ISSN: 2597-8713 (Online)
ISSN: 2598-5167 (Print)
Agricultural Science

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Journal Of Agricultural Science And Agriculture Engineering
Faculty of Agriculture, Merdeka University Surabaya
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Soya Yoghurt Organoleptic Test With The Addition of Rosella Flower Extract

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Article History: Received: January 01, 2022; Accepted: March 15, 2022

ABSTRACT

The unpleasant aroma of soy juice drinks causes not everyone to like it even though they know that the drink is healthy. Several studies have carried out efforts to overcome this condition, such as adding aromas, flavors, and fermentation. In this study, the effort to eliminate the unpleasant aroma was carried out through the fermentation process of soybean juice into soya yogurt accompanied by the addition of rosella extract. There are six levels of addition of rosella flower extract, namely from R0 (0%), R1 (10%), R2 (15%), R3 (20%), R4 (25%), and R5 (30%), with a fermentation process the same one. An organoleptic test was conducted on 30 selected panelists who like yogurt. The test uses a hedonic scale of 5 responses (very much like, like, quite like, dislike, and do not like). This study found that the addition of rosella flower extract eliminated the unpleasant aroma of soybean juice and the distinctive aroma of yogurt, thereby reducing consumer preference responses. The panelist's highest preference for color was in the R5 treatment. The addition of too much rosella extract concentration will cause the soy yogurt taste to be too sour, so the addition of rosella extract is recommended to be sufficient at 10% - 20%.

Keywords: soya yogurt, rosella flower extract, organoleptic test

1. INTRODUCTION

The nutritional content of soybeans is no longer in doubt. Ramayulis (2021) has stated that 100 g of cooked soybeans can meet 30% of the RDA (nutritional adequacy rate), 9 g of fat, 8 g of carbohydrates, 6 g of fiber, several minerals such as Ca, Fe, Mg, P, Na, Zn and Se, and some vitamins such as Vitamin C, Vitamin B1, B2, B3, B6, folic acid and pantothenic acid. One form of processed soybean is soybean juice. Compared to cow's milk, soy milk has several advantages: lactose-free, lower energy, higher protein, lower Ca and Fe, and higher Zn (USDA, 2019 in Ramayulis, 2021).

However, the high nutritional content of soy juice is inversely proportional to the response to consumption of soy juice in Indonesia. The typical response was influenced by several factors, including the unpleasant taste of soy juice (Suarjana et al., 2019), there are still at least medium and large industries involved in the production process, and the limited public knowledge of the benefits of soy juice (Anonymous, 2019). In Indonesia, only about 19% of ready-to-eat soy juice is produced by medium and large industries, 5% is powdered soybean juice, and 76% of ready-to-eat

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soy juice is produced by MSMEs (Micro, Small and Medium Enterprises). The difference is striking compared to Thailand, the largest consumer of soy juice (12.2 liters per capita per year), where 84% of ready-to-eat soy juice is produced by medium and large industries (Anonymous, 2019). Kilamanca (2008) also added that MSME producers of soy juice need to improve quality, pay attention to food safety attributes, add variations to the taste of soy juice, and provide promotions to increase sales of soy juice.

One of the efforts to reduce the unpleasant aroma is adding flavor and the fermentation process. Through the soybean juice fermentation process, lactic acid bacteria (LAB) will produce lactic acid compounds, acetaldehyde, diacetyl, acetic acid, and other volatile substances that produce new flavors, reduce unpleasant aromas and improve texture (Marshal and Arenas, 2003; Surono). 2004). Types of carbohydrates in soybeans are oligosaccharides that are less than optimal in fermenting lactic acid, and it is necessary to add milk to produce good quality soy yogurt. Handayani and Wulandari (2016) concluded that the type of milk added affects the characteristics of yogurt, where the addition of full cream milk results in a panelist's preference for aroma, color, taste, and viscosity better than skim milk and sweetened condensed milk.

Efforts to reduce unpleasant odors through the addition of flavorings have been carried out by several previous researchers such as Purwanto et al. (2018) through the addition of date juice, Nurrochmah (2019) through the addition of brown sugar, and Handayani and Wulandari (2016) through the addition of milk. The addition of date juice and brown sugar produces a brown soy yogurt color. With the addition of date juice, an increase in the concentration of date juice resulted in a decrease in the preference response to the color and taste of soy yogurt, resulting in an inhomogeneous consistency and producing a more unpleasant aroma (Purwanto et al., 2018). Meanwhile, Handayani and Wulandari (2016) concluded that the addition of milk could significantly reduce the unpleasant smell. It encourages using other natural ingredients with a fresh scent and produces pretty attractive colors to consumers.

The reason for choosing rosella (Hibiscus sabdariffa L.) to reduce aroma, among others, is that this plant contains essential oils with a fresh citrus aroma that contains antioxidants. Thus, it can neutralize free radicals, is anti-bacterial, antifungal, antiseptic, anti-cancer, anti-inflammatory, stimulates peristalsis intestines, reduce heat, viscosity, and blood pressure (Mahadevan et al., 2009; Wardani, 2012; Zofania et al., 2020).

2. RESEARCH METHODS

This research was conducted at the Integrated Food Laboratory of Agroindustry Study Program, Faculty of Vocational Studies, University of 17 August 1945, Surabaya. The implementation is carried out in 2 stages: preliminary experiments and primary research starting

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in April - June 2021. The materials used are water, soybean seeds, cow's milk, skim milk, granulated sugar, lactic acid bacteria culture, and dried rosella flowers. The equipment used is a basin, blender, filter cloth, pan, stirrer, stove, and scales.

This study is a descriptive study with one factor, namely the addition of rosella flower extract, which consists of six levels, namely R0 (Rosella Extract 0%), R1 (Rosella Extract 10%), R2 (Rosella Extract 15%), R3 (Rosella Extract 20%), R4 (25% Rosella Extract), and R5 (30% Rosella Extract). The process of making soybean juice, rosella extract, and soy yogurt is presented in Figure 1.

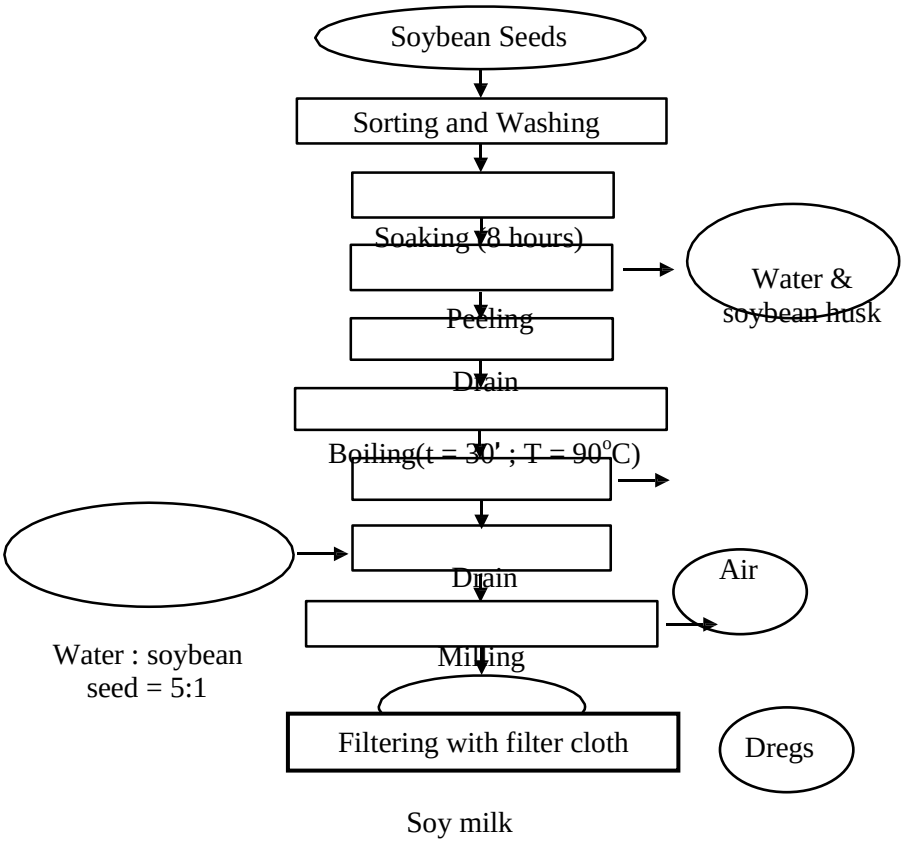

Figure 1. Flowchart of the Soy Milk Making Process

The yogurt starter used was *Streptococcus thermophillus*, *Lactobacillus bulgaricus*, and *Lactobacillus acidophilus* with a ratio of 1:1:1. Soy juice processed for yogurt is 3 liters, so it takes 150 ml of starter with 50 ml each for *Streptococcus thermophillus*, *Lactobacillus bulgaricus*, and *Lactobacillus acidophilus*. Starter mixing is carried out on pasteurized soybean juice at 40-45°C, then stored in an airtight container. Soya yogurt is fermented for 12 hours at room temperature, and the rosella extract was added into soy yogurt by mixing the rosella extract according to the soy yogurt treatment. Then stored in a secure place and stored in the

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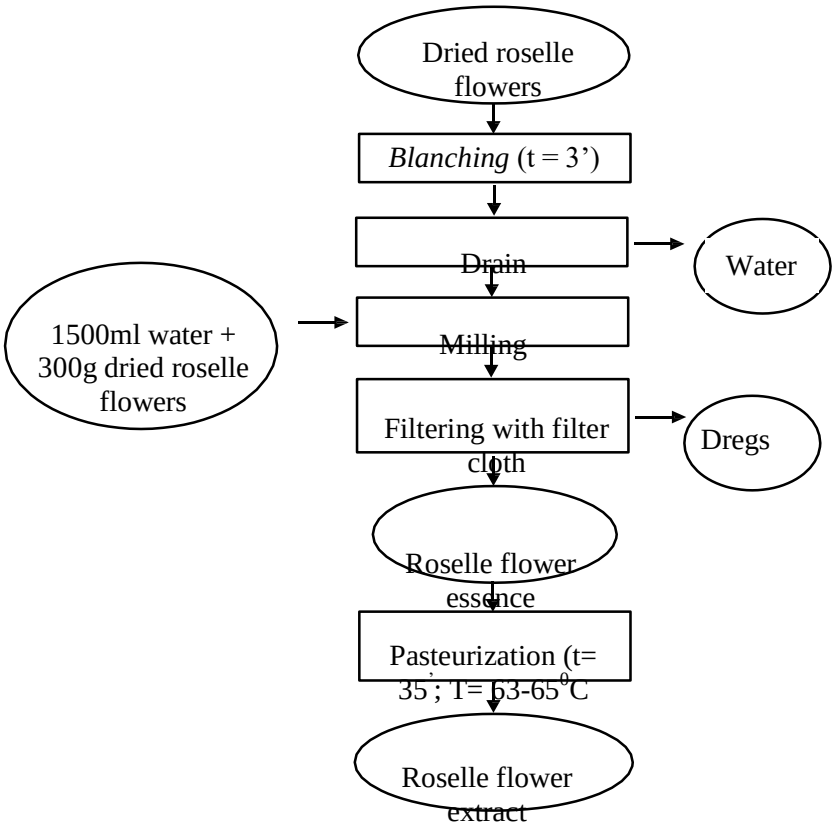
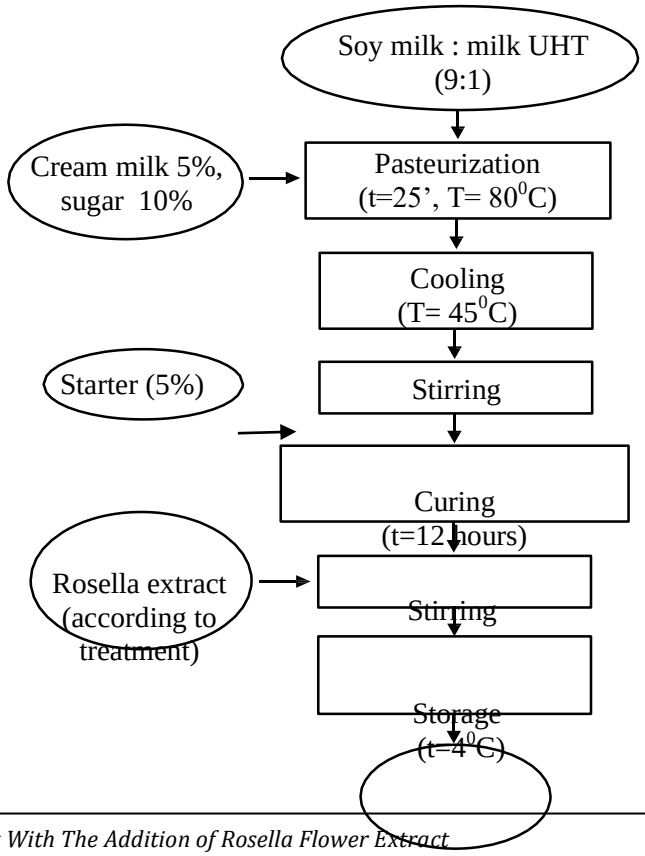


Figure 2. Flowchart of the Process of Making Rosella Flower Extract



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Soya Yoghurt
Rosella

Figure 3. Flowchart of Making Soya Yoghurt Rosella Flowers

The panelist's preference response was measured through hedonic tests on color, aroma, taste, and texture. The hedonic test consists of five scales: very much like = 5, like = 4, quite like = 3, dislike = 2, and really don't like = 1. The number of panelists is 30 people who first screened about the introduction and liking of yogurt. The Friedman test was carried out, followed by the Wilcoxon test at a 95% confidence level to determine the difference in the preference responses of the panelists,

3. RESULTS AND DISCUSSION

Color

Color is the first factor considered in assessing the good or bad of a product (Mahfud, 2015). Soya yogurt has a yellowish-white color, while the rosella extract is dark red. The addition of rosella extract to soy yogurt causes the color change of soy yogurt to become reddish. The preference test results for soy yogurt can be seen in Table 1.

Table 1. Percentage of Panelist's Favorite Response to Soya Yoghurt Rosella Color

Color score	R0	R1	R2	R3	R4	R5
1	0	6,67	0	0	0	0
2	10	46,67	30	6,67	0	0
3	16,67	36,67	33,33	23,33	23,33	13,33
4	56,67	10	23,33	56,67	56,67	43,33
5	16,67	0	13,33	13,33	20	43,33

Table 1. shows that the R5 treatment responded to panelists' higher preference than the other treatments and produced a bright red color (Figure 4.). The paler red dye was made as the added rosella extract was lower. It is because rosella flowers contain anthocyanin compounds that play a role in producing natural red pigments (Kustyawati and Ramli, 2008).

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Figure 4. Soya Yogurt Color at Various Concentrations of Rosella

After statistical tests were performed, the panelists' response to the control treatment (without the addition of rosella extract) was not significantly different from the addition of 15%, 20%, 25%, and 30% rosella extract (Table 2.). The panelists liked the pink to bright red color formed and did not like the pale red color in the R1 and R2 treatments.

Table 2. The Average Response of Panelists' Likes to the Color of Soya Yogurt Rosella

Treatment	Average
R0	3,8 ± 0,87 ab
R1	2,5 ± 0,78 c
R2	3,2 ± 1,03 bc
R3	3,8 ± 0,78 ab
R4	4,0 ± 0,67 ab
R5	4,3 ± 0,70 a

Aroma

Aroma is a response to volatile compounds in food that enter the nose, which will then be responded to by the olfactory system. The aroma can determine the delicacy of the product (Winarno, 1997). Each panelist's olfactory ability is different. The results of the preference test for soy yogurt can be seen in Table 3 below:

Table 3. Percentage of Panelist's Liked Response to the Aroma of Soya Yogurt Rosella

Aroma score	R0	R1	R2	R3	R4	R5
1	0	0	0	0	0	10
2	6,67	6,67	13,33	13,33	26,67	40
3	20	43,33	60	60	40	20
4	50	43,33	20	23,33	30	30
5	23,33	6,67	6,67	3,33	3,33	0

Based on the data in Table 3, soya yogurt without the addition of rosella extract (R0) is the most preferred treatment by the panelists with a percentage of 50%. In addition, 23.33% of the panelists liked it very much because the aroma produced was typical of yogurt in this treatment, and there was no longer the unpleasant smell of soybeans. It is because soy milk is substituted for

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cow's milk by 10%, and the addition of 5% skim milk can eliminate the unpleasant aroma. The same thing is in accord with research conducted by Ramadhan (2016).

Although treatment R1 had a lower preference response percentage than R0, these two treatments statistically had a preference response that was not significantly different (Table 4). The reduction in the preferred response of the panelists will decrease with the higher concentration of Rosella added due to the loss of the distinctive aroma of yogurt. According to Mahdevan et al. (2009) and Diniyah et al. (2011), rosella flower petals have a refreshing citrus aroma because they contain several acidic components. As a result, the higher the addition of rosella extract, it will reduce the distinctive aroma of yogurt and give rise to a fresh citrus aroma.

Table 4. The Average Response of Panelists' Preferences to the Aroma of Soya Yogurt Rosella

Treatment	Average
R0	3,9 ± 0,84 a
R1	3,5 ± 0,73 a
R2	3,2 ± 0,76 b
R3	3,2 ± 0,70 b
R4	3,1 ± 0,84 b
R5	2,7 ± 1,02 b

Taste

The sharpness of rosella flower taste is an aspect of *organoleptic* testing. The fresh sour taste of rosella flowers comes from citric acid compounds, while soya yogurt produces lactic acid after fermentation (Prasetyani, 2018). Table 5 shows that preference for soy yogurt in treatments R0 to R3 is relatively the same, which is around 46.67 - 50%, while in treatment R4 and R5 there is a sharp decrease in the preferred response of the panelists.

Tabel 5. Percentage of Panelist's Preferred Response to the Taste of Soya Yogurt Rosella

Taste score	R0	R1	R2	R3	R4	R5
1	0	3,33	0	0	0	16,67
2	13,33	6,67	10	16,67	3	40,00
3	6,67	36,67	36,67	33,33	4	30,00
4	5	46,67	50	46,67	3	13,33
5	3	6,67	3,33	3,33	0	0,00

The statistical analysis results showed that the response to preference for the taste of soy yogurt rosella treatment R0 was not significantly different from treatment R1 but significantly different from treatment R4 and R5 (Table 6.). Soya yogurt tastes a bit sour, so the addition of rosella extract up to a concentration of 15% (R3) produces a fresh sour taste which the panelists still favor. However, if the addition concentration is too high, it will make it more acidic, thereby reducing the preference response of the panelists. This sour taste has several components in rosella,

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including ascorbic acid, maleic acid, hibiscus acid, oxalic acid, tartaric acid, and glycolic acid. The dominant acid compounds in roselle are citric acid and malic acid by 13% (Maryani and Kristiana, 2008).

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Table 6. Average Response of Panelists' Preferences to Soya Yogurt Rosella Flavor

Treatment	Average
R0	4,0 ± 0,96 a
R1	3,5 ± 0,86 ab
R2	3,5 ± 0,73 b
R3	3,4 ± 0,81 bc
R4	3,0 ± 0,79 c
R5	2,4 ± 0,93 d

Texture

Oral viscosity is an assessment of the thickness response felt in the mouth. Yogurt viscosity describes the property of a liquid that has resistance to a flow which can provide increased strength to withstand relative motion (Manab, 2008). The panelists' preference response to the highest rosella soy yogurt texture was obtained in treatment R1 and decreased with increasing concentration of added rosella extract (Table 7)

Tabel 7. Percentage of Panelist's Preferences Response to Soya Yogurt Texture

Texture score	R0	R1	R2	R3	R4	R5
1	0	0	0	0	0	0
2	0	3,33	3,33	0	0	10
3	56,67	20	46,67	43,33	46,67	43,33
4	33,33	53,33	50	56,67	50	40
5	10	23,33	0	0	3,33	6,67

The statistical analysis results in Table 8 show that the texture of soy yogurt R0 was not significantly different from R1 but significantly different from the treatment R3 to R5. The increase in the concentration of rosella extract resulted in a thicker soy yogurt, so the panelists did not like it. According to Manab (2008) and Sunarlimi et al. (2010), the increase in texture viscosity or milk viscosity is influenced by the pH value after the fermentation process. The lower the pH value, the more coagulated milk protein will be. The study results by Mattila-Sandholm and Saarela (2000) showed that the pH value of yogurt ranged from 4.3 - 4.5 with a total final LAB of 109cfu/g, while the pH value of rosella extract was 3.87 - 4.32 (Mardiah et al., 2009). The increased concentration of rosella extract added will decrease the pH value. The pH value lower than the isoelectric point (4.4 - 4.5) can cause clumping of milk protein so that it is hydrophilic, which causes the viscosity to increase (Djaafar and Rahayu, 2006, Sunarlimi et al., 2010).

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Table 8. The Average Response of Panelists' Preferences to Soya Yogurt Rosella Texture

Treatment	Average
R0	3,5 ± 0,68 b
R1	4,0 ± 0,76 a
R2	3,6 ± 0,57 a
R3	3,6 ± 0,50 b
R4	3,5 ± 0,57 b
R5	3,4 ± 0,77 b

In this study, the addition of rosella extract above 15% resulted in a softer but thicker soy yogurt texture. It is due to a decrease in the pH value. The addition of rosella extract, which has a higher concentration, causes stirred yogurt to turn into a yogurt set so that the panelists do not like it.

4. CONCLUSION

The addition of rosella flower extract has eliminated the unpleasant aroma of soybean juice and the distinctive smell of yogurt, thereby reducing the consumer's preference response. The panelist's highest preference for color was in the R5 treatment. Adding a rosella extract concentration that is too large causes a sour taste of soy yogurt, so it is advisable to add only 10-15% rosella extract.

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