

# Characterizing Instant Powder Drink Mixed of Kersen Leaves (*Muntingia calabura*) and Secang Wood (*Caesalpinia sappan* L.) with Maltodextrin Addition

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**Abstract.** This study aims to determine the effect of the proportion of kersen leaves extract with secang wood and the addition of maltodextrin on the characteristics of instant powder drink and determine the best treatment combination. This study used a completely randomized design (CRD) with 2 factors, namely the proportion of kersen leaves extract and secang wood (75: 25, 50: 50, and 25: 75) and the addition of maltodextrin (5%, 10%, 15%). The data obtained were analyzed statistically using analysis of variance (ANOVA) at a 95% confidence level, if there was a difference between treatments, it was continued with Duncan's test = 5%. The best treatment was obtained at the proportion of kersen leaves and secang wood 25: 75 with the addition of 15% maltodextrin with a water content of 4.24%; ash content 1.17%; Solubility 94.48%; total phenol 126.51 mg TAE/gr sample; antioxidant activity 57.24%; vitamin C 1.87 mg/100 grams; The average sensory evaluation value of color was 4.15 (like), aroma was 3.85 (rather like) and taste was 3.6 (rather like).

**Keyword.** Instant powder drink, Kersen leaves, Secang wood, Maltodextrin.

## 1 Introduction

In modern times, society tends to demand everything that is fast-paced and practical. Likewise, in terms of food, people tend to prefer instant food products. Instant food products are types of food products that are easy to serve or consume in a relatively short time, for example, instant powder drinks that are easy to serve and usually contain compounds that are beneficial for health. One of the plants that has the potential to be used as instant powder drink is kersen leaves (*Muntingia calabura*). The results of phytochemical test research [1], in kersen leaves there are flavonoids, triterpenoids, alkaloids, saponins, and steroids. Flavonoids are active compounds that can be used as antioxidants, antibacterial and anti-inflammatory because they can inhibit the activity of bacteria that cause disease.

Furthermore, it was said that the antioxidant activity in kersen leaves was 49% and the total phenol content was 67 mg TAE/gr. One of the disadvantages of using kersen leaves into instant powder is the presence of a color that is not liked, therefore other materials are needed that can improve the sensory of kersen leaf drinks. One of the materials that can be added is secang wood. The components of bioactive compounds contained in secang wood, namely brazilin, brazilein, 3'-O-methylbrazilin, sappanone, chalcone, sappanalcone and other common components, [2].

Brazilin stands a group of constituent components of the red color in plants. The resulting red color can be used as a natural color. According to [3], secang wood can be used as a natural color because it contains red brazilin which is easily soluble in hot water.

The processing of kersen leaves and secang wood into instant powder is expected to make it easier for people to consume and utilize its properties for endurance. To produce a good instant powder, a filler is required. The usual filling material added is maltodextrin. Maltodextrin is a starch modification product, the result of chemical and enzymatic hydrolysis with DE (dextrose equivalent) less than 20 [4]. The addition of maltodextrin aims to coat the flavor component, increase the volume, speed up the drying process, prevent damage to heat-induced materials and increase the solubility and organoleptic characteristics of instant drinks [5]. This research will study the effect of the proportion of kersen leaves extract and secang wood as well as the addition of maltodextrin on the quality character of the instant powder drink produced.

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## 2 Materials and Methods

### 2.1 Materials

The main materials used in the making of instant powder drink are kersen leaves and secang wood, obtained from traditional markets in Surabaya, maltodextrin obtained from the grocery store in Surabaya. Supporting materials for analysis are Aquadest, HCl, DPPH, Fe Cl<sub>3</sub>, NaOH, etanol 96%, tannic acid, reagen folin ciocalteu (50% v/v), iodium, Na<sub>2</sub>CO<sub>3</sub>, methanol, amylum. The tools used include blender, analytical balance, oven, furnace, vortex, sieve, uv-vis spectrophotometer.

### 2.2 Research Methods

The process of making instant powder drink, begins with making kersen leaves extract, first the kersen leaves are weighed, cleaned, blanched at 80°C for 5 minutes, blended by adding 1:2 water and then filtered. While the secang wood, cleaned, weighed, then soaked in hot water for 5 minutes with a ratio of 1:2 then filtered. The process of making instant powder was the proportion of kersen leaves extract and secang wood extract according to treatment (75:25; 50:50; 25:75) then added maltodextrin (5%; 10%, 15%). The mixture was homogenized and then dried in a cabinet dryer at 60°C for 6 hours. After drying, the product was crushed with a blender and sieved through an 80-mesh sieve. Analysis of the product includes water content [6], ash content [6], total phenol [7], antioxidant activity [8], vitamin C content [6], solubility [9] and sensory evaluation [10].

This study used a Completely Randomized Design (CRD) compiled with factorial pattern, consisting of two factors, where the factor A consists of three levels and factors B consists of three levels. Data obtained from the analysis results using Analysis of Variance (ANOVA) and advanced test using Duncan ( $\alpha = 5\%$ ). Sensory evaluation was carried out by organoleptic test on 25 panelists using the hedonic scale scoring method. The hedonic scale was transformed into a numerical scale according to the panelist's level of preference (1 = really dislike, 2 = dislike, 3 = rather like, 4 = like and 5 = really like). The data obtained were processed using the Friedman test at a significance level of 5%. To determine the best treatment based on all parameters, used effectiveness index [11].

## 3 Equations and Mathematics

### 3.1 Physicochemical Characteristics

Based on the result of statistical analysis, there was a significant interaction ( $p \leq 0.05$ ) between the proportion of kersen leaves extract and secang wood in total phenol and solubility parameters. However, in the parameters of water content, ash content, vitamin C content and antioxidant activity there were no significant interaction, but each factor gave a significant effect ( $p \leq 0.05$ ). Table 1 showed the result of effect proportion of kersen leaves and secang wood and maltodextrin addition in total phenol and solubility parameters of instant powder drink. While in Table 2 showed the average value of moisture content, ash content, vitamin C content and antioxidant activity of instant powder drink affected by each proportion of kersen leaves and secang wood and maltodextrin addition.

**Table 1.** The average value of total phenol and solubility due to the effect of proportion kersen leaves and secang wood and maltodextrin addition

Treatment		Total Phenol (mgTAE/g)	Solubility (%)
Extract of kersen leaves: secang wood	Malto dextrin %		
75 : 25	5	93,25±3,34a	89,81±0,08a
	10	94,67±3,34b	90,31±0,412b
	15	100,15±0,25c	92,05±0,006d
50 : 50	5	101,98±1,67d	91,09±0,102c
	10	104,58±0,67e	92,57±0,342e
	15	106,23±0,33f	93,52±0,020f
25 : 75	5	109,23±0,33h	91,40±0,298c
	10	116,60±1,00g	92,78±0,005e
	15	126,51±0,33i	94,13±0,008g

Description: The average value accompanied by different letters expresses a significant difference ( $p \leq 0.05$ ).

Table 1 shows that the higher the proportion of secang wood extract and the higher the addition of maltodextrin, the higher the total phenol yield and the increasing solubility. This is because extract of secang wood has a high phenol content, which is 166.69 µg/ml CGAE [12]. The phenolic components in secang wood are homoisoflavones and brazilin where both of these components have antioxidant activity abilities. Tannins in sappan wood are very high and are the dominant component in sappan wood polyphenols. So that the

higher the addition of sappan wood filtrate, the higher the total phenol content. The higher addition of maltodextrin causes an increase in the total phenol content. This is because maltodextrin is able to protect the release of nutritional components, protect important compounds due to high temperatures, because maltodextrin has the ability to form a body and has a strong binding capacity to coated compounds [13]. The higher the concentration of maltodextrin, the higher the solubility because maltodextrin has a high solubility and

the presence of drying makes the material have a lower water content so it is easier when dissolved in water.

According to [5] the hydroxyl group contained in maltodextrin will interact with water so that the solubility of the powder will increase. The freer

hydroxyl groups in the filler, the higher the solubility level. That is, the higher the solubility value, the better the quality of the product, because the presentation process will be easier.

**Table 2.** The average value of chemical component due to the effect of proportion kersen leaves extract and secang wood and malto

Treatment		Water content (%)	Ash content (%)	Vit .C content (mg/100g)	Antioxidant activity (%)
Extract of kersen leaves: secang wood					
75 : 25		3,88±0,145c	1,11±0,014a	1,81±0,009a	52,44±0,44a
50 : 50		3,62±0,009b	1,12±0,032a	1,83±0,003b	53,62±0,15b
25 : 75		3,44±0,125a	1,14±0,025a	1,84±0,004c	56,02±2,34c
Maltodextrin (%)					
5		3,96±0,125c	1,09±0,025a	1,80±0,012a	53,20±2,34a
10		3,57±0,010b	1,12±0,012a	1,82±0,006b	54,13±2,05a
15		3,41±0,059a	1,15±0,062a	1,85±0,012c	54,74±1,37b

Description: The average value accompanied by different letters expresses a significant difference ( $p \leq 0.05$ ).

Table 2 shows that the higher the secang wood extract and the higher the addition of maltodextrin resulted in a lower water content, this was due to the fact that maltodextrin contains a lot of hydroxyl groups that easily bind free water, and when heated this bond is easier to evaporate water so that the water content of the product becomes lower. [13]. On the ash content parameter, the proportion of kersen leaves extract and secang wood extracts as well as the addition of maltodextrin did not have a significant effect. The ash content obtained in the product shows results that are in accordance with SNI, which is less than 3 percent. In the parameter of vitamin C content, the greater the proportion of secang wood extract and the more addition of maltodextrin, the higher the vitamin C content. This is due to the high content of vitamin C in the secang wood extract and the ability of encapsulation by maltodextrin to protect components such as vitamin C during the drying process, so that the more maltodextrin added, the less vitamin C is damaged.

The use of maltodextrin in the encapsulation process can bind nutritional elements to the dried material because maltodextrin has a strong bond and a spiral helical structure that helps reduce loss of volatile components during the processing [14]. In the parameter of antioxidant activity, the higher the proportion of sappan wood extract and the higher the addition of maltodextrin, the higher the antioxidant activity. Antioxidant activity increases with increasing levels of total phenol and vitamin C, which are bioactive compounds that act as antioxidants [15].

### 3.2 Sensory Evaluation

Based on the Friedman test, it showed that the treatment of proportion kersen leaves extract and secang wood and maltodextrin addition had a significant effect ( $p \leq 0.05$ ) on the color but had no significant effect ( $p \geq 0.05$ ) on taste and aroma of the instant powder drink product. The results of sensory evaluation can be seen in Table 3. Table 3 shows the high response to the color of the

product with the treatment proportion kersen leaves extract and secang wood 25:75 and 15% maltodextrin addition indicates that the panelists or consumers prefer the instant powder product which is brownish red in color. Low response to the products with the treatment of 75: 25 proportion of kersen leaves extract and secang wood and the addition of 5% maltodextrin because the color of the resulting product tends to be darker green.

According to [13] high maltodextrin concentrations increase color protection in instant powders and can reduce non-enzymatic browning reactions in products. The highest number of rankings on aroma preference is instant powder drinks with the treatment of the proportion of kersen leaves: secang wood extract 25: 75 with the addition of 15% maltodextrin. According to [10], aroma is an indicator that gives the results of an assessment of whether the product is accepted or not.

**Table 3.** The value of the number of rankings on the hedonic scale scoring test

Treatment		Color	Aroma	Taste
Extract of kersen leaves: secang wood	Maltodextrin %			
75 : 25	5	67	91,5	108
	10	95	110	97
	15	66,5	77,5	94
50 : 50	5	108	101	98,5
	10	102	106,5	94
	15	108	92,5	108,5
25 : 75	5	113,5	106	103
	10	110,5	85	101,5
	15	128	130	95,5

The highest number of rankings on taste preferences was found in instant powder drinks with the treatment of the proportion of kersen leaves: secang wood extract 50: 50 with the addition of 15% maltodextrin. Panelists tend to prefer instant powder drinks with a higher maltodextrin

concentration because the addition of maltodextrin can give a little sweet taste to the product [16].

### 3.3 Effectivity Test.

An effectivity test was conducted to determine the best treatment. Based on the results of the effectivity test on all research parameters including the physiochemistry test and sensory evaluation, treatment of 25 : 75 proportion kersen leaves and secang wood extract and 15% maltodextrin addition was the best treatment. It resulted in water content 4.24% ash content 1.17%, solubility 94.13%, vitamin C 1.87 mg/100 g, total phenol 126.51 mg TAE/gr sample, antioxidant activity 57.24%, The average organoleptic value of color was 4.15 (like), aroma was 3.85 ( rather like)and taste was 3.6 (rather like).

## 4 Conclusion

Treatment of proportion kersen leaves extract and secang wood and maltodextrin addition affected the characteristics of the instant powder drink produced. The best treatment was obtained at the proportion kersen leaves and secang wood extract 25: 75 and 15% maltodextrin addition with the value of water content 4.24% ash content 1.17%, solubility 94.13%, vitamin C 1.87 mg/100 g, total phenol 126.51 mg TAE/gr sample, antioxidant activity 57.24%, The average organoleptic value of color was 4.15 (like) ,aroma was 3.85 ( rather like)and taste was 3.6 (rather like).

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