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Production of 'Kailan' Organic Juice

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Abstract

'Kailan' organic juice is the type of drink made from 'kailan' with the addition of honey and water. This research had a purpose to determine the concentration of honey and water to be added to 'kailan' to produce 'kailan' organic juice. The benefits of the research was to produce healthy and nutritious beverage that can be consumed and accepted by the community. The experiment design used was factorial pattern in randomized block design (RBD) with variable of concentrations of honey, water and 'kailan'. The results indicated that interaction of concentrations of honey have real influence on the total sugar content, vitamin C, total soluble solid and taste but do not have real influence on pH, color, aroma, and texture, concentration ratio of water to the raw materials have real influence on vitamin C, total soluble solid and taste, but do not real effected on the total sugar content, pH, color, flavor and texture, concentration and interaction of water with a ratio of materials have reals influence on total soluble solid and taste, but does not real effected on the total sugar content, vitamin C content, pH, color, aroma and texture.

INTRODUCTION

'Kailan' is originated from China. In Indonesia, 'kailan' is a new plant, but has become a family favorite. 'Kailan' crop at a glance is similar to Caisim or cauliflower. The leaves are long and widened like Caisim, while the color of the leaves and the stem is similar to cauliflower. The stem is quite sweet and tender on the tongue when chewed. While the leaves are tasty and sweet (Anonim. 2005).

Beverage product from vegetable is a vegetable extract or vegetable juice where in the production process is added water, sugar and other additives before it is consumed. Vegetable juice is believed to be functional and can help cure diseases. Juice therapy becomes an integral part in the healing programs. Fruits and vegetables are the largest contributor to the body's need for vitamins and minerals.

Juice is a beverage that has a balance between sucrose and acid. Therefore the addition of sucrose is essential to enhance sweetness. The purpose of sweetener addition is to improve the food flavor (taste and odor) so that the sweetness can increase its delicacy. The addition of sweeteners may also improve the texture of food such as increased viscosity, adding heavy sense, thus improving the quality of food. Sucrose is a kind of sweeteners that is widely used, because the flavor of sucrose can give more sweet pleasure to human making it suitable to be considered as a standard sweetener (Sudarmadji, et al, 1982).

Generally honey is functional for generating energy, increase endurance, and improve stamina. Many diseases can be cured by honey such as gastric disease, colitis, heart disease and hypertension. In addition, there are substances in honey acetyl i.e. choline which can improving the process of metabolism such as improving blood circulation and lowering blood pressure (Suranto, 2004).

Water is used as an kailan's extraction material. The water used in the food processing industry should at least meet the required quality standards for drinking water, but each part of the food processing industry may need to develop a specific water quality requirements to achieve a satisfactory outcome (Buckle, *et al.*, 1985).

The purpose and benefit of this research were as follows : utilize organic 'kailan' to become refreshing and healthy beverage product, produce new beverage product from organic vegetables in this case organic 'kailan' that can be functioning as functional beverage, the determination of honey concentration whether it can affect the characteristics of juice from organic 'kailan', determine the level of preference of panelist to beverage products. This study is expected to provide the following benefits: producing healthy and nutritious beverage that can be consumed and accepted by the community; diversification of products processed from organic 'kailan'.

MATERIAL AND METHODS

The main raw material used in this study were organic 'kailan' from Graha Puspa Lembang (Figure 1). Additional ingredient was honey and water.

The tools used for making organic Kailan juice were pan, juicer, filter cloth, scales, bottles, spoon, basin, labels and measuring glasses. Analysis tools are burette, analytical balance, beaker, funnel, pipette drops, Erlenmeyer, volumetric flask, and measuring glass, hand refractometer.

The design of treatment consisted of two factors, namely the concentration of honey (M) consists of three levels namely: m1 (10%), m2 (15%), m3 (20%). The second factor, comparison of addition of water to raw material (L) and comprised three levels, namely: I1 (1:1), I2 (2:1), I3 (3:1).

Experimental design used in this study was the pattern of 3 x 3 factorial with completely randomized groups (RAK) and repeated 3 times so acquired 27 plots experiment. To prove any differences between behavior influence and interactions from it to all the observed response variable, data analysis was performed. Based on the above experimental design and to simplify the test then experimental analysis of variance (ANOVA) was performed and the hypothesis, namely:

1. If $F_{count} > F_{table}$ at the level of 5%, then the honey treatment concentration, ratio of water with raw materials and their interactions influence the characteristics of 'kailan' juice. Thus the research hypothesis was accepted and continued with Duncan test.
2. If the $F_{count} < F_{table}$ at the level of 5%, then the concentration of honey treatment, ratio of water with raw materials and their interaction did not affect the characteristics of 'kailan' juice. Research hypothesis therefore rejected (Gaspers, 1995).

The response design in main research for 'kailan' juice products were chemical analysis, physical analysis, microbiological analysis and sensory responses. Chemical analyzes were performed on 'kailan' juice products, namely: Analysis of total sugar content, pH levels of analysis, and the analysis of vitamin C. Physical analysis conducted on 'kailan' juice products, namely: determination of total soluble solids with a refractometer.

Organoleptic tests used hedonic test (Kartika, *et al.*, 1988), because it can determine whether the product is acceptable or not by the consumers represented by the panelists. Assessment of 'kailan' juice products consist of color, aroma, flavor, and appearance.

Experiment Description

Organic 'kailan' juice manufacturing process began with the raw material sorting process. Selected organic 'kailan' plant were aged 22 days, and ready to harvest, green,

unrotten, and free from disease. Further processing, the selected organic 'kailan' washed with clean water to remove dirt that sticks to the skin. It was intended that at the time of the destruction process, dirt does not cause contamination to the final product. After 'kailan' organic vegetables was clean, then the cutting process was conducted. Vegetables cut into several pieces. This process is intended to help simplify the process of vegetables destruction. The next process was the destruction by using a juicer machine. 'Kailan' destroyed in order to form slurry. Once the vegetables were destroyed then performed the screening process. The screening process was done manually, where the screening results collected in the container and the waste was disposed. The mixing process is a very important process because in this process, the main materials and other materials began to be mixed together. Vegetable slurry (*organic 'kailan'*) was mixed to supporting materials such as water and honey. Mixing slurry vegetables (*organic 'kailan'* to water) with a variation of 1:1, 2:1, 3:1, and the concentration of honey with a variation of 10%, 15%, and 20%. The resulting juice, then pasteurized at 85 ° C for 7.5 min, because juice usually acidic in nature, then heating at low pH would be effective in killing microorganisms. The purpose of pasteurization is as follows: Killing pathogens, Extending shelf life by killing bacteria and deactivate the enzymc (fruit juice, juice, wine, beer). The next process is the final process in the manufacture of kailan juice that is packaging process. Packaging was done to extend the shelf life of juice products. Type of packaging used was cup.

RESULTS AND DISCUSSION

1. Total Sugar

Results of analysis of variance showed that the concentration of honey (M) independently affect on the response of total sugar 'kailan' organic juice, whereas comparison of water with raw material (L) and the interaction between the two treatments (ML) showed no significant effect on the response of total sugar content of 'kailan' organic juice. The higher the addition of honey, the higher the concentration of sugar. Sugar content in honey is 80% is 85% the form of fructose and glucose (Suranto, 2004).

2. The Levels of Vitamin C

Results of variance analysis showed that treatment of honey concentration (M) as well as comparison of water with raw material (L) significantly affect levels of vitamin C, and further test on the interaction was performed. The higher concentrations of honey were added to the product makes vitamin C levels higher, this is caused by high levels of vitamin C in honey. Decreased levels of vitamin C in the 'kailan' organic juice from raw ingredients is because in the process of making juice there was a heating process of pasteurization.

Comparison of water with raw material to the treatment of I1 (1:1) significantly different from I2 (2:1) and I3 (3:1), but the treatment I2 (2:1) was not significantly different from of I3 (3:1). In this case the ratio of water and raw materials affect the amount of vitamin C. Therefore if more water is added to juice the vitamin C in the kailan will be more diluted and will lead to the reduction and loss during the pasteurization process. High content of vitamin C is from raw material itself that is 'kailan'.

3. pH

Results of variance analysis showed that treatment of honey concentration (M) as well as comparison of water with raw materials (L) did not give significant affect to the pH, therefore further test is not necessary. pH values in this study had no effect on the

concentration of honey, the addition of ratio of water with raw materials, and their interactions. This is because the pH of the raw materials in this study was the same, and additional ingredients such as honey, which only causes a slightly sour taste. Because of differences in the concentration of honey is not much different, the level of acidity is also not affected.

4. Total Soluble Solute (TSS)

Results of analysis of variance showed that treatment of honey concentration (M) as well as comparison of water with raw materials (L) has significant effect on levels of TSS, therefore further tested on the interaction was carried out. The same concentrations of honey m1 (10%) and m3 (20%) with a ratio of water to raw material l1 (1:1) significantly different from l2 (2:1), but l2 is not significantly different from l3 (3:1), the same concentrations of honey m2 (15%) with a ratio of water to raw material l1 (1:1) is not significantly different from l2 (2:1) and l3 (3:1). Honey does not have total insoluble solids, this result has been tested by Perum Perhutani Pusat Perlebahan Nasional (2006). So that the honey has a high total soluble solids. The higher concentration of honey, the greater the total soluble solids, this is due to honey is derived from carbohydrates that can increase the volume of total soluble solids.

Water comparison with the same raw materials l1 (1:1) with honey concentration m (10%) significantly different from m2 (15%) and m3 (20%), as well as m2 (15%) significantly different from m3 (20%), the ratio of water with the same raw materials l2 (2:1) with m1 honey concentration (10%) was not significantly different from m2 (15%), but significantly different from m3 (20%), the ratio of water to raw material at l3 (3:1) with honey concentration m1 (10%), m2 (15%), m3 (20%) were not significantly different. This is because more solids are dissolved on more added solution. Changes in the value of total soluble solids depending on the amount of soluble solids in solution. The more soluble substances, the value of total soluble solids become increasingly large. TSS test results showed that selected sample is m2l1 with water and raw materials ratio of 2:1 and 15% honey concentration.

5. Organoleptic Test

For color, the analysis of variance showed that the honey concentration factor (M), the addition of water to raw material ratio (L), and their interaction (ML) on the 5% level did not significantly affect kailan organic juice color, the use of additives such as honey does not giving significant different effect on colors, due to the concentration of honey given to only contribute very small to sweet taste.

For aroma, the results on the analysis of variance showed that the honey concentration factor (M), the addition of water to the ratio of raw material (L), and their interaction (ML) on 5% level did not significantly affect kailan organic juice aroma. Thus, concentration of honey and water comparison with raw material does not affect the flavor of kailan organic juice. This can be caused by organic kailan juice has a distinctive scent, so the addition of honey and ratio of water with raw materials does not lead to a different flavor. This also occurs in the interaction between two factors.

For flavor, analysis of variance showed that honey concentration (M), water comparison with the raw material (L) and the interaction between them (ML) significantly affect the response value of sense from 'kailan' organic juice. The same concentrations of honey m1 (10%) and m2 (15%) with a ratio of water to raw material l1 (1:1), l2 (2:1), and l3 (3:1) were significantly different, whereas the concentration of honey m3 ratio of water to

raw material I1 (1:1) significantly different from I3 (3:1), and I2 (2:1). It can be concluded that in this study, panelists disliked m1, but for treatment m2 and m3 panelists are rather like it, this is because several panelists do not like healthy drink made from raw vegetables. Panelists in this study are not vegetarian. Panelists should be used the ones who already know the benefits of healthy drinks such as 'kailan' organic juice, and consumers who have a life style a healthy life with natural foods. The results of organoleptic test showed that the best samples for flavor is m3I3 sample (ratio of water to raw material 2:1 with 20% honey concentration).

For appearance, the experimental results on the analysis of variance showed that the honey concentration factor (M), the addition of water to the comparison of raw material (L), and also the interaction between the two (ML) on the level of 5% did not significantly affect the appearance of 'kailan' organic juice.

6. Determination of Best Sample

Results of chemical analyses, physical and organoleptic test (hedonic test) showed that sample m3I3 (20% honey concentration and ratio of water to raw material 3:1) is the best sample with 22.83% total sugar content, vitamin C content of 5.073 mg/100g, pH 5.19 and TSS levels of 19.643%.

CONCLUSION

Concentrations of honey significantly affect total sugar content, vitamin C content, TSS (total soluble solid) and flavor, but did not significantly affect pH, color, aroma, and texture. Concentration ratio of water with raw materials significantly affect vitamin C, TSS (total soluble solid) and flavor, but did not significantly affect total sugar content, pH, color, aroma and texture. The interaction of honey concentration and ratio of water to raw materials significantly affect the TSS (total soluble solid) and flavor, but did not significantly affect total sugar, vitamin C, pH, color, aroma and appearance. Based on the results of the study showed that honey concentration of 20% and comparison 'kailan' with water (3:1), is best sample, with a total of 22.813% sugar content, vitamin C content 5.073 mg/100g, 5.19 pH levels and levels of TSS (total soluble solid) 19.643%.

SUGGESTION

There needs to be another research innovation for 'kailan' organic juice additives in order to maintain and improve its quality at long storage life. It will determine the level of shelf life for expiration of 'kailan' organic juice products. The functional food study on organic 'kailan' still need further research.

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Fig. 1. Organic 'kailan' from Graha Puspa Lembang



Fig. 2. Organic 'kailan' juice