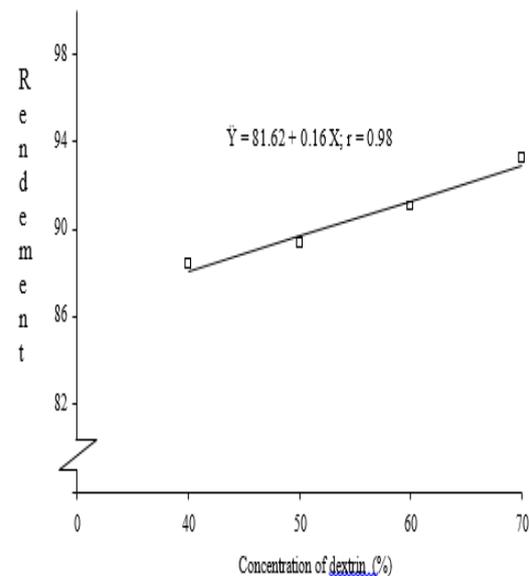


Figure 3. The relationship of concentration dextrin to rendement of instant fruit powder from red seed guava and rosella flower.

Table 1 shows the treatment of L<sub>1</sub> is very different from the treatment of L<sub>2</sub>, L<sub>3</sub> and L<sub>4</sub>. The treatment of L<sub>2</sub> was very different from L<sub>3</sub> and L<sub>4</sub> treatment as well as L<sub>3</sub> treatment was very

different from L<sub>4</sub> treatment. The highest vitamin C yield was found in the L<sub>1</sub> treatment and the lowest vitamin C was found in L<sub>4</sub> treatment. The relationship between the main of the effects of long drying on vitamin C can be seen in Figure 4.

The Figure 4 shows the longer drying result of vitamin C instant drink from the mixture of red guava with rosella petals decreasing. Vitamin C is the most unstable of vitamins compared to other substances or vitamins. Vitamin C is easily oxidized when exposed to air and this process is accelerated by heat, rays, alkalis, enzymes, oxidizers, and copper (Cu) and iron (Fe) catalysts. Vitamin C is easily oxidized because its compounds contain highly reactive hydroxy (OH) functional groups in the presence of oxidizing hydroxy groups to oxidation into carbonyl groups. The oxidation process will be inhibited when vitamin C is in very acid or low temperature [24].

Table 2 shows the K<sub>1</sub> treatment was very different from the treatment of K<sub>2</sub>, K<sub>3</sub> and K<sub>4</sub> treatment. Treatment of K<sub>2</sub> was very different from the treatment of K<sub>3</sub> and K<sub>4</sub>. Treatment of K<sub>3</sub> differed very significantly with K<sub>4</sub> treatment. The highest vitamin C yield was found in the K<sub>1</sub> treatment and the lowest vitamin C yield was found in the K<sub>4</sub> treatment. The main effect relationship between dextrin concentration and vitamin C levels can be seen in Figure 5.

The Figure 5 shows that the higher the concentration of dextrin the vitamin C of instant drink from the mixture of red guava and rosella flower would decrease. The high concentration of dextrin in instant drink from the mixture of red guava with rosella will damage the vitamin C. This is because vitamin C is stable in acid state. Because of the higher concentration of dextrin, the residual acid will be more which causes the total value of instant drink acid from the mixture of red guava with rosella flower increased of vitamin C content [1].

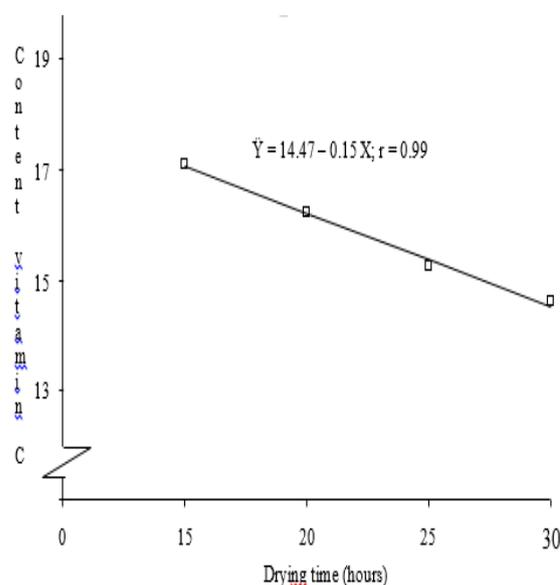


Figure 4. The relationship of drying with vitamin C of instant fruit powder from red seed guava and rosella flower.

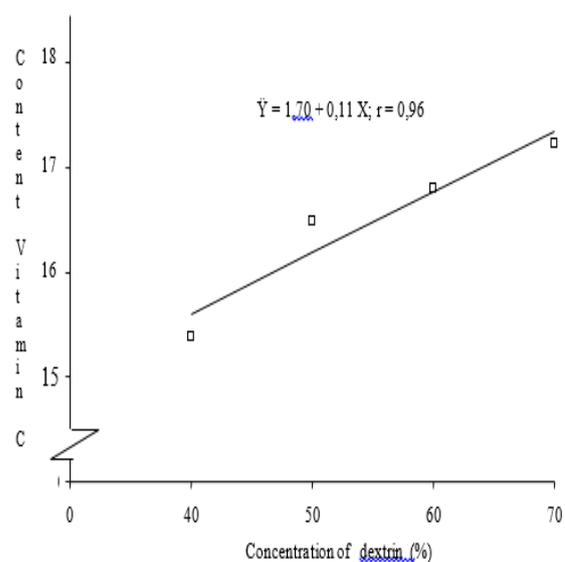


Figure 5. The relationship of concentration dextrin to vitamin C of instant fruit powder from red seed guava and rosella flower.

Table 1 shows the different treatments L<sub>1</sub> is not significant with L<sub>2</sub> but very different from L<sub>3</sub> and L<sub>4</sub> treatment. The treatment of L<sub>2</sub> was not significant with L<sub>3</sub> but very different from L<sub>4</sub> treatment. The treatment of L<sub>3</sub> was not significant with L<sub>4</sub> treatment. The highest total acid yield was found in the L<sub>1</sub> treatment and the lowest total acid yield was found in the L<sub>4</sub> treatment. The relationship to the effect of temperature with the total yield of instant drink from the mixture of red guava with rosella flower can be seen with the linear regression equation in Figure 4.

The Figure 6 shows that the longer the drying time, the lower the total acid. The total decrease in acid is caused by evaporation during the drying process. Organic acid which are soluble compounds in water, so with the evaporation of water then the content of organic acids contained in instant drink from a mixture of red guava with rosella flower also evaporate. Losing the organic acid content from the instant drink from the mixture of red guava and rosella petals further decreases the total acid content in the juice instant from the mixture of red guava with rosella flower [25].

Table 2 shows the different treatment  $K_1$  was not significant with the treatment of  $K_2$  but differed very significantly with  $K_3$  and  $K_4$ . The treatment of  $K_2$  differed not significantly with  $K_3$  but differed significantly with  $K_4$ . Treatment of  $K_3$  was not significant with  $K_4$  treatment. The highest total acid yield was found in the  $K_1$  treatment and the lowest total acid yield was found in  $K_4$ . The relationship between the main effects of the effect of dextrin concentration on the total juice of instant fruit powder from the mixture of red guava with rosella flower can be shown in Fig. 7.

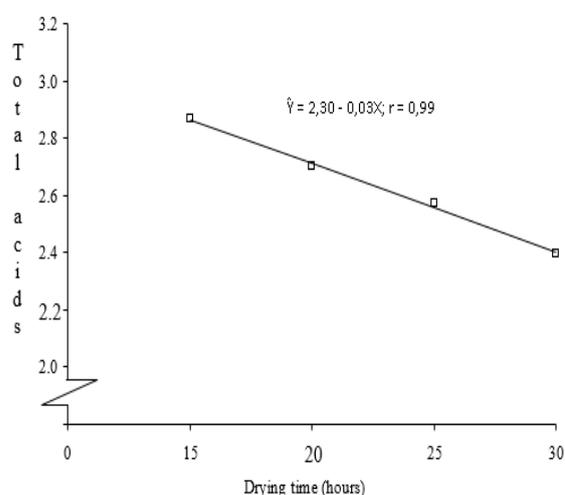


Figure 6. The relationship of drying with total acid of instant fruit powder from red seed guava and rosella flower.

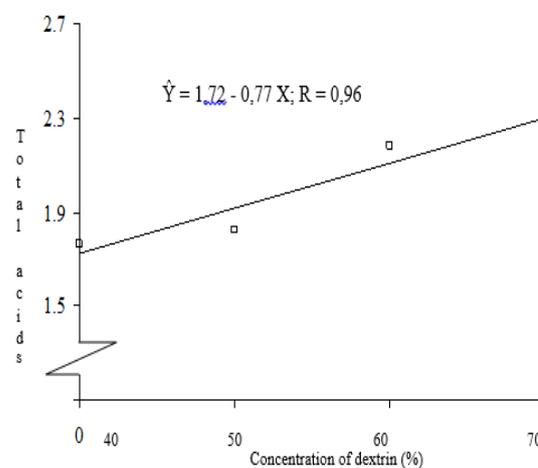


Figure 7. The relationship of concentration dextrin to total acid of instant fruit powder from red seed guava and rosella flower.

The Figure 7 shows the higher the dextrin concentration, the lower the total acid produced. The total averaging of instant drink of red guava mixture with rosella was obtained at the treatment of  $K_1$  while the lowest total acid was obtained at  $K_4$  treatment. The higher concentration of dextrin added then the total acid of instant drink acid from the mixture of red guava with rosella flower, this is due to residual acid in dextrin due to hydrolysis process with acid or enzyme. Because of the higher concentration of dextrin, the residual acid will be more which causes the total acid of instant drink from the mixture of red guava with rosella flower to increase [18].

Table 1 shows the treatment of  $L_1$  is very significant with  $L_2$ ,  $L_3$  and  $L_4$ . The treatment of  $L_2$  was very significant with  $L_3$  and  $L_4$  and  $L_3$  treatment was very different from  $L_4$  treatment. The highest organoleptic value was found in  $L_4$  treatment that was 7.63 and the lowest organoleptic value was  $L_1$  treatment which was 4.94. The relationship between temperature and organoleptic value follows the quadratic equation as in Figure 8.

The Figure 8 shows that the longer drying the organoleptic value of instant drink from the mixture of red guava and rosella increases. This is due to browning reactions in instant drinks from a mixture of red guava with rosella flower during the drying process. The flavor and aroma changes are caused by changes in terpene compounds and hydrocarbons in instant drinks from a mixture of red guava and rosella flower while have volatile or easily damaged properties by light or heat. Drying can lead to changes in color, texture, nutrient content, volatile aroma, which will reduce the value of

organoleptik instant drinks from a mixture of red guava and rosella. Temperature has a greater influence on nonenzymatic browning, in which each 5 hour rise in drying speed of browning process increases between 4-8 times which causes the organoleptic value to increase. High temperatures cause sugars and amino acids (Maillard reactions) to increase that affect the color and wanted flavor of the food stuff [19].

Table 2 shows the K<sub>1</sub> treatment was very different from the treatment of K<sub>2</sub>, K<sub>3</sub> and K<sub>4</sub>. The K<sub>2</sub> treatment was very different from the treatment of K<sub>3</sub> and K<sub>4</sub> as well as the K<sub>3</sub> treatment was very different from the K<sub>4</sub> treatment. The highest organoleptic value was found in K<sub>4</sub> treatment and the lowest organoleptic value was found in K<sub>1</sub> treatment. The relationship between dextrin concentration and organoleptic value follows the linear equation as shown in Fig. 9.

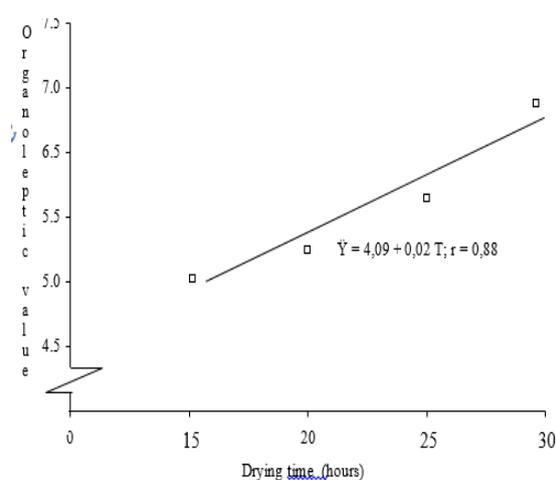


Figure 8. The relationship of drying with organoleptic value of instant fruit powder from red seed guava and rosella flower.

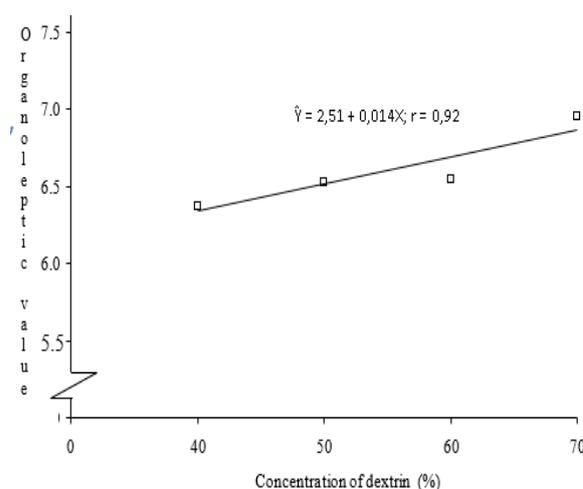


Figure 9. The relationship of concentration dextrin to organoleptic value of instant fruit powder from red seed guava and rosella flower.

The Figure 9 shows that the higher the concentration of dextrin, the value of organoleptic instant fruit powder drink from the mixture of red guava with rosella flower increase. This is due to the permanent of taste and aroma of instant drink from a mixture of red guava with rosella flower. Especially on the sticky texture due to the high concentration of dextrin given which will bind the organic compounds in the material. That addition of dextrin will also increase the sweetness caused by the hydroxyl groups present in dextrin that can bind aromatic compounds that give rise to the natural flavor of red seed guava and rosella flower can survive [18].

Table 1 shows the treatment of L<sub>1</sub> is very different from the treatment of L<sub>2</sub>, L<sub>3</sub> and L<sub>4</sub>. The treatment of L<sub>2</sub> was very different from the treatment of L<sub>3</sub> and L<sub>4</sub> as well as the treatment of L<sub>3</sub> was very significant with L<sub>4</sub> treatment. The highest water content was found in L<sub>1</sub> treatment that was 3.93 and the lowest water content was found in L<sub>4</sub> treatment that was 0.88. The relationship between the concentration of temperature and the water content of instant drinks from the mixture of red guava with rosella flower followed the linear regression equation as presented in Figure 10.

The Figure 10 shows the longer the drying the water content decreases. The increase in drying time will also decrease the water content of instant drinks from the mixture of red guava and rosella flower, because the longer drying the moisture content of the material will be lower due to the speed of drying will be increasingly broken of the hydrogen bond between the dextrin molecule with water. [26].

The Table 2 shows the K<sub>1</sub> treatment was not significantly different with K<sub>2</sub> and K<sub>3</sub> but very different from K<sub>4</sub> treatment. The different K<sub>2</sub> treatment is not real K<sub>3</sub> but very different from K<sub>4</sub>. Treatment of K<sub>3</sub> is not significant with K<sub>4</sub>. The highest water content was found in the K<sub>4</sub> treatment

and the lowest was found in the  $K_1$  treatment. The relationship between the effect of dextrin concentration on the water content of instant drink from the mixture of red guava with rosella flower can be seen with the linear regression equation in Figure 11.

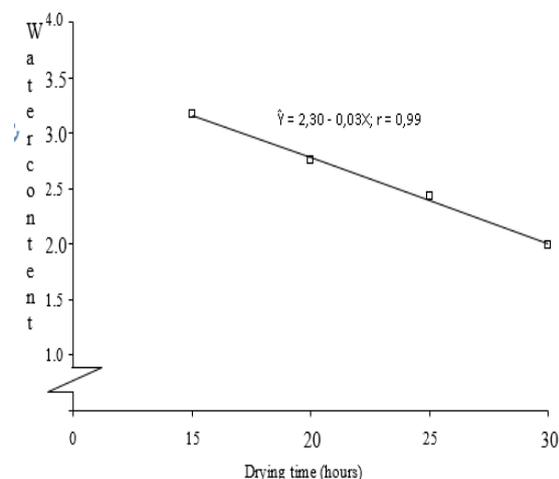


Figure 10. The relationship of drying with water content of instant fruit powder from red seed guava and rosella flower.

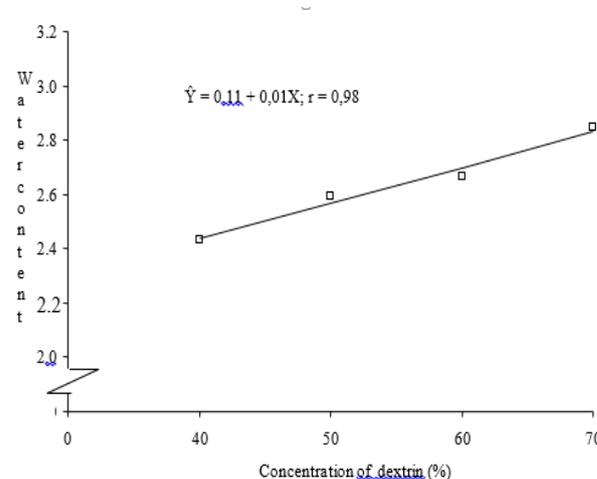


Figure 9. The relationship of concentration dextrin to water content of instant fruit powder from red seed guava and rosella flower.

The Figure 11 shows that the higher the concentration of dextrin in instant drink from the mixture of red guava with rosella flowers, the water content is increasing. The rate of reabsorption of instant drink powder from a mixture of red guava with rosella flower tends to increase with increasingly high concentrations of dextrin. This is because the hydroxyl group contained by dextrin is more attached and absorbs water through hydrogen bonds. The hydroxyl group in dextrin can increase water in a red powdered instant guava with rosella flower [26].

#### 4. Conclusion

The result research can be described as follows, the effect of drying and dextrin concentration on the quality of instant fruit powder from the mixture of red guava and rosella flower can be concluded that dextrin concentration has significant effect ( $p < 0.01$ ) on yield, organoleptic value, total acid, moisture content, and vitamin C levels. The higher concentration of dextrin added rendement, vitamin C content, total acid, organoleptic value, and water content increased. The effect drying time has a very significant effect ( $p < 0.01$ ) on the yield, organoleptic value, total acid, water content, and vitamin C content. The longer drying of rendement, total acid, water content and vitamin C decreases while the organoleptic value increases. Seen from value, yield of rendement, organoleptic value, total acid, water content and vitamin C content of instant juice powder of red seed guava mixture and rosella flower is best obtained with 60% dextrin concentration in 25 hours of drying time.

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