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# Formulation of *Temulawak* for Improvement of the Organoleptic Characteristics

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**ABSTRACT**

Indonesia is a country that rich in diversity of herbs and spices. As many as 20,000 plant species on earth can be used as a medicine and 11 percent or as much as more than 2,200 kinds of medicinal plants there are hiking Indonesia. One of the medicinal plants that have the potential to increase in value-added is *Temulawak*. In the area of Borneo total *Temulawak* in 2014 is 162.212 productions. One of the medicinal plants that have the potential to increase in value-added is *Temulawak* (Curcuma xanthorrhiza Roxb). *Temulawak* is one of the herbs that have the taste, aroma, and color typical of Rhizome Curcuma. Processing of Curcuma crops in Indonesia many carried out the purpose of this research is to know the influence of the number of concentration dilution Curcuma, and type of sugar (aren and sand), against the chemical properties and the acceptance of consumers, drink *temulawak* to enhance the consumer's receipt against the taste, the aroma of variant *Temulawak*. Manufacture of *Temulawak* has done with added sugar, Palm sugar, *pandan* leaves, and tamarind, with different concentrations, then analyzed the nutritional components, power thank consumers and consumer purchase interest. The results showed that the variation in the concentration of sugar concentration and *Temulawak* to sugar levels, variations in the concentration of sugar concentration and *Temulawak* to pH levels, and concentration of sugar concentration and *Temulawak* effect on total dissolved solids. Overall organoleptic results obtained 5% concentration of the sample extract and sugar concentration *Temulawak* 6% most preferred panelists

**Keywords:** organoleptic, palm sugar, *temulawak*, types of sugar.

## 1. Introduction

*Temulawak* is one of the spices that come into family *Zingiberaceae*. *Temulawak* is useful for traditional medicine, the material for beverage, oleoresin and dyes (Listiana & Herlina, 2015). Indonesian traditional beverage that can be classified as functional foods, such as: *wedang's* ginger, *wedang's* secang, *wedang's* lime, *Kaempferia galanga*, tamarind, *temulawak* beer, *plethok* beer, *ronde*, *sekoteng*, *bandrek*, *serbat* and *dadih*. Has special qualities which is important for health, such as, can warm the body, prevent colds, cough, influenza, rheumatism, increase stamina, facilitate digestion and antidiarrhea (Farikha dkk., 2013).

Processing of agricultural products in South Kalimantan is mostly carried out by UKM. One of UKM processing of agricultural products with the production of *temulawak* which have considerable productivity UKM were Sani and Dedy. *Temulawak* is a traditional fresh drink made from herbal spices.

*Temulawak* is a beverage that made from ginger tuber rhizome, tastes sweet and slightly like herbs, but is watery. This beverage has been sold in bottles in the Martapura area of South Kalimantan.

This product innovation is new, that is qualitatively different from existing products to add economic value to products. The innovations made on T*emulawak* are innovative flavours and aromas, namely bitter spicy taste and sharp pungent aroma. The need for innovation of the taste and aroma of a product. Because of the taste and aroma have a big influence on consumers' buying interest.

Repairing the sensory characteristics of products in *Temulawak* needs to be finish to increase the consumer's acceptability. In the innovation of *Temulawak*, the addition of natural flavourings (pandan leaves) with a predetermined concentration is intended to eliminate the bitter spicy taste and the pungent aroma of *Temulawak*, so that the ginger drink can be accepted by consumers as well to reach a wider market share.

## 2. Materials and Methods

*Materials*

The materials used in this study were fresh ginger, granulated sugar, palm sugar, distilled water, pandan leaves and tamarind, salt. The analysis material used was aquades obtained at the Chemical and Industrial Environment Laboratory, Faculty of Agriculture, Lambung Mangkurat University, Banjarbaru.

*Tools*

The tools are gas stove, pot, thermometer, scales, basin, knife, stirrer, measuring cup, measuring spoon, filter, cutting board, ruler, stationery, book. Laboratory equipment used analytical balance, *refractophotometer*, funnel, Erlenmeyer, PH meter, oven, filter paper, beaker glass.

## 3. Results and Discussion

*Temulawak*

*Temulawak* is made by preparing all ingredients. First, the ginger rhizome is peeled and washed along with the *pandan* leaves. Rhizomes, palm sugar and *pandan* leaves are then sliced. *Temulawak* was boiled for 15 minutes, after it filtered sugar and *pandan* leaves are added to get ginger drink products. Picture of *Temulawak* in Figure 1.

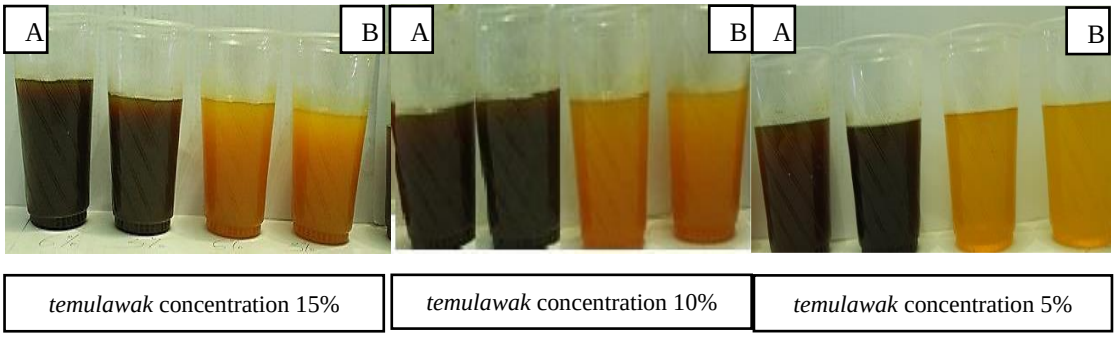


Figure 1. Temulawak

*Analysis of Acidity Degrees*

The degree of acidity is the level of acidity that can affect the durability of a product (Buckle, 1985). Measurement of pH value is one of the parameters to determine the change in the acidity of a product (Winarno & Wirakartakusumah, 1974). Wahyono dkk. (2015) states that acids are molecules that release ions $H^+$ (proton) in solution so that it can reduce pH. The higher the pH level will accelerate the level of damage to the product, while the lower pH will make the product durable. The degree of acidity of pH can be seen in Figure 2

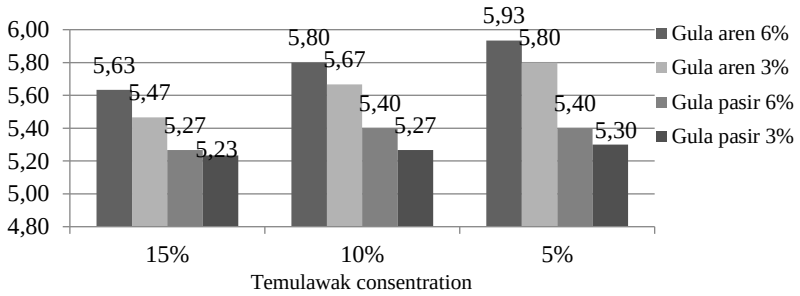


Figure 2. The degree of acidity of *Temulawak*

The results of Anova variance analysis showed that the formulation between the concentration of ginger and sugar had significant effect (α 5%) towards the degree of acidity. Further testing BNT (α 5%) shows that the degree on P4 with the 15% concentration formulation Curcuma extract with sugar 3% produce the lowest pH of 5,23 this treatment was significantly different from P9 with 5% concentration formulations Curcuma extract with 6% palm sugar has a pH value that tends to be higher than 5,91. The high and low pH levels in the two treatments were caused by the *Temulawak* which had been silent, resulting in a fermentation process.

Diantoro dkk. (2015) states that the fermentation process will form lactic acid because it is secreted which accumulates in the media, the longer fermentation process, the total amount of acid accumulated increases and decreases the pH, while the type of sugar will have higher pH level because lactose contained in it is higher, compared to the type of palm sugar. Yuliawaty dan Susanto (2015), states that the longer the fermentation process can reduce pH and glucose levels.

*Sugar Rate Analysis*

Sucrose has an important role in food ingredients, besides as a sweetener, texture forming, flavor forming, as a substrate for microbes in the fermentation process, solvent fillers and also as preservatives (Rifkowaty & Wardanu, 2016). Sugar levels can be seen in Figure 3

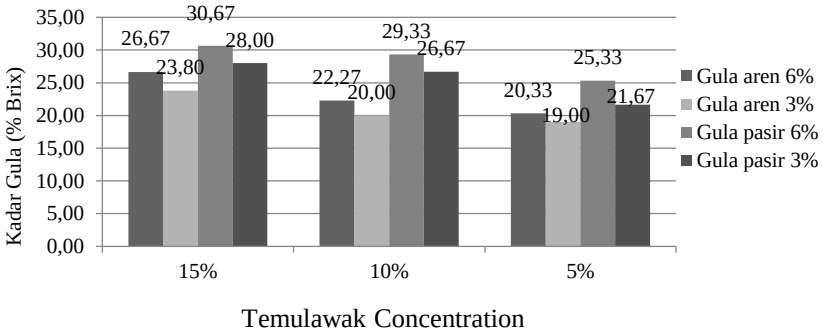


Figure 3. Sugar content of *Temulawak*

The results of analysis of variance (ANOVA) showed that the formulation between the concentration of ginger and sugar had significant effect (α 5%) on sugar levels. Further testing BNT (α 5%) shows that P3 and P4 are not significantly different, this is presumably because the addition of the added sugar concentration is not much different, namely 3 and 6 %. The higher the water content in the material, the better the product granule level, and the sugar content decreases (Rifkowaty & Wardanu, 2016).

*Analysis of Acidity Degrees*

Total dissolved solids show the content of the ingredients dissolved in the solution. Farikha dkk. (2013) states that most changes in total solids in beverages are sugar. Total dissolved solids can be seen in figure 4.

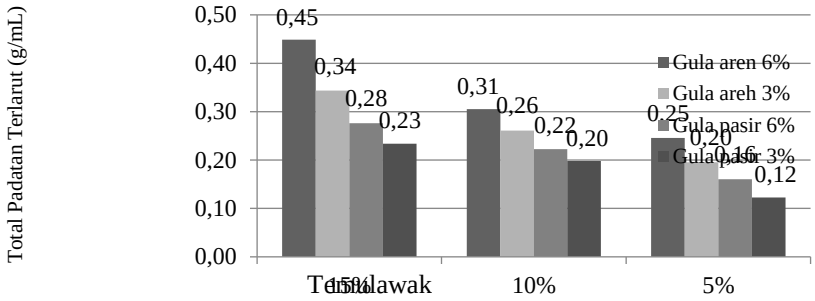


Figure 4. Total Dissolved Solids's Temulawak

The results of analysis of variance (ANOVA) showed that the formulation between the concentration of ginger and sugar had a very significant effect (α 5%) to total dissolved solids. BNT further test (α 5%) showed that total dissolved solids (TPT) in P2 in the concentration formulation 5% Curcuma extract and sugar 3% produces the lowest total dissolved solids of 0,01 g/mL this treatment was significantly different from the concentration ratio 15% Curcuma extract with palm sugar 6% those with total dissolved solids tend to be higher by 0,32 g/mL

Adding the amount of sugar will increase of dissolved solids. The amount of sugar added will affect the total dissolved solids in *Temulawak*, this is presumed because the higher the concentration of sugar added, the more total solids are measured, while the addition of sugar with low concentrations is less measured. Additions to the type of palm sugar have a higher total amount of solids, compared to the addition of granulated sugar, the total amount of measured solids tends to be lower. This is presumably because palm sugar gives more suspended particles than sugar (Farikha dkk., 2013).he degree of acidity is the level of acidity that can affect the durability of a product (Buckle, 1985).

*Organoleptic Test*

Organoleptic is a panelist's assessment of the product. The criteria that will be valued by the panelists are taste, aroma, color, thickness, and color, as for the assessment that can be given by the panelist, namely 1 (strongly dislike), 2 (dislike), 3 (slightly like), 4 (like), 5 (really like). Based on these five criteria, panelists can determine whether or not they like and are interested in or not *Temulawak*.

*Consumer Acceptance*

Consumer acceptance can be done by organoleptic means that is sensory assessment. The assessment was carried out on the attributes in *Temulawak*, namely the concentration of *Temulawak*, the concentration of sugar, the type of sugar, taste, aroma, color, thickness and appearance. Consumer acceptance of *Temulawak* can be seen in Figure 5.

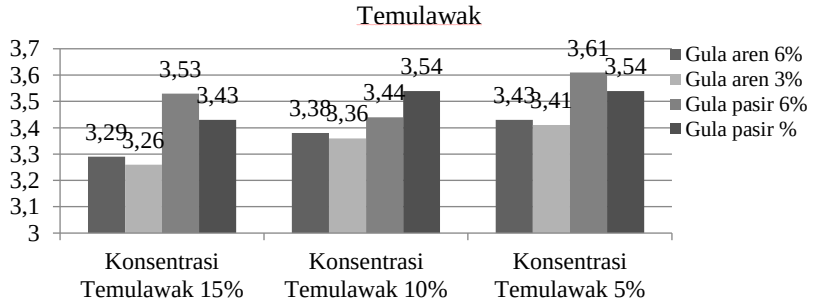


Figure 5. Temulawak

*Analysis of Kruskal Wallis* level of 5% on consumer acceptance in the hedonic test is taste, aroma, color, thickness and appearance. The taste, aroma, and thickness after being analyzed by the Kruskal Wallis test were not significantly different or (p-value < 0,05), while the colors and appearance are significantly different (α 5%). This is presumably because the color of *Temulawak* is following the color of *Temulawak*, so it is preferred, while the appearance is suspected because all the criteria in the beverage have differences in taste, aroma, color, thickness, and appearance.

*Taste of Attribute*

The taste is related to the component of the material that is captured by the sense of taste (tongue). Taste is influenced by several factors including chemical compounds, concentration, temperature, and

interactions with other taste components (Winarno, 1997). The high and low dose of ginger given will affect the taste (Diantoro, 2015). The taste of *Temulawak* is a mixture of curcuma extract, palm sugar, granulated sugar, *pandan* leaves, and tamarind.

*Kruskall wallis* non parametric test with value Asymp. Sig = 0,335 (p-value < 0,05). This means that there is no difference in acceptance of *Temulawak* on taste of attributes, acceptance of taste attributes can be seen in Figure 6.

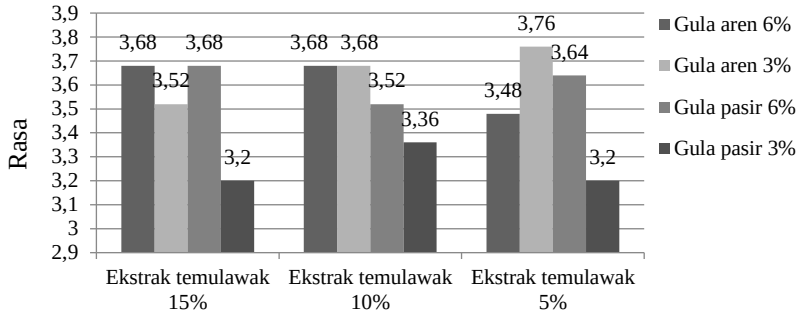


Figure 6. Panelists' passion for the taste of *Temulawak*

*Aroma of Attribute*

The aroma is related to volatile compounds that exist in a material, the more volatile components, the more aromatic and strong aromas produced. Assessment of the aroma of a food cannot be separated from the function of the sensory smell. According to Winarno (1997), the smell that received by the nose and brain is generally a mixture of four main odors, namely fragrant, sour, rancid, and charred.

Kruskal-Wallis results, which is Value *of Asymp. Sig* (0,317) > 0,05, it means there is no difference in *Temulawak* on color attributes, this is because *temulawak* have a value of aroma preference. Acceptance of aroma attributes is seen in Figure 7.

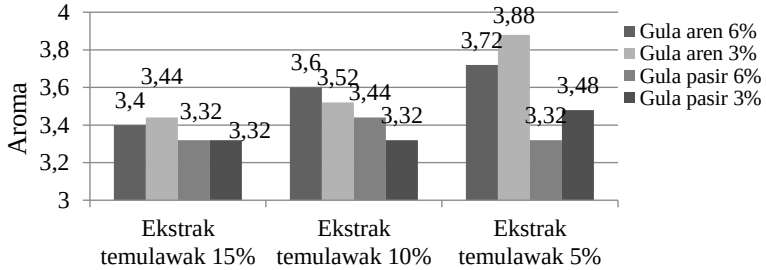


Figure 7. Panelist passions towards the aroma of *Temulawak*

*Color of Attribute*

Subjective assessment with vision is crucial in evaluating a product (Soekarto, 1985). Color is usually more interesting than taste because the color is the fastest and easiest to give the impression of a food product. Color preference is also a criterion that can affect consumer acceptance of the product, besides that color is also the element that was first assessed by consumers before other elements such as taste, texture, aroma and some other physical properties (Soekarto, 1990).

Based on *Kruskal Wallis* test with the value Asymp. Sig = 0,000 (p-value < 0,05) means there is a difference in *temulawak*, this is presumably due to differences in the concentration of ingredients added in temulawak so that the concentration of the color is produced following the color of ginger which is yellow, according to Masuda (1996), the content of *kurkuminoid* (27,19%) owned by the ginger rhizome so that the color that tends to be produced is yellow. Acceptance of color attributes can be seen in Figure 8.

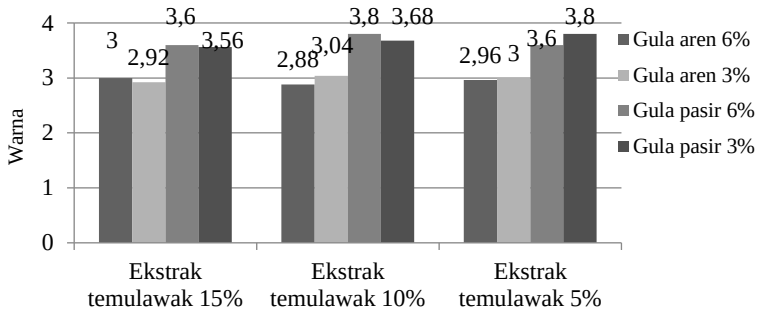


Figure 8. Panelists' preference for *Temulawak's* Color

*Viscosity Attribute*

Viscosity (appearance) is an element of organoleptic properties that are assessed by people in a material through several ways, namely palpable by a finger or a touch, observed by the eye and felt in the mouth (Soewarno, 1985).

Based on Kruskal Wallis test with Asymp. Sig = 0,373 (p-value < 0,05), it means that there is no difference in acceptance of *Temulawak* on viscosity attributes, this is because *temulawak* have a preference for viscosity. Acceptance of color attributes can be seen in figure 9.

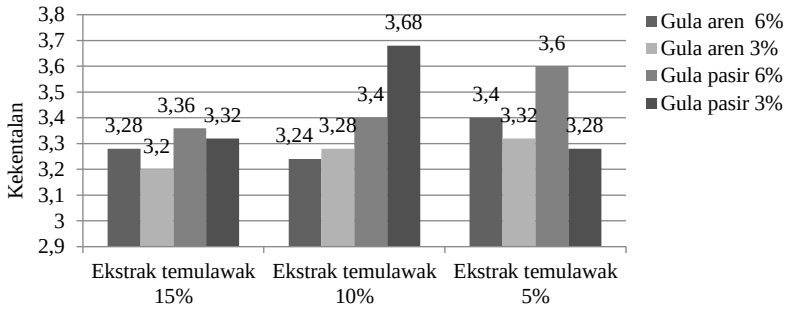


Figure 9. Panelists' preference for *Temulawak's* viscosity

*Appearance Attribute*

An appearance is a form of product image that radiates on a product is a means of communication with other people. Appearance is something that appears and can be seen by the senses (eyes), which is one of the ingredients for consideration whether someone will be interested or not with the product.

Based on *Kruskal Wallis* test with the value Asymp. Sig = 0,001 (p-value) < 0,05. It means that there are differences in the acceptance of *Temulawak* on appearance attributes, this is because T*emulawak* have a preference for appearance ranging.

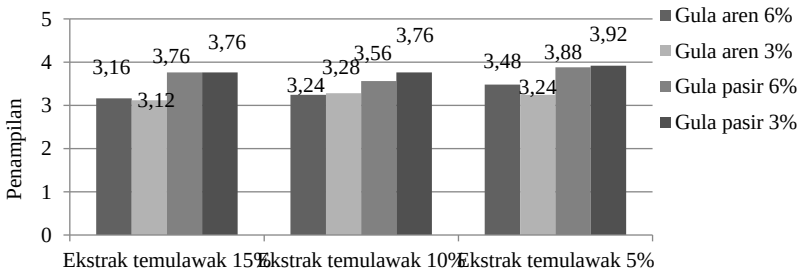


Figure 10. Panelists' preference for *Temulawak's* appearance

*Consumer Acceptance Data*

Consumer acceptance is based on the total value of the average parameter, panelists prefer ginger with concentration 5% and the addition of sugar 6%. At concentration with average sugar content 25 brix, pH 5, and total dissolved solids 2. The chemical test that the higher the sugar content and the lower the pH will provide durability to the durability of beverage products, besides that the higher the concentration of sugar, the lower the total acid according to Hulme (1971), increasing the concentration of *temulawak* will increase the content of organic acids, in addition to the addition of palm sugar which has an organic acid content will increase the total acid in *Temulawak*. The low total dissolved solids will give a positive value to the parameters of color, appearance, thickness, aroma, and taste. High sugar

levels, low pH and total dissolved solids can reduce the taste, aroma, color, viscosity, and appearance of drinks.

The best formula based on chemical testing, consumer acceptance, and HPP shows that panelists prefer *Temulawak* formulations with a ratio of 5% and type of sugar concentration of 6%. Chi-Square Test results show that the product with a ratio of 5% and 6% sugar is significantly different from the control, especially on the good taste on the aroma, color, thickness, and appearance there is no difference. This is presumably because the development product has a different taste compared to the market products on the market (Sani). HPP products are still eligible to be marketed where the price of the product on the market reaches Rp. 3.000,00 per glass, while the price of developing products reaches Rp. 1.215,00. Besides that, with the high buying interest and consumer's acceptance of the product, it gives a positive value to the *Temulawak*, especially in UKM.

## 4. Conclusions

1. *Temulawak* dilution concentrations and types of sugar are very influential on the chemical properties and consumer acceptance of *Temulawak*.
2. Formulation with 5% *Temulawak* concentration and 6% sugar is the best product with the value of consumer acceptance and consumer buying interest.
3. The consumer's acceptance of the aroma flavour from *Temulawak* variant ranges from 3.32 to 3.88.

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